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Sexual Dimorphism in the Expression of Cytochrome P450 Enzymes in Rat Heart, Liver, Kidney, Lung, Brain, and Small Intestine[S]

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ABSTRACT

Cytochrome P450 (P450) enzymes are monooxygenases that are expressed hepatically and extrahepatically and play an essential role in xenobiotic metabolism. Substantial scientific evidence indicates sex-specific differences between males and females in disease patterns and drug responses, which could be attributed, even partly, to differences in the expression and/or activity levels of P450 enzymes in different organs. In this study, we compared the mRNA and protein expression of P450 enzymes in different organs of male and female Sprague-Dawley rats by real-time polymerase chain reaction and western blot techniques. We found significant sex- and organ-specific differences in several enzymes. Hepatic *Cyp2c11*, *Cyp2c13*, and *Cyp4a2* showed male-specific expression, whereas *Cyp2c12* showed female-specific expression. *Cyp2e1* and *Cyp4f* enzymes demonstrated higher expression in the female heart and kidneys compared with males; however, they showed no significant sexual dimorphism in the liver. Male rats showed higher hepatic and renal *Cyp1b1* levels. All assessed enzymes were found in the liver, but some were not expressed in other organs. At the protein expression level, CYP1A2, CYP3A, and CYP4A1 demonstrated higher expression levels in the females in several organs, including the liver. Elucidating sex-specific differences in P450 enzyme levels could help better understand differences in disease pathogeneses and drug responses between males and females and thus improve treatment strategies.

SIGNIFICANCE STATEMENT

This study characterized the differences in the mRNA and protein expression levels of different cytochrome P450 (P450) enzymes between male and female rats in the heart, liver, lung, kidney, brain, and small intestine. It demonstrated unique sex-specific differences in the different organs. This study is considered a big step towards elucidating sex-specific differences in P450 enzyme levels, which is largely important for achieving a better understanding of the differences between males and females in the disease's processes and treatment outcomes.

Introduction

Cytochrome P450 (P450) is a superfamilyof membrane-bound hydrophobic heme enzymes that play a pivotal role in health, homeostasis, and metabolism. P450 enzymes are expressed in almost all biologic systems (El-Sherbeni and El-Kadi, 2017). They are so called because their heme pigment absorbs light at a wavelength of 450 nm following reduction and exposure to carbon monoxide (Lynch and Price, 2007). The discovery of P450 enzymes started in the early 1950s and continued until the 1960s (El-Sherbeni and El-Kadi, 2017). P450 enzymes are classified into families, subfamilies, and individual enzymes based on the structural homology of their amino acid sequences (Nebert et al., 1987; Elbekai and El-Kadi, 2006). Microsomal P450s, which are attached to the endoplasmic reticulum membrane, comprise the majority of human P450 enzymes and catalyze a wide array of biologic reactions (El-Sherbeni and El-Kadi, 2017).

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P450 enzymes are mainly expressed in the liver, but they are also found in several extrahepatic tissues, including the heart (Elbekai and El-Kadi, 2006), kidney (Fan et al., 2015), lungs (Hukkanen et al., 2002), brain (Dutheil et al., 2008), and other tissues (Zhu and Zhang, 2012; Alonso et al., 2015; Ibrahim et al., 2020). The induction or inhibition of P450 enzymes by xenobiotics or disease states is a major mechanism underlying drug-drug and drug-disease interactions. Moreover, genetic polymorphisms in P450 genes could lead to differences in P450 enzymes that might explain individual and ethnic variations in disease pathogeneses and drug responses (Manikandan and Nagini, 2018). Given their significant biologic effects, P450 enzymes have been the focus of many clinical, experimental, and drug development studies.

P450 enzymes play an essential role in the detoxification and activation of both xenobiotics and endogenous molecules. In humans, there are 18 P450 families with more than 50 individual P450 isoenzymes, nine of which are involved in the metabolism of several drugs (CYP1A2, CYP2C9, CYP2C19, CYP2D6, CYP3A4, and CYP3A5) (Wilkinson, 2005). In addition to their essential role in xenobiotic metabolism, P450 enzymes are also largely involved in the synthesis and metabolism of endogenous molecules such as steroids and prostaglandins. For example, P450s metabolize polyunsaturated fatty acids like arachidonic acid (AA) by the insertion of either an epoxide or hydroxyl group, based on which they can be classified into P450 epoxygenases or hydroxylases, respectively. AA metabolism by P450 enzymes to give multiple epoxy and

ABBREVIATIONS: AA, arachidonic acid; GAPDH, glyceraldehyde-3-phosphate dehydrogenase; GH, growth hormone; P450, cytochrome P450; PCR, polymerase chain reaction; SD, Sprague-Dawley.

TABLE 1

Rat cytochrome P450 enzymes and their human orthologs

Rat gene	Human Ortholog
Cyp1a1	*CYP1A1*
Cyp1a2	*CYP1A2*
Cyp1b1	*CYP1B1*
Cyp2a1	—
Cyp2b1	*CYP2B6*
Cyp2b2	—
Cyp2c6	*CYP2C19*
Cyp2c11	*CYP2C9*
Cyp2c12	—
Cyp2c13	—
Cyp2c23	—
Cyp2d2	—
Cyp2d3	*CYP2D6*
Cyp2d4	—
Cyp2e1	*CYP2E1*
Cyp2j3	—
Cyp2j4	*CYP2J2*
Cyp2j10	—
Cyp3a1	*CYP3A5*
Cyp3a2	-
Cyp3a9	*CYP3A7*
Cyp3a18	—
Cyp3a23	*CYP3A5*
Cyp4a1	*CYP4A11*
Cyp4a2	—
Cyp4a3	—
Cyp4a8	—
Cyp4f1	*CYP4F12*
Cyp4f4	*CYP4F8*
Cyp4f5	—
Cyp4f6	*CYP4F3*

hydroxy metabolites has been extensively studied in health and diseases, particularly in the cardiovascular system (Elbekai and El-Kadi, 2006; Shoieb et al., 2019; Gerges and El-Kadi, 2022).

To date, a large body of evidence points out to significant differences between males and females in the pathogenesis and outcomes of different diseases, as well as in drug metabolism and responses (Dahan et al., 2008; Waxman and Holloway, 2009; Ngo et al., 2014; Regitz-Zagrosek and Kararigas, 2017; Holingue et al., 2020; Tramunt et al., 2020; Madla et al., 2021; Gerges and El-Kadi, 2022). Moreover, it was established previously that there are significant sex differences in the expression or activity of several drug-metabolizing enzymes in animals and humans and that this could be responsible for differences in clinical drug effects between men and women (Waxman and Holloway, 2009). For example, multiple studies have shown higher mRNA and protein expression levels of hepatic CYP3A4 in women than in men, which could explain the higher clearance rates of CYP3A4 substrates in women (Tanaka, 1999; Greenblatt and Von Moltke, 2008; Waxman and Holloway, 2009). On the other hand, some CYP1A2, CYP2E1, and CYP2D6 substrates were found to have higher clearance rates in men than in women (Franconi et al., 2007; Schwartz, 2007). Cardiovascular diseases are among the diseases that demonstrate significant sex-specific discrepancies, which could be mediated, even in part, by different expression or activity levels of cardiac P450 enzymes and their metabolites (Gerges and El-Kadi, 2022).

Elucidating sex differences in the expression levels of P450 enzymes in different organs could help explain observed sex differences in diseases and drug effects, decrease the incidence of adverse effects and improve the efficacy of different medications, and approach precision medicine. Thus, the current study is one of a series of studies aiming at investigating sex-specific differences in the expression and activity levels of different P450s, as well as the levels of their metabolites. The aim of the current study was to compare the mRNA and protein expression levels of different P450 enzymes in the heart, liver, lung, kidney, brain, and small intestine between male and female rats.

TABLE 2

Rat primer sequences

Gene	Forward Primer	Reverse Primer
Cyp1a1	CCAAACGAGTTCCGGCCT	TGCCCAAACCAAAGAGAATGA
Cyp1a2	CGCCCAGAGCGGTTTCTTA	TCCCAAGCCGAAGAGCATC
Cyp1b1	GCTTTACTGTGCAAGGGAGACA	GGAAGGAGGATTCAAGTCAGGA
Cyp2a1	CACAGGGCAGCTCTATGACA	CAGACCCAGCAAAGAAGAGG
Cyp2b1	AACCCTTGATGACCGCAGTAAA	TGTGGTACTCCAATAGGGACAAGATC
Cyp2b2	CCATCCCTTGATGATCGTACCA	AATTGGGGCAAGATCTGCAAA
Cyp2c6	CCTGCTGAAGTGTCCAGAGG	CCCATCTAAAAAGTGGCCAG
Cyp2c11	CACCAGCTATCAGTGGATTTGG	GTCTGCCCTTTGCACAGGAA
Cyp2c12	TATAAACTCAATACGTTCTGAG	TTTTACATTAACTTCAGAAACTG
Cyp2c13	CTGGCAATCATGGTGACTGA	GAAACTCCTTGCTGTCATGC
Cyp2c23	GATGCTGTCTTCCGTCATGC	GTAATAGGCTTGATGTCAAG
Cyp2d2	CTACTGCCCATCTATAATCA	CCAAAGCTCTCCTTCAATGT
Cyp2d3	ACCAATGCTGTCATCCATGAGGT	GCTGGACTAGAATTTCTTTCCTT
Cyp2d4	GACCAGTCGGGCTTTGGACCAC	CGAAGGCCTTCTTTCCAGAG
Cyp2e1	AAAGCGTGTGTGTGTTGGAGAA	AGAGACTTCAGGTTAAAATGCTGCA
Cyp2j3	CATTGAGCTCACAAGTGGCTTT	CAATTCCTAGGCTGTGATGTCG
Cyp2j4	GCTCGGACCTTCATTCCACA	GATCGTGGCTACCAGAGAGC
Cyp2j10	TTGAACTTAGCAGAGGGGCTG	TCATACTCAAAGCGCTCCCC
Cyp3a1	GGAAATTCGATGTGGAGTGC	AGGTTTGCCTTTCTCTTGCC
Cyp3a2	GCTCTTGATGCATGGTTAAAGATTTG	ATCACAGACCTTGCCAACTCCTT
Cyp3a9	GGACGATTCTTGCTTACAGG	ATGCTGGTGGGCTTGCCTTC
Cyp3a18	CAACTACGGTGATGGCATGT	CACTCGGTTCTTCTGGTTTG
Cyp3a23	ATGTTCCCTGTCATCGAACAGTATG	TTCACAGGGACAGGTTTGCCT
Cyp4a1	TTGAGCTACTGCCAGATCCCAC	CCCATTTTTGGACTTCAGCACA
Cyp4a2	CTCGCCATAGCCATGCTTATC	CCTTCAGCTCATTCATGGCAATT
Cyp4a3	CTCGCCATAGCCATGCTTATC	CCTTCAGCTCATTCATGGCAATC
Cyp4a8	TGTGGTATCATGAGTGGCTCG	CTTCAGCACGCAGGTCCTTA
Cyp4f1	CCCCCAAGGCTTTTTGATG	GAGCGCAACGGCAGCT
Cyp4f4	CAGGTCTGAAGCAGGTAACTAAGC	CCGTCAGGGTGGCACAGAGT
Cyp4f5	AGGATGCCGTGGCTAACTG	GGCTCCAAGCAGCAGAAGA
Cyp4f6	TCACTTGACCTTGATGAAGAACAAC	AAGAGAGGTGGATATCACGGAAG
B-actin	CCAGATCATGTTTGAGACCTTCAA	GTGGTACGACCAGAGGCATACA
Gapdh	CAAGGTCATCCATGACAACTTTG	GGGCCATCCACAGTCTTCTG

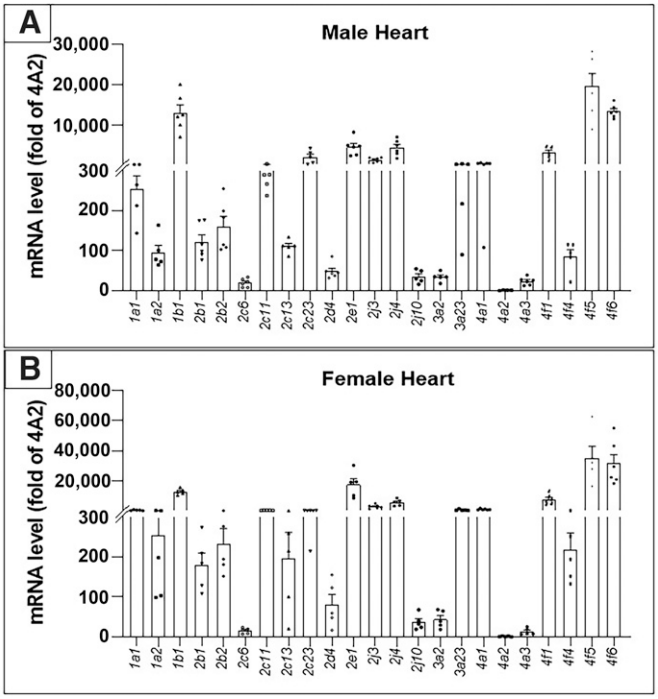

Fig. 1. The mRNA expression of different P450 enzymes in male (A) and female (B) rat heart relative to the least expressed. The mRNA expression of P450 enzymes was determined in the heart of adult male and female Sprague-Dawley rats by real-time PCR and normalized to β-actin housekeeping gene. Results are presented as mean plus or minus S.E.M, n = 4–6.

Material and Methods

Nomenclature. The nomenclature used throughout the manuscript is following the Guidelines for Formatting Gene and Protein Names, released in 2014. Briefly, enzyme symbols were written in sentence case and italicized when referring to genes or mRNA of mice or rats and were capitalized and nonitalicized when referring to the proteins (https://www.biosciencewriters.com/Guidelines-for-Formatting-Gene-and-Protein-Names.aspx).

Animals. Adult (8 weeks old) male (260–280 g, n = 6) and female (200–220g, n = 6) Sprague-Dawley (SD) rats were purchased from Charles River Canada (Montreal, QC, Canada). All animals were allowed access to food and water ad libitum throughout the experiment period and were maintained on a 12-hour light/dark cycle. Rats were kept in the animal facility for an acclimatization period of 1 week, after which they were euthanized under isoflurane anesthesia. The liver, heart, lung, kidney, brain, and small intestine (20 cm extending from the stomach distally) were isolated and immediately frozen in liquid nitrogen and then stored at −80°C. All procedures involving experimental animals were performed in accordance with the Guide for the Care and Use of Laboratory Animals as adopted and promulgated by the US National Institutes of Health and were approved by Alberta Health Sciences Animal Policy and Welfare Committee.

Chemicals. The TRIzol reagent used for mRNA extraction was Invitrogen brand (Thermo Fisher Scientific, Carlsbad, CA). High Capacity cDNA Reverse Transcription Kit and SYBR Green PCR Master Mix were purchased from Applied Biosystems (Foster City, CA). Real-time polymerase chain reaction (PCR) primers were formulated by and purchased from Integrated DNA Technologies (Coralville, IA). Trans-Blot Turbo RTA Transfer Kit and 2X Laemmli Sample Buffer were purchased from Bio-Rad Laboratories (Hercules, CA). CYP1A2, CYP3A, and CYP4A1 mouse monoclonal primary antibodies were purchased from Santa Cruz Biotechnology (Dallas, TX); CYP2C23, CYP2E1, and CY4F2 rabbit polyclonal primary antibodies were purchased from Abcam (Cambridge, UK); and CYP2J rabbit polyclonal primary antibody was purchased from MilliporeSigma (St. Louis, MO). Chemiluminescence western blotting detection reagents (enhanced chemiluminescence) were obtained from Cytiva (Marlborough, MA). All other chemicals used were obtained from Sigma Aldrich (St. Louis, MO).

RNA Extraction and cDNA Synthesis. RNA extraction and cDNA synthesis were performed according to the method described by Elshenawy and El-Kadi (2015).

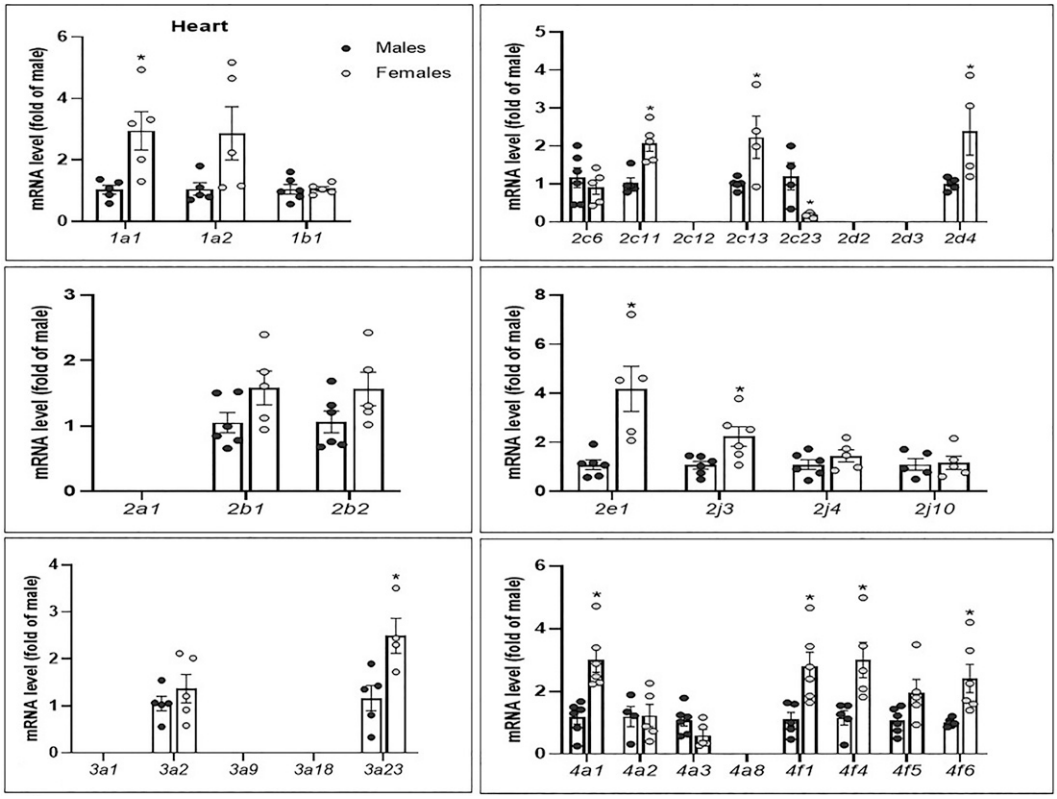

Fig. 2. Sex-specific differences in the mRNA expression levels of P450 enzymes in the rat heart. The mRNA expression of P450 enzymes was determined in the heart of adult male and female Sprague-Dawley rats by real-time PCR and normalized to β-actin housekeeping gene. Results are presented as mean plus or minus S.E.M., n = 4–6. Data were analyzed using an unpaired student t test. *P < 0.05, significant difference from male rats.

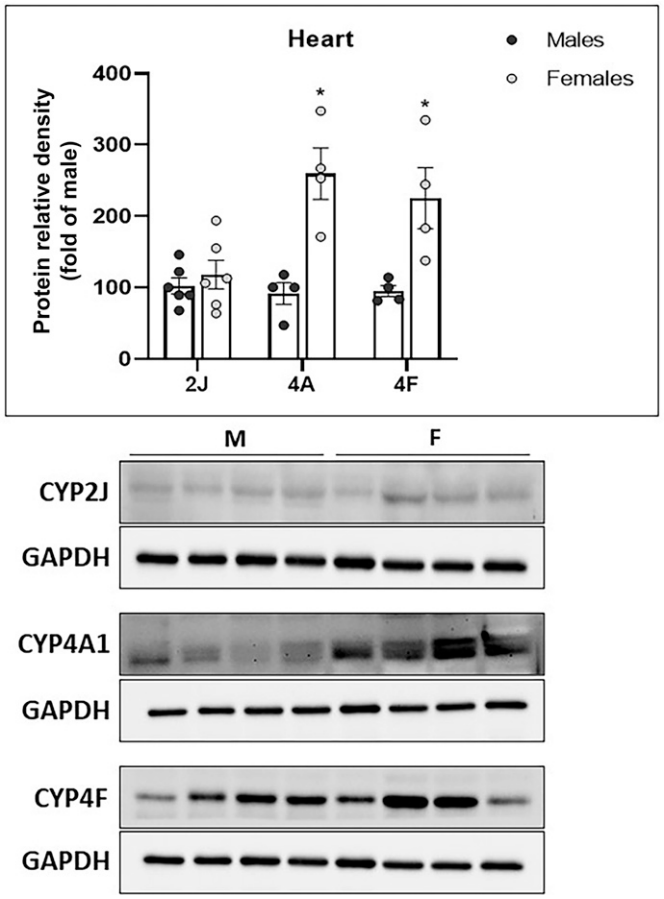

Fig. 3. Sex-specific differences in the protein expression levels of some P450 enzymes in the rat heart. The protein expression of P450 enzymes was determined in the heart of adult male and female Sprague-Dawley rats by western blot and normalized to glyceraldehyde-3-phosphate dehydrogenase (GAPDH) housekeeping protein. Results are presented as mean plus or minus S.E.M., $n = 4–6$. Data were analyzed using an unpaired student t test. $^*P < 0.05$, significant difference from male rats.

Quantification of mRNA Expression by Real-Time PCR. The resulting cDNA was subject to PCR amplification using 384-well optical reaction plates in the QuantStudio 5 (Applied Biosystems). The 20 μL reaction mix contained 0.04 μL of 10 μM forward primers and 0.04 μL of 10 μM reverse primers (20 nM final concentration of each primer), 10 μL SYBR Green Universal Master Mix, 8.92 μL of nuclease-free water, and 1 μL cDNA sample. Thermocycling conditions were as described in previous reports (Shoieb et al., 2022). The rat P450 enzymes and their human orthologs are listed in Table 1. Rat primer sequences used in this study are listed in Table 2. Analysis of the real-time PCR data were performed using the relative gene expression (ΔΔCT) method (Livak and Schmittgen, 2001). In short, the fold change in the level of target genes between female and male rats, corrected for the level of the housekeeping gene, was determined using the following equation: Fold change $= 2^{-\Delta(\Delta Ct)}$, where ΔCt = Ct(target gene) − Ct(housekeeping gene) and $\Delta(\Delta Ct) = \Delta Ct$(females) – mean ΔCt(males). For the comparison of all genes' expression within the same organ, fold change was calculated relative to the least expressed gene.

Preparation of Microsomal Protein. Microsomal fractions were prepared by differential centrifugation of the homogenized organs. Briefly, a weighed mass of each organ was homogenized in cold sucrose solution (0.25 M in distilled water, 0.5 g tissue in 2 mL sucrose solution) containing protease inhibitor cocktail (5 μL/1 mL sucrose solution). The homogenate was centrifuged at 10,000*g* for 20 minutes. The resulting supernatant was centrifuged again at 100,000*g* for 60 minutes to obtain the microsomal pellet. The pellets were dissolved in the homogenization sucrose solution containing protease inhibitor cocktail and stored at −80°C. The Lowry method was used to determine microsomal protein concentrations using bovine serum albumin as a standard (Lowry et al., 1951).

Western Blot Analysis. We determined the protein expression of important P450-metabolizing enzymes (CYP1A2, CYP3A) as well as some main arachidonic acid epoxygenases (CYP2C23, CYP2J) and hydroxylases (CYP2E1, CYP4A1, and CYP4F) using denaturing gel electrophoresis. Briefly, isolated proteins from the different organs of male and female rats (15 μg from the liver; 50 μg from the kidney, lung, and brain; 60 μg from the heart; and 75 μg from the small intestine) were diluted with an equal amount of 2X Laemmli Sample Buffer, boiled for 5 minute, and separated by 10% SDS-PAGE as described by Shoieb et al. (2022). Then, the blots were incubated with the primary antibody: mouse anti-rat CYP1A2 (sc-53241), rabbit anti-rat CYP2C23 (ab53944), rabbit anti-rat CYP2E1 (ab28146), rabbit anti-rat CYP2J (ABS1605), mouse anti-rat CYP3A (sc-271033), mouse anti-rat CYP4A1 (sc-53248), and rabbit anti-human CYP4F2 (ab230709) for 2 hours or overnight at 4°C. Then, blots were incubated with a horseradish peroxidase–conjugated horse anti-mouse or goat anti-rabbit IgG secondary antibody for 45 minutes at room temperature. Bands were visualized using the ChemiDocTM Imaging System (Bio-Rad Laboratories, Hercules, CA) using the enhanced chemiluminescence method.

Statistical Analysis. All results are presented as mean plus or minus S.E.M. Comparisons between male and female groups were carried out using unpaired student t tests. Differences were considered significant at $P < 0.05$. All statistical analyses and graphs plotting were performed using GraphPad Prism software, version 8.4.3. (GraphPad Software, Inc. La Jolla, CA).

Results

Sex-Specific Differences in the mRNA and Protein Expression Levels of P450 Enzymes in the Heart. The mRNA expression levels of different P450 enzymes were determined by real-time PCR. Some P450 enzymes were found to not be expressed in the heart (*Cyp2a1*, *Cyp2c12*, *Cyp2d2*, *Cyp2d3*, *Cyp3a1*, *Cyp3a9*, *Cyp3a18*, and *Cyp4a8*). *Cyp4f5* is the most highly expressed P450 in the hearts of both male and female rats, whereas *Cyp4a2* is the least expressed (Fig. 1). Generally, female hearts showed higher P450 expression levels than male hearts. *Cyp2e1* showed the most marked difference, being nearly fourfold higher in female hearts than male hearts. *Cyp1a1*, *Cyp1a2*, *Cyp4a1*, *Cyp4f1*, and *Cyp4f4* are all approximately threefold higher in female than male hearts. *Cyp4a2*, *Cyp4a3*, and *Cyp4f5* showed no significant difference, whereas all other *Cyp4* family members showed significantly higher expression in female hearts. Only *Cyp2c23* was significantly higher in male hearts than female hearts (5.3-fold) (Supplemental Material). Fig. 2 shows the mRNA expression levels of different P450 enzymes in male hearts compared with female hearts.

Since mRNA expression does not always correlate with protein levels of enzymes, we measured the protein expression of certain P450 enzymes (CYP1A2, CYP2C23, CYP2E1, CYP2J, CYP3A, CYP4A1, and CYP4F) in all organs to investigate sex-specific differences at the protein level. As shown in Fig. 3, CYP2J, CYP4A, and CYP4F enzymes were detected in the heart. In agreement with the mRNA results, CYP4A and CYP4F enzymes showed higher protein levels in female rat hearts (2.8 and 2.4-fold higher than the male level, respectively). However, CYP2J showed no significant difference (Fig. 3).

Sex-Specific Differences in the mRNA and Protein Expression Levels of P450 Enzymes in the Liver. All the investigated 31 P450 enzymes were found to be expressed in the liver. The expression of *Cyp2c12* and *Cyp3a18* was found to be limited to the liver, with no extrahepatic expression. *Cyp2c23* was the highest-expressed P450 in the male liver, whereas *Cyp2e1* was the highest in the female liver. *Cyp4a8* was the lowest in both sexes (Fig. 4). In contrast to the heart, *Cyp2c11* and *Cyp2c13* levels in the liver are male specific, with dramatically higher expression in males, around 1700- and 1300-fold the female hepatic expression levels, respectively. In contrast, *Cyp2c12* in female livers is nearly 200-fold compared with male livers. In the CYP3 family, *Cyp3a9* is nearly

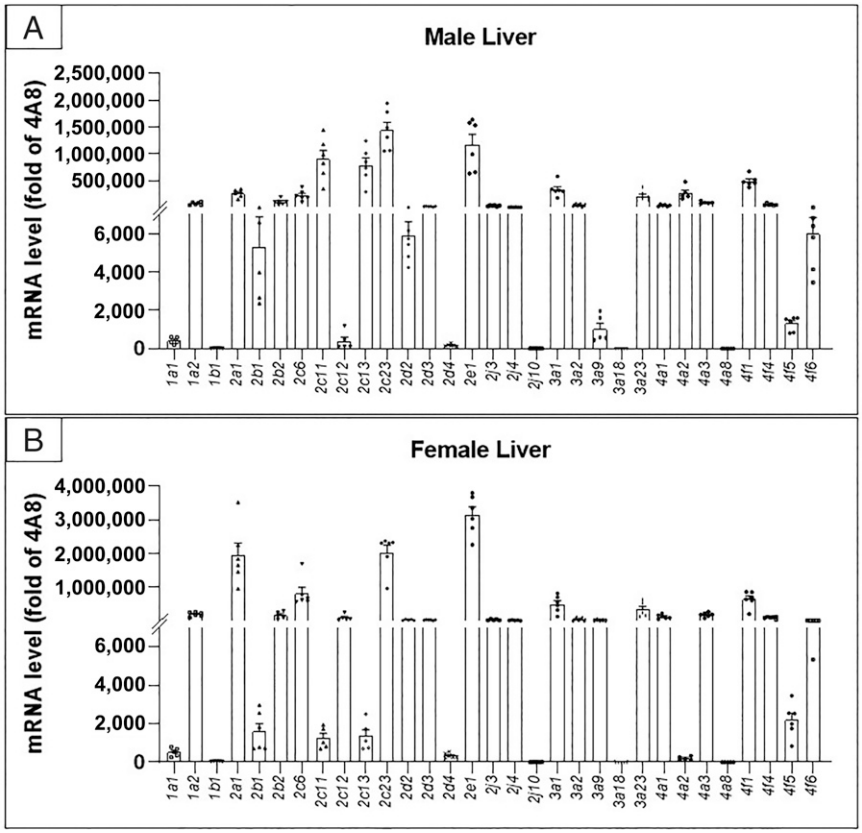

Fig. 4. The mRNA expression of different P450 enzymes in male (A) and female (B) rat liver relative to the least expressed. The mRNA expression of P450 enzymes was determined in the liver of adult male and female Sprague-Dawley rats by real-time PCR and normalized to β-actin housekeeping gene. Results are presented as mean plus or minus S.E.M, $n = 4–6$.

10-fold higher in the female liver, whereas *Cyp3a18* is nearly 25-fold higher in the male liver. Most CYP4 family enzymes are significantly higher in male livers, especially *Cyp4a2*, which is also male specific: 3000-fold in the male liver compared with the female liver (Supplemental Material). Fig. 5 shows the mRNA expression levels of different P450 enzymes in male versus female livers.

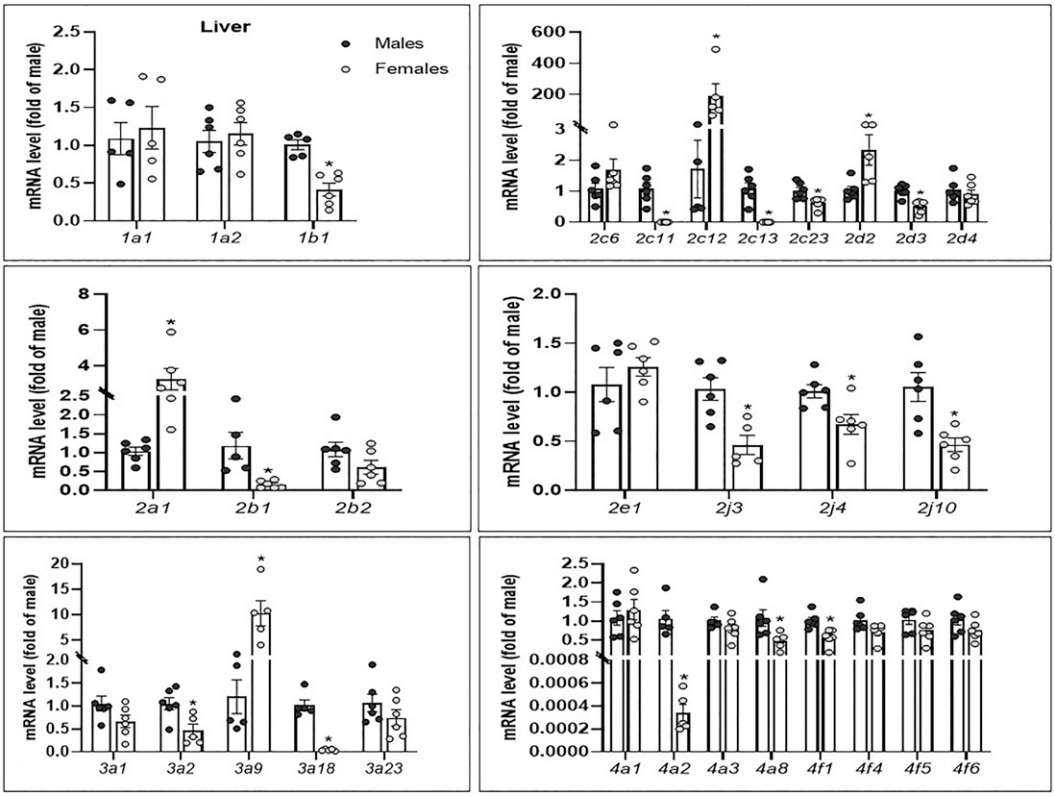

Fig. 5. Sex-specific differences in the mRNA expression levels of P450 enzymes in the rat liver. The mRNA expression of P450 enzymes was determined in the liver of adult male and female Sprague-Dawley rats by real-time PCR and normalized to β-actin housekeeping gene. Results are presented as mean plus or minus S.E.M., $n = 4–6$. Data were analyzed using an unpaired student t test. $^*P < 0.05$, significant difference from male rats.

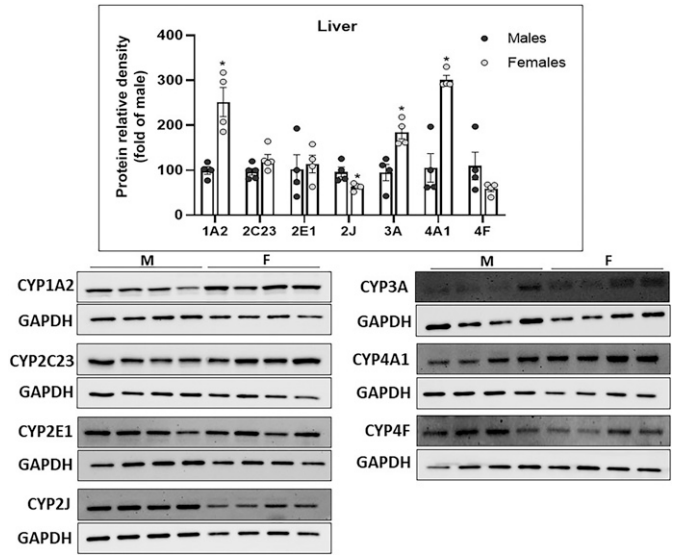

Fig. 6. Sex-specific differences in the protein expression levels of some P450 enzymes in the rat liver. The protein expression of P450 enzymes was determined in the liver of adult male and female Sprague-Dawley rats by western blot and normalized to GAPDH housekeeping protein. Results are presented as mean plus or minus S.E.M., $n = 4–6$. Data were analyzed using an unpaired student t test. $^*P < 0.05$, significant difference from male rats.

As shown in Fig. 6, all the assessed enzymes were found to be expressed in the liver. CYP1A2, CYP3A, and CYP4A1 were significantly higher in female rat livers (2.5-fold, 1.9-fold, and 2.9-fold, respectively) compared with the male livers. In contrast, CYP2J was found to be significantly higher in the male rat liver (1.5-fold female expression level), in agreement with the mRNA result (Fig. 6).

Sex-Specific Differences in the mRNA and Protein Expression Levels of P450 Enzymes in the Kidney. *Cyp2c23* was the most highly expressed, whereas *Cyp3a1* was the least expressed, P450 in both male and female kidneys (Fig. 7). *Cyp2c12*, *Cyp2c13*, and *Cyp3a18* are not expressed in the kidney. Several enzymes demonstrated similar sexual dimorphism in the kidney to that shown in the heart, such as *Cyp1a1*, *Cyp2e1*, *Cyp4f1*, *Cyp4f4*, and *Cyp4f6*, which all showed higher expression in the female organs. *Cyp1a1* showed the greatest difference, with the female expression level 26-fold the male level. However, similar to the liver and in contrast to the heart, *Cyp2c11* expression was significantly higher in male versus female kidneys (13-fold), and in contrast to both heart and liver, *Cyp2c23* expression was significantly higher in female kidneys (approximately twofold). In addition, *Cyp4a8* showed nearly 7.5-fold higher expression in the females' kidney, whereas it was not expressed in the heart (Supplemental Material). Fig. 8 shows the mRNA expression levels of different P450 enzymes in male versus female kidneys.

At the protein expression level, CYP2C23, CYP2E1, CYP3A, CYP4A1, and CYP4F2 were detected in the kidney. Similar to the mRNA expression, CYP2E1 was found to be significantly higher in the female rat kidney (1.7-fold the male expression level). CYP2C23 also appears to be slightly higher in females, but the difference did not achieve statistical significance. Moreover, CYP3A protein levels are significantly higher in the female kidney (2.4-fold), in agreement with CYP3A2 mRNA result (Fig. 9).

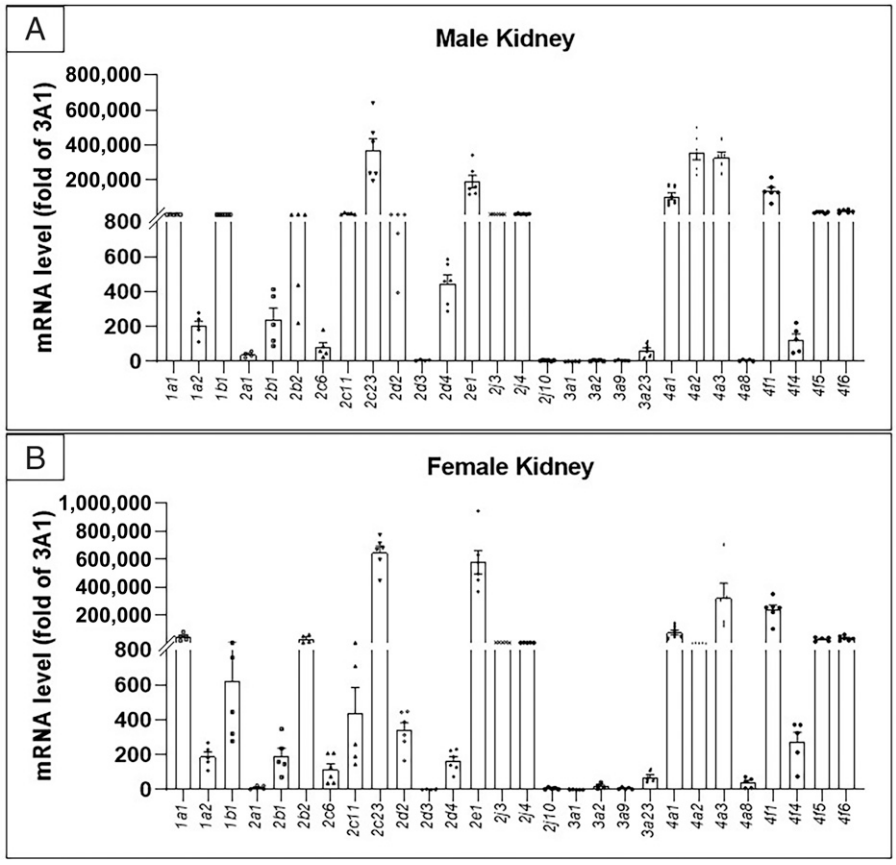

Fig. 7. The mRNA expression of different P450 enzymes in male (A) and female (B) rat kidney relative to the least expressed. The mRNA expression of P450 enzymes was determined in the kidney of adult male and female Sprague-Dawley rats by real-time PCR and normalized to β-actin housekeeping gene. Results are presented as mean plus or minus S.E.M, $n = 4–6$.

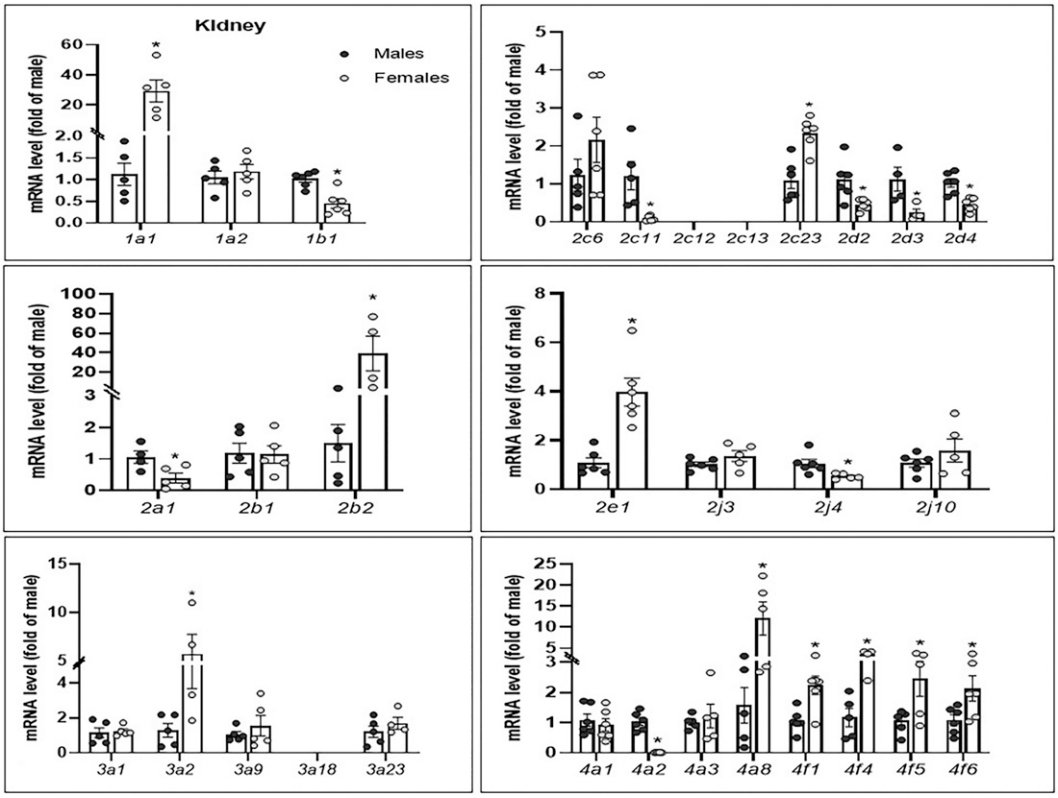

Fig. 8. Sex-specific differences in the mRNA expression levels of P450 enzymes in the rat kidney. The mRNA expression of P450 enzymes was determined in the kidney of adult male and female Sprague-Dawley rats by real-time PCR and normalized to β-actin housekeeping gene. Results are presented as mean plus or minus S.E.M., $n = 4–6$. Data were analyzed using an unpaired student t test. $^*P < 0.05$, significant difference from male rats.

Sex-Specific Differences in the mRNA and Protein Expression Levels of P450 Enzymes in the Lung. The most expressed P450 mRNA in the lungs of both male and female rats was *Cyp2b1*, with a marked difference between it and the second enzyme (*Cyp2e1*) (11.5-fold in males and 27-fold in females). On the other hand, *Cyp2j10* and *Cyp3a2* were the least expressed (Fig. 10). In addition to *Cyp2c13* and *Cyp4a2* and except *Cyp3a9*, all the enzymes that were not expressed in the heart were also found to not be expressed in the lung. Except *Cyp1a2* and

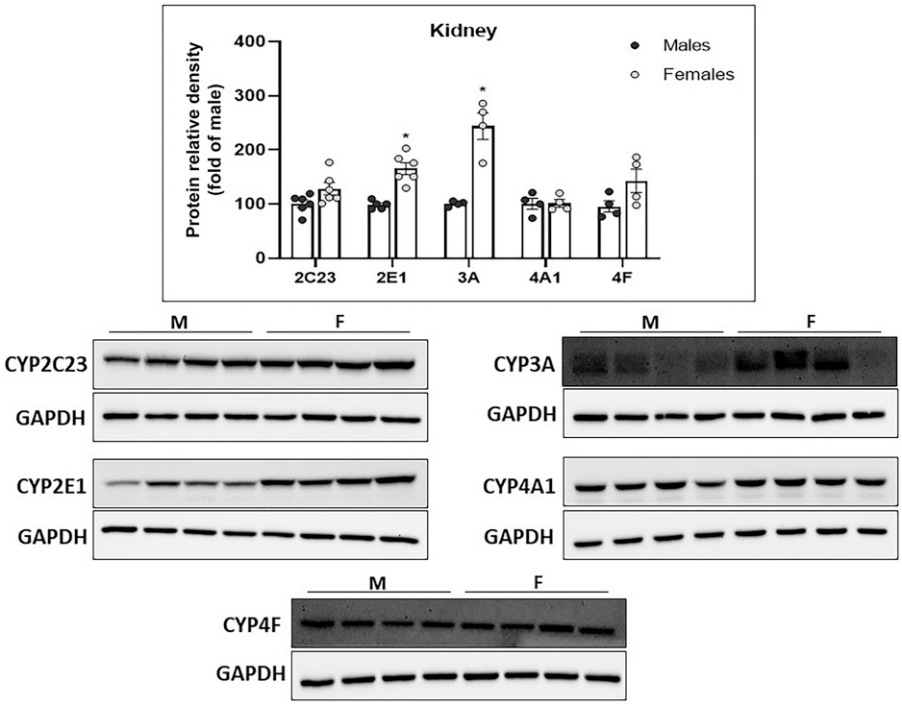

Fig. 9. Sex-specific differences in the protein expression levels of some P450 enzymes in the rat kidney. The protein expression of P450 enzymes was determined in the kidney of adult male and female Sprague-Dawley rats by western blot and normalized to GAPDH housekeeping protein. Results are presented as mean plus or minus S.E.M., $n = 4–6$. Data were analyzed using an unpaired student t test. $^*P < 0.05$, significant difference from male rats.

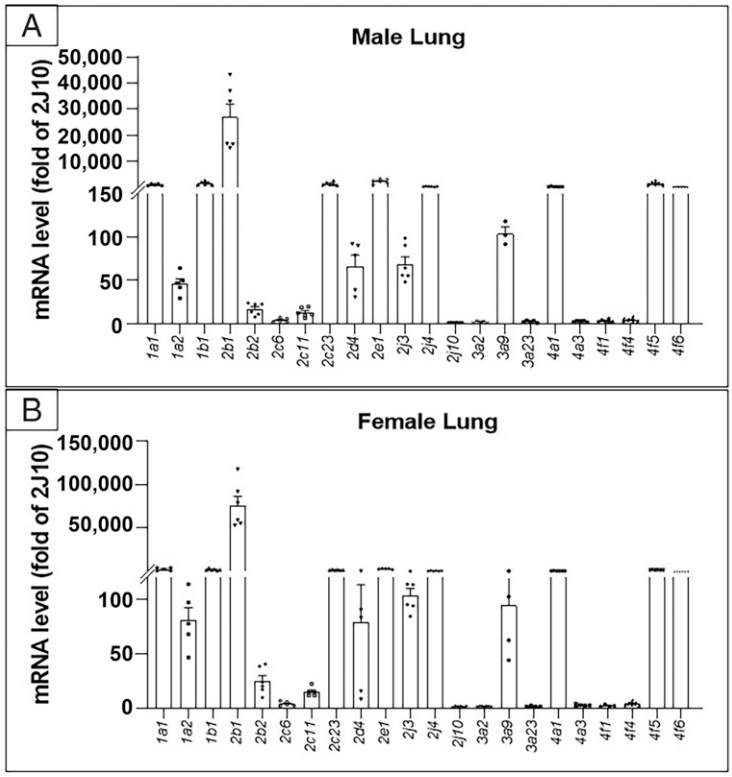

Fig. 10. The mRNA expression of different P450 enzymes in male (A) and female (B) rat lung relative to the least expressed. The mRNA expression of P450 enzymes was determined in the lung of adult male and female Sprague-Dawley rats by real-time PCR and normalized to β-actin housekeeping gene. Results are presented as mean plus or minus S.E.M, $n = 4–6$.

Cyp2b1, all other P450 enzymes expressed in the lung did not show statistically significant sex-specific differences between males and females. *Cyp1a2* is around 1.8-fold higher in male lung, whereas *Cyp2b1* is 2.3-fold higher in female lung (Supplemental Material). Fig. 11 demonstrates the male versus female mRNA expression levels of different P450 enzymes in the lungs.

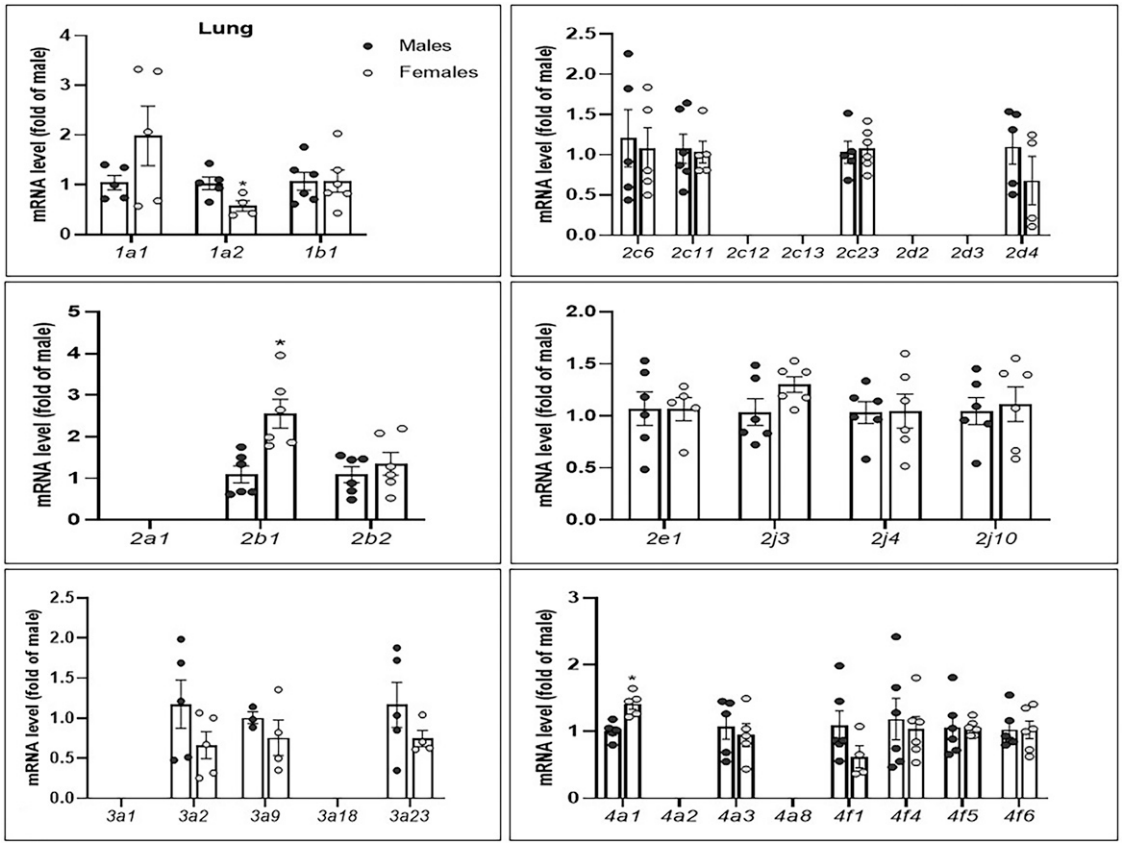

Fig. 11. Sex-specific differences in the mRNA expression levels of P450 enzymes in the rat lung. The mRNA expression of P450 enzymes was determined in the lung of adult male and female Sprague-Dawley rats by real-time PCR and normalized to β-actin housekeeping gene. Results are presented as mean plus or minus S.E.M., $n = 4–6$. Data were analyzed using an unpaired student t test. $^*P < 0.05$, significant difference from male rats.

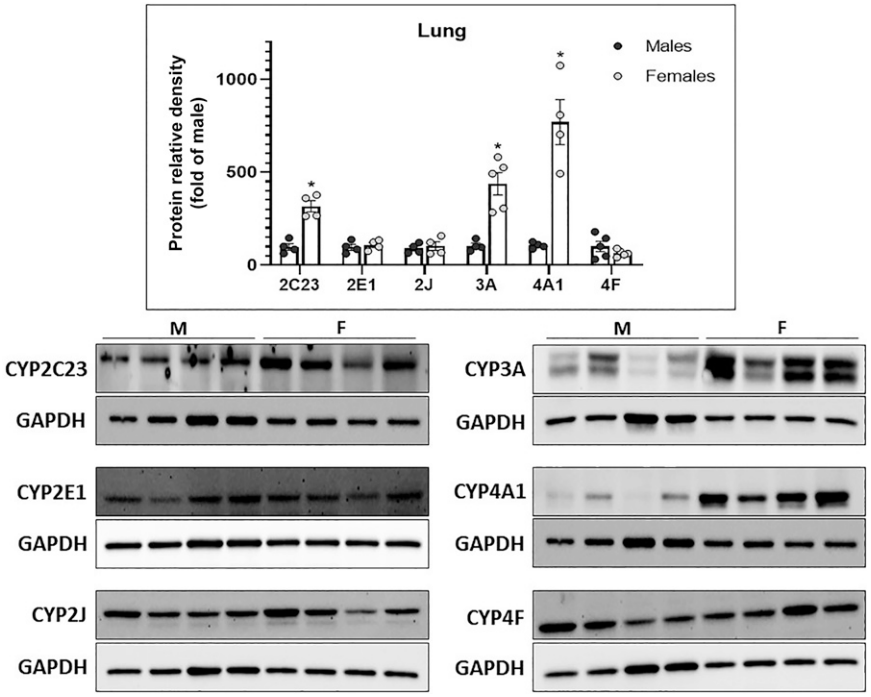

Fig. 12. Sex-specific differences in the protein expression levels of some P450 enzymes in the rat lung. The protein expression of P450 enzymes was determined in the lung of adult male and female Sprague-Dawley rats by western blot and normalized to GAPDH housekeeping protein. Results are presented as mean plus or minus S.E.M., $n = 4–6$. Data were analyzed using an unpaired student t test. $^*P < 0.05$, significant difference from male rats.

CYP2C23, CYP3A, and CYP4A1 were all found to be significantly higher in the female lung at the protein expression level (3.2-, 4.2-, and 7.3-fold the male expression level, respectively). On the other hand, CYP2E1, CYP2J, and CYP4F demonstrated no significant difference between males and females, and CYP1A2 was not detected (Fig. 12).

Sex-Specific Differences in the mRNA and Protein Expression Levels of P450 Enzymes in the Brain. *Cyp2j3* was found to be the most expressed enzyme in the brain of male and female rats, whereas *Cyp4a8* and *Cyp2c13* were the least expressed (Fig. 13). *Cyp2c12*, *Cyp2d2*, *Cyp2d3*, *Cyp3a18*, and *Cyp4a2* were found to not be expressed in the brain. Similar to the liver, the brain mRNA expression levels of *Cyp2c11* and *Cyp2c13* were significantly higher in males than in females but with a less marked difference (1.8- and 3.7-fold, respectively). Unlike all other organs, *Cyp1a1* and *Cyp4a3* in the brain were significantly higher in the males (approximately two- and sixfold, respectively). On the other hand, *Cyp4f4* and *Cyp4f5* mRNA levels were significantly higher in the females (1.7- and 1.4-fold, respectively) (Supplemental Material). The mRNA expression levels of different P450 enzymes in male versus female brain are shown in Fig. 14.

At the protein expression level, CYP2J and CYP4F enzymes were detected in the brain, and both showed no significant sex-specific difference (Fig. 15).

Sex-Specific Differences in the mRNA and Protein Expression Levels of P450 Enzymes in the Small Intestine. At the mRNA expression level, *Cyp2b1* and *Cyp2b2* were found to be the most highly expressed P450 enzymes in the small intestine of female and male rats, respectively, whereas *Cyp3a1* was the least expressed in both sexes, similar to the kidney (Fig. 16). *Cyp3a18*, *Cyp2c12*, *Cyp2d2*, *Cyp4a2*, and *Cyp4a3* were found to not be expressed in the small intestine. Only *Cyp2c13* showed significant sex-specific difference in the small intestine, being 1.4-fold higher in the males compared with the females (Supplemental Material). The male-versus-female mRNA expression of P450 enzymes in the small intestine is demonstrated in Fig. 17.

At the protein expression level, CYP1A2 and CYP3A were demonstrated to be significantly higher in the females: 2.4-fold and 3.7-fold, respectively. This result is in agreement with other organs such as the liver, kidney, and lung. CYP4A1 was also detected at the protein

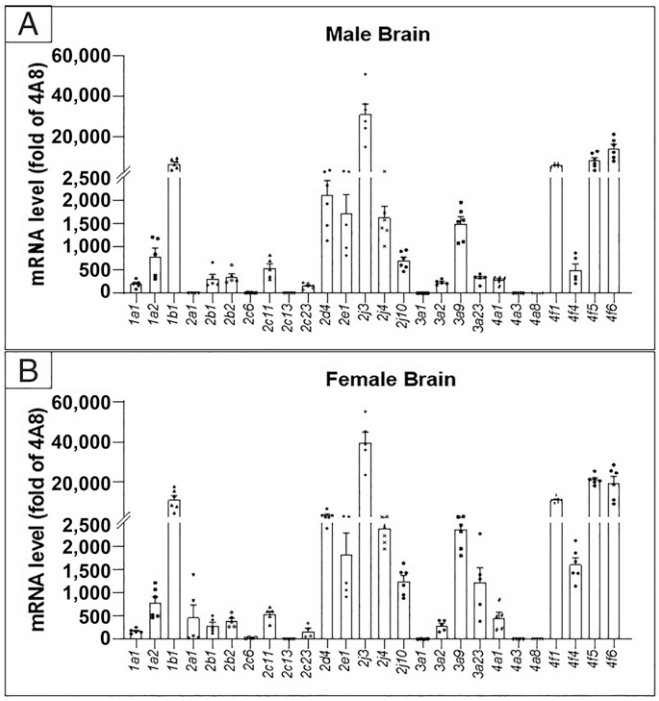

Fig. 13. The mRNA expression of different P450 enzymes in male (A) and female (B) rat brain relative to the least expressed. The mRNA expression of P450 enzymes was determined in the brain of adult male and female Sprague-Dawley rats by real-time PCR and normalized to β-actin housekeeping gene. Results are presented as mean plus or minus S.E.M, $n = 4–6$.

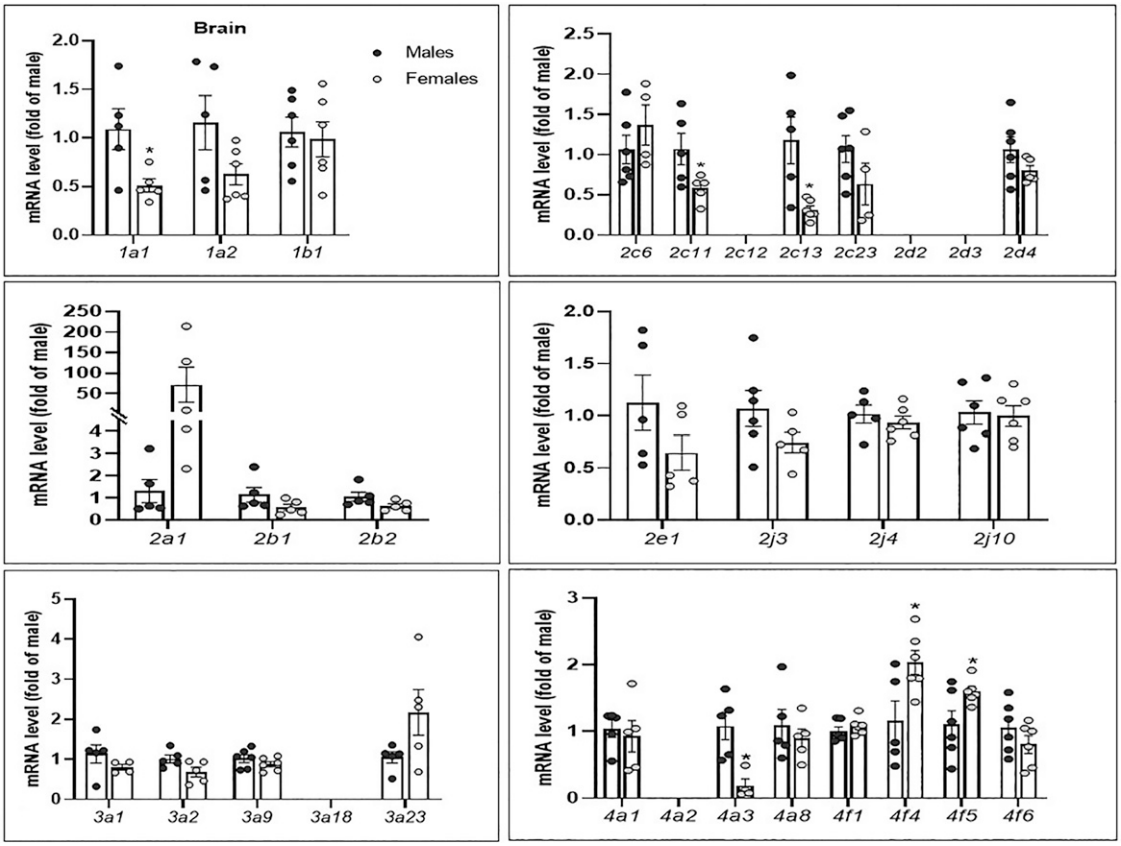

Fig. 14. Sex-specific differences in the mRNA expression levels of P450 enzymes in the rat brain. The mRNA expression of P450 enzymes was determined in the brain of adult male and female Sprague-Dawley rats by real-time PCR and normalized to β-actin housekeeping gene. Results are presented as mean plus or minus S.E.M., $n = 4$–6. Data were analyzed using an unpaired student t test. $^*P < 0.05$, significant difference from male rats.

expression level but showed no significant difference between males and females, similar to CYP4A1 expression in the kidney (Fig. 18).

Discussion

Previously, many studies were conducted on male animals only, and results were generalized to both sexes (Holdcroft, 2007; Lee, 2018). Ignoring sex differences could have undesirable consequences such as increased side effects or decreased efficacy. Thus, sex-specific differences are gaining increasing attention in research, and more studies are starting to include female groups (Wald and Wu, 2010; Lee, 2018). Previous studies have demonstrated sex-specific differences in the expression or activity levels of different P450 enzymes (Waxman and Holloway, 2009; Zhang et al., 2011). However, most of these studies reported just a few enzymes and investigated sexual dimorphism in response to inducers or inhibitors. In this study, we investigated and compared the mRNA and protein expression of different P450s in the heart, liver, lung, kidney, brain, and small intestine of male and female SD rats.

Higher expression levels of CYP1A1 were previously reported in the lungs (Lingappan et al., 2013, 2016) and hearts (Zhang et al., 2015) of female versus male mice. Moreover, CYP1A1 was detectable in the lungs and kidneys of female but not male SD rats and was undetectable in the liver of both sexes (Iba et al., 1999). Our results showed significantly higher cardiac and renal *Cyp1a1* mRNA levels in female rats. Hepatic CYP1A2 activity was reported to be higher in male than in female SD rats (Fonsart et al., 2008). However, a study found higher CYP1A2 levels in female compared with male human liver samples (Zhang et al., 2011), whereas other studies gave conflicting results (Nafziger and Bertino, 1989; Ou-Yang et al., 2000; Zanger and Schwab, 2013). A study in 2016 demonstrated higher *Cyp1a2* brain mRNA levels in female Wistar rats (Nagai et al., 2016), whereas our results showed no significant difference in the brain. In our study, *Cyp1a2* mRNA expression showed significant sex difference only in the lung, being male dominant, whereas CYP1A2 protein was female dominant in the liver and the intestine.

CYP1B1 is constitutively expressed in several tissues, most importantly in the heart (Maayah et al., 2015). A previous study showed that treatment of embryonic rat cardiomyocytes with growth hormone (GH) in a pulsatile pattern, which mimics the male secretory pattern, significantly decreased *Cyp1a1* and increased *Cyp1b1* expression compared with the constant treatment pattern, which mimics the female pattern. Moreover, they found higher *Cyp1b1* mRNA levels in male mice hearts compared with female mice (Zhang et al., 2015). Acute doxorubicin exposure in mice also caused a male-specific increase in cardiac *Cyp1b1* (Grant et al., 2017). In our study, cardiac *Cyp1b1* showed no significant difference, but hepatic and renal *Cyp1b1* levels were significantly higher in male rats. Interestingly, human hepatic CYP1B1 was also previously reported to be significantly higher in men (Yang et al., 2012). Hepatic CYP2A1 was previously found to be female dominant in rats (Martignoni et al., 2006). We found higher hepatic *Cyp2a1* expression in females but higher renal expression in males.

The CYP2C family is known to be highly abundant in the rat liver (Martignoni et al., 2006). CYP2C11 and CYP2C13 were previously reported to be male-specific enzymes in the liver, spleen, and bone marrow, whereas CYP2C12 was reported to be female specific (Thangavel

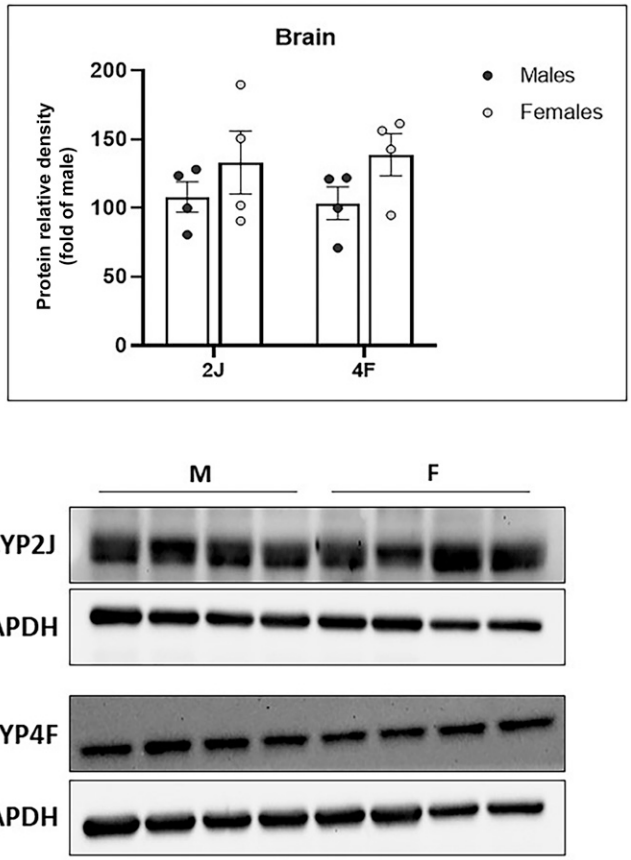

Fig. 15. Sex-specific differences in the protein expression levels of some P450 enzymes in the rat brain. The protein expression of P450 enzymes was determined in the brain of adult male and female Sprague-Dawley rats by western blot and normalized to GAPDH housekeeping protein. Results are presented as mean plus or minus S.E.M., $n = 4–6$. Data were analyzed using an unpaired student t test. $^*P < 0.05$, significant difference from male rats.

et al., 2007; Huang et al., 2011; Babelova et al., 2015). In addition, previous studies demonstrated significantly lower metabolism of CYP2C substrates in female compared with male Wistar (Ohhira et al., 2006) and SD rats (Fukuno et al., 2018). CYP2C11 sexual dimorphism is attributed to sex differences in the circulating GH profile. Female SD rats could express CYP2C11 after hypophysectomy and infusion with GH in the pulsatile male secretory fashion (Legraverend et al., 1992; Thangavel et al., 2007; Banerjee et al., 2021). We also found significantly higher *Cyp2c11* levels in male versus female kidney and brain; however, interestingly, it was found to be female dominant in the heart. CYP2C23 protein was previously reported to be highly abundant in the liver and kidney of SD rats, whereas it was undetectable in the heart and lungs (El-Sherbeni et al., 2013). We detected CYP2C23 in the lung with a higher expression in female rats.

Our results showed female-dominant expression of *Cyp2e1* in the heart and kidney. In mice, in contrast, renal CYP2E1 expression was found to be higher in males (Freeman et al., 1992; Speerschneider and Dekant, 1995), whereas cardiac CYP2E1 showed no sexual dimorphism (Zhang et al., 2015). However, acute doxorubicin exposure was associated with a female-specific increase in heart CYP2E1 in mice (Grant et al., 2017). Hepatic CYP2J2 levels were found to be significantly higher in female subjects compared with male subjects (Yang et al., 2012). In contrast, our results showed male-dominant hepatic expression of CYP2J enzymes. We found *Cyp2j4* to be significantly higher in male kidneys. A previous study demonstrated significantly higher CYP2J5 levels in male versus female mice kidneys (Ma et al., 2004). As for cardiac expression, we found significantly higher *Cyp2j3* levels in female rat hearts compared with males. In line with that, treatment of rat cardiomyocytes with GH in a male secretory pattern significantly decreased *Cyp2j3* expression compared with the female pattern. Mouse *Cyp2j11* is also higher in female than in male hearts (Zhang et al., 2015). However, cardiac CYP2J protein levels showed no significant difference.

The CYP3A subfamily of enzymes is considered the most important among human drug-metabolizing enzymes. Several studies have shown that women have significantly higher hepatic and intestinal CYP3A enzyme activities compared with men (Tanaka, 1999; Greenblatt and Von Moltke, 2008; Krogstad et al., 2020), as well as higher hepatic CYP3A4 levels (Lamba et al., 2010; Yang et al., 2010, 2012). CYP3A7, the human ortholog of rat Cyp3a9, was previously found to have significantly higher gene expression in female hepatic samples compared with males (Yang et al., 2012). In agreement with human data, our results showed higher hepatic *Cyp3a9* mRNA and CYP3A protein levels in female rats; however, we found *Cyp3a2* mRNA to be higher in male rats. CYP3A2 was previously found to be induced by zolmitriptan in male but not female SD rats (Yu et al., 2008).

A study in 2003 reported *Cyp3a9* mRNA levels to be significantly higher in the livers and lungs of female SD rats compared with male rats and that its expression is affected by ovariectomy and subsequent estrogen administration (Anakk et al., 2003). In agreement, we found significantly higher *Cyp3a9* mRNA and CYP3A protein levels in the livers of female rats. In the lung, kidney, and small intestine, *Cyp3a9* mRNA levels showed no significant difference, whereas CYP3A protein levels were significantly higher in the females. Similar to our findings, previous reports have identified hepatic CYP3A2 and CYP3A18 to be male-dominant isoenzymes and CYP3A9 to be a female-dominant isoenzyme in Wistar (Robertson et al., 1998) and SD rats (Kushida et al., 2021).

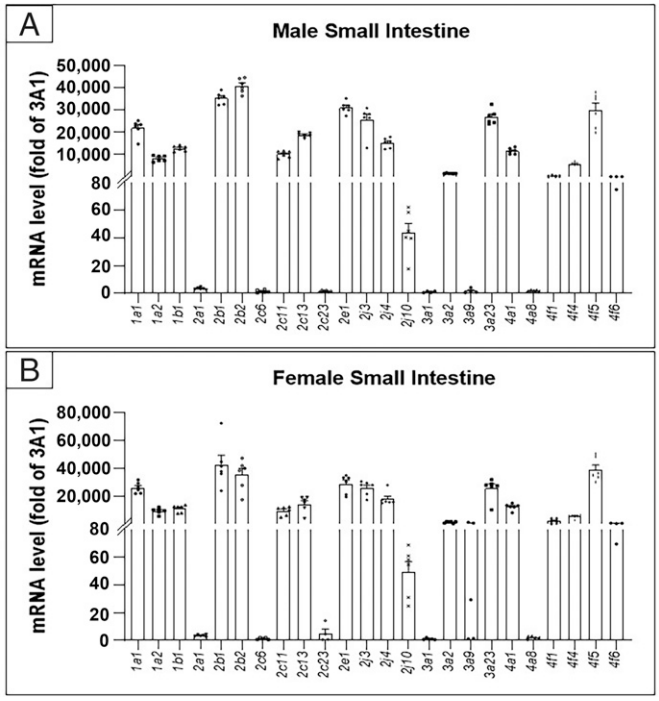

Fig. 16. The mRNA expression of different P450 enzymes in male (A) and female (B) rat small intestine relative to the least expressed. The mRNA expression of P450 enzymes was determined in the small intestine of adult male and female Sprague-Dawley rats by real-time PCR and normalized to *Gapdh* housekeeping gene. Results are presented as mean plus or minus S.E.M, $n = 4–6$.

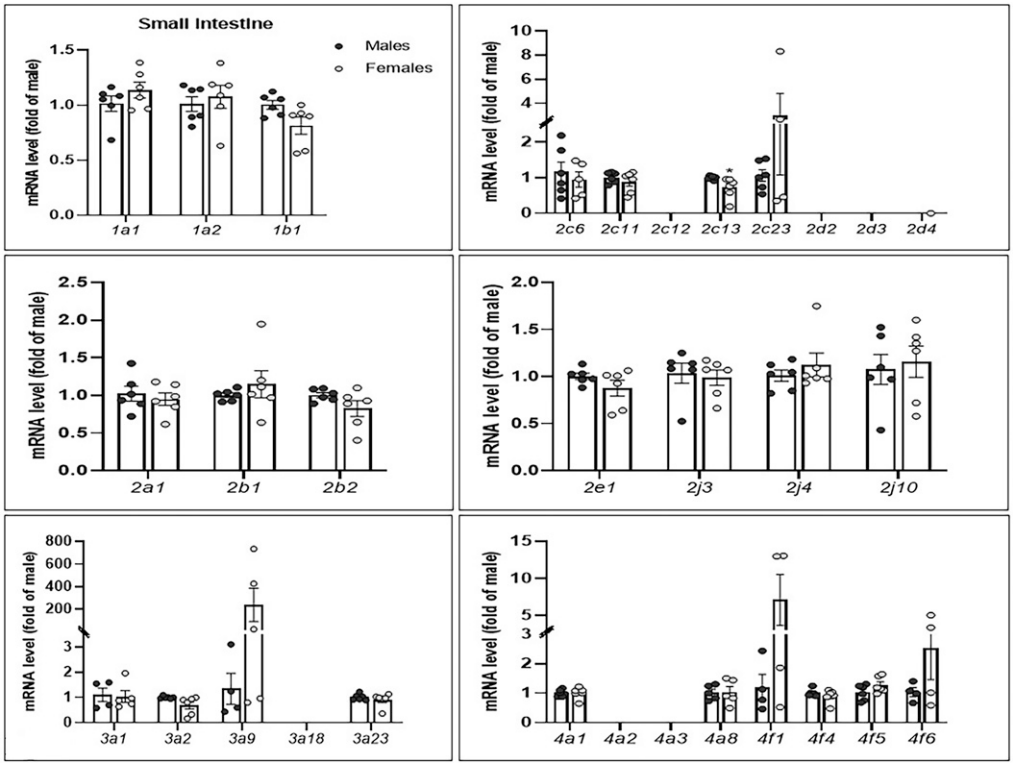

Fig. 17. Sex-specific differences in the mRNA expression levels of P450 enzymes in the rat small intestine. The mRNA expression of P450 enzymes was determined in the small intestine of adult male and female Sprague-Dawley rats by real-time PCR and normalized to *Gapdh* housekeeping gene. Results are presented as mean plus or minus S.E.M., $n = 4–6$. Data were analyzed using an unpaired student t test. $^*P < 0.05$, significant difference from male rats.

CYP4A enzymes play an important role in the ω-hydroxylation of AA (El-Sherbeni and El-Kadi, 2017). In line with our results, hepatic *Cyp4a2* was previously reported to be significantly higher in male rats of Fischer 344 and obese ZSF1 strains (Sundseth and Waxman, 1992; Babelova et al., 2015). Moreover, the induction of hepatic *Cyp4a* by endotoxin was found to be male specific in SD and Fischer 344 rats (Mitchell et al., 2001). Although hepatic *Cyp4a1* showed no sex-specific difference at the mRNA level, hepatic CYP4A1 protein levels were found to be significantly higher in female rats.

We found renal *Cyp4a2* levels to be significantly higher in male rats. Similarly, previous studies showed significantly higher renal CYP4A2 levels in male versus female Fischer 344 and SD rats (Sundseth and Waxman, 1992; Bleicher et al., 2001). Interestingly, a previous study demonstrated that treatment of SD rats with dihydrotestosterone lowered the renal *Cyp4a1* levels and enhanced *Cyp4a2/3* levels (Nakagawa et al., 2003). In addition, clofibrate administration significantly enhanced renal *Cyp4a2* expression only in male SD rats (Bleicher et al., 2001). Another study showed an increase of renal CYP4A protein in female SD rats treated with dihydrotestosterone (Zhou et al., 2005).

CYP4F enzymes appear to be female-dominant enzymes. We found significantly higher *Cyp4f* levels in the heart and kidney of females versus males, and *Cyp4f4* and *Cyp4f5* were significantly higher in female brains. At the protein expression level, we found significantly higher CYP4F levels in the heart of female versus male rats. Similarly, a study in 2002 found significantly higher expression levels of CYP4F enzymes in female versus male SD rats in the liver, kidney, lung, and brain and found a significant decrease in hepatic and renal CYP4F expression levels in female rats after ovariectomy, which was significantly restored by estrogen treatment (Kalsotra et al., 2002).

In conclusion, there are significant sex-specific differences in the expression levels of different P450 enzymes. Elucidating sex-specific differences in P450s is crucial for explaining the differences between males and females in diseases processes and treatment outcomes. This study has some limitations. First, species discrepancies in the basal and inducible levels of enzymes could complicate the translation of the results to humans (Hammer et al., 2021). Moreover, P450 expression levels could differ among different rat strains (Nishiyama et al., 2016).

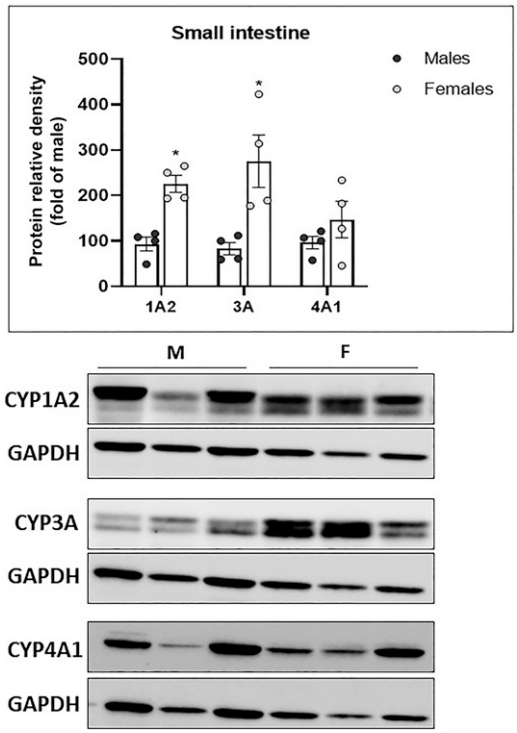

Fig. 18. Sex-specific differences in the protein expression levels of some P450 enzymes in the rat small intestine. The protein expression of P450 enzymes was determined in the small intestine of adult male and female Sprague-Dawley rats by western blot and normalized to GAPDH housekeeping protein. Results are presented as mean plus or minus S.E.M., $n = 4–6$. Data were analyzed using an unpaired student t test. $^*P < 0.05$, significant difference from male rats.

Finally, expression levels of enzymes are not necessarily correlated to their activity levels. However, rats are still considered to be valuable models for preclinical development and have previously been used for the study of sex differences in drug-metabolizing enzymes and the mechanisms underlying these differences (Waxman and Holloway, 2009; Jung et al., 2015; Blais et al., 2017). Moreover, several rat P450 enzymes (e.g., CYP1A1, CYP1A2, CYP2E1, CYP2J3, CYP4F1) show high degrees of structural similarity to their human orthologs (Hammer et al., 2021). Thus, despite the study limitations and some results that are different from human data, we believe that our results could still give valuable insights regarding sex-specific differences in human P450 enzymes. Additional studies investigating the activity of different P450 enzymes and levels of their metabolites in males and females are important for having better insight into sex-specific discrepancies and their potential clinical and therapeutic implications.

Authorship Contributions

Participated in research design: Gerges, El-Kadi.
Conducted experiments: Gerges.
Performed data analysis: Gerges, El-Kadi.
Wrote or contributed to the writing of the manuscript: Gerges, El-Kadi.

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Sexual Dimorphism in the Expression of Cytochrome P450 Enzymes in Rat Heart, Liver, Kidney, Lung, Brain, and Small Intestine

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Supplemental information: Supplemental tables.

Supplemental Material:

S.1 Calculation of the fold change in the heart level of target genes between female and male rats normalized to the housekeeping gene using the ΔΔCT method:

Table S.1.1: *Cyp1a1* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp1a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	29.13337135	20.92013931	8.213232	-0.35456	1.278592
	29.66686821	20.3425827	9.324286	0.756497	0.591932
	29.91246796	21.15733528	8.755133	0.187344	0.878221
	28.86815262	20.42703056	8.441122	-0.12667	1.091768
	28.72581673	20.62064743	8.105169	-0.46262	1.378041
		Mean ΔCt (control)	8.567788		
				Fold gene expression	1.043711
				Standard deviation	0.316523
				Standard error of the mean	0.141553
				Relative standard error of mean	13.5625
Female	28.59449959	22.33119392	6.263306	-2.30448	4.939903
	29.1534977	20.97496605	8.178532	-0.38926	1.309718
	28.30037117	21.40462685	6.895744	-1.67204	3.186658
	28.07941055	20.5268631	7.552547	-1.01524	2.02124
	26.61247826	19.77409935	6.838379	-1.72941	3.31592
				Fold gene expression	2.954688
				Standard deviation	1.38768
				Standard error of the mean	0.620589
				Relative standard error of mean	21.00355

Table S.1.2: *Cyp1a2* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp1a2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	30.19035339	21.05346298	9.13689	-0.85739	1.811758
	30.82837486	20.3425827	10.48579	0.491512	0.711279
	31.35821342	21.15733528	10.20088	0.206598	0.866579
	30.26600075	20.42703056	9.83897	-0.15531	1.113661
	30.92951965	20.62064743	10.30887	0.314592	0.804079
		Mean ΔCt (control)	9.994281		
				Fold gene expression	1.061471
				Standard deviation	0.445119
				Standard error of the mean	0.199063
				Relative standard error of mean	18.75351
Female	29.95394897	22.33119392	7.622755	-2.37153	5.174881
	30.75047493	20.97496605	9.775509	-0.21877	1.163742
	30.23438263	21.40462685	8.829756	-1.16452	2.241594
	28.30106926	20.5268631	7.774206	-2.22007	4.659175
	29.61742592	19.77409935	9.843327	-0.15095	1.110303
				Fold gene expression	2.869939
				Standard deviation	1.931085
				Standard error of the mean	0.863608
				Relative standard error of mean	30.0915

Table S.1.3: *Cyp1b1* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp1b1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	26.03538895	22.85683632	3.178553	0.297267	0.813792
	27.12061119	24.93114853	2.189463	-0.69182	1.615323
	27.05721092	24.19585228	2.861359	-0.01993	1.013908
	27.26329994	24.80513954	2.45816	-0.42312	1.340829
	26.72787857	23.04715919	3.680719	0.799434	0.574575
	26.9718399	24.05238152	2.919458	0.038173	0.973887
		Mean ΔCt (control)	2.881285		
				Fold gene expression	1.055386
				Standard deviation	0.372268
				Standard error of the mean	0.151978
				Relative standard error of mean	14.4002
Female	27.11470032	24.01935005	3.09535	0.214065	0.862105
	26.84157181	24.15325165	2.68832	-0.19297	1.143111
	25.97097778	23.04361534	2.927362	0.046077	0.968566
	25.44727898	22.94629478	2.500984	-0.3803	1.301614
	26.67259979	23.86953545	2.803064	-0.07822	1.055715
				Fold gene expression	1.066222
				Standard deviation	0.167803
				Standard error of the mean	0.075044
				Relative standard error of mean	7.038304

Table S.1.4: *Cyp2b1* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2b1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	28.87459373	19.83474731	9.039846	-0.59072	1.506003
	29.72143173	20.69773674	9.023695	-0.60688	1.522958
	30.55892372	20.32675362	10.23217	0.601599	0.659023
	30.96835899	21.10294151	9.865417	0.234846	0.849775
	28.85180855	19.21535873	9.63645	0.005879	0.995933
	30.71287537	20.72702789	9.985847	0.355276	0.78172
		Mean ΔCt (control)	9.630571		
				Fold gene expression	1.052569
				Standard deviation	0.374016
				Standard error of the mean	0.152691
				Relative standard error of mean	14.50653
Female	29.4179821	21.04896927	8.369013	-1.26156	2.397546
	29.8570919	20.39573288	9.461359	-0.16921	1.124444
	28.93009186	19.21967506	9.710417	0.079846	0.946159
	28.53790855	19.59550095	8.942408	-0.68816	1.611231
	29.09913063	20.33984947	8.759281	-0.87129	1.829298
				Fold gene expression	1.581735
				Standard deviation	0.578959
				Standard error of the mean	0.258919
				Relative standard error of mean	16.36927

Table S.1.5: *Cyp2b2* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2b2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	28.32958603	19.83474731	8.494839	-0.75395	1.686407
	29.66993904	20.69773674	8.972202	-0.27659	1.211328
	29.96926117	20.32675362	9.642508	0.393716	0.761167
	29.95347214	21.10294151	8.850531	-0.39826	1.317918
	28.94464874	19.21535873	9.72929	0.480498	0.71673
	30.53040886	20.72702789	9.803381	0.554589	0.680851
		Mean ΔCt (control)	9.248792		
				Fold gene expression	1.0624
				Standard deviation	0.408084
				Standard error of the mean	0.1666
				Relative standard error of mean	15.68144
Female	29.01791382	21.04896927	7.968945	-1.27985	2.428132
	29.2552166	20.39573288	8.859484	-0.38931	1.309765
	28.43643379	19.21967506	9.216759	-0.03203	1.022452
	28.55935287	19.59550095	8.963852	-0.28494	1.218359
	28.69308472	20.33984947	8.353235	-0.89556	1.860327
				Fold gene expression	1.567807
				Standard deviation	0.572678
				Standard error of the mean	0.256109
				Relative standard error of mean	16.33551

Table S.1.6: *Cyp2c6* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c6*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	33.16339493	21.7662735	11.39712	-1.01135	2.015803
	33.71570969	22.06328773	11.65242	-0.75605	1.688865
	35.91555405	23.92972374	11.98583	-0.42265	1.340384
	35.42041779	21.89413071	13.52629	1.117811	0.460792
	34.54964447	21.03207779	13.51757	1.10909	0.463586
	34.05702209	21.68539238	12.37163	-0.03685	1.025869
		Mean ΔCt (control)	12.40848		
				Fold gene expression	1.165883
				Standard deviation	0.63817
				Standard error of the mean	0.260532
				Relative standard error of mean	22.34629
Female	34.42850876	22.53539467	11.89311	-0.51536	1.429353
	35.80165863	22.48576355	13.3159	0.907419	0.533138
	35.7972374	22.18027306	13.61696	1.208488	0.432722
	34.45858002	22.10305214	12.35553	-0.05295	1.037383
	34.17071915	21.98749924	12.18322	-0.22526	1.168985
				Fold gene expression	0.920316
				Standard deviation	0.424945
				Standard error of the mean	0.190041
				Relative standard error of mean	20.64957

Table S.1.7: *Cyp2c11* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c11*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	29.3860054	21.7662735	7.619732	-0.6333	1.551104
	30.49220085	22.06328773	8.428913	0.175886	0.885224
	30.49056244	21.89413071	8.596432	0.343405	0.788179
	29.34132957	21.03207779	8.309252	0.056225	0.961778
	29.99619865	21.68539238	8.310806	0.057779	0.960742
		Mean ΔCt (control)	8.253027		
				Fold gene expression	1.029405
				Standard deviation	0.300182
				Standard error of the mean	0.134245
				Relative standard error of mean	13.04105
Female	30.12242508	22.53539467	7.58703	-0.666	1.586664
	29.54848671	22.48576355	7.062723	-1.1903	2.282008
	29.34716606	22.18027306	7.166893	-1.08613	2.123044
	28.89202118	22.10305214	6.788969	-1.46406	2.758833
	29.53164482	21.98749924	7.544146	-0.70888	1.634536
				Fold gene expression	2.077017
				Standard deviation	0.486119
				Standard error of the mean	0.217399
				Relative standard error of mean	10.46689

Table S.1.8: *Cyp2c13* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c13*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	31.44035339	21.7662735	9.67408	-0.03493	1.024509
	31.48086929	22.06328773	9.417582	-0.29143	1.223854
	31.56737709	21.89413071	9.673246	-0.03577	1.025101
	30.75460434	21.03207779	9.722527	0.013514	0.990677
	31.74302292	21.68539238	10.05763	0.348618	0.785336
		Mean ΔCt (control)	9.709013		
				Fold gene expression	1.009896
				Standard deviation	0.15574
				Standard error of the mean	0.069649
				Relative standard error of mean	6.896638
Female	32.34845352	22.53539467	9.813059	0.104046	0.93042
	30.33805656	22.48576355	7.852293	-1.85672	3.621833
	30.55036163	22.10305214	8.447309	-1.2617	2.397787
	30.70465279	21.98749924	8.717154	-0.99186	1.988747
				Fold gene expression	2.234697
				Standard deviation	1.112411
				Standard error of the mean	0.556205
				Relative standard error of mean	24.88953

Table S.1.9: *Cyp2c23* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c23*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	29.78787422	24.93114853	4.856726	-0.55644	1.470633
	28.60475159	24.19585228	4.408899	-1.00426	2.00592
	30.24746704	24.80513954	5.442327	0.029164	0.979988
	29.99185944	23.04715919	6.9447	1.531537	0.345909
			Mean ΔCt (control)	5.413163	
				Fold gene expression	1.200612
				Standard deviation	0.707254
				Standard error of the mean	0.353627
				Relative standard error of mean	29.45389
Female	31.64385796	24.01935005	7.624508	2.211345	0.215933
	31.83003235	24.15325165	7.676781	2.263618	0.208249
	32.59623718	25.18678856	7.409449	1.996285	0.250645
	30.94094086	23.04361534	7.897326	2.484162	0.178728
	31.66618919	22.94629478	8.719894	3.306731	0.101059
	31.81600189	23.86953545	7.946466	2.533303	0.172743
				Fold gene expression	0.187893
				Standard deviation	0.050975
				Standard error of the mean	0.02081
				Relative standard error of mean	11.07562

Table S.1.10: *Cyp2d4* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2d4*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	31.50374603	20.44839668	11.05535	-0.07904	1.056314
	31.64796257	20.65575409	10.99221	-0.14218	1.103572
	32.53544617	21.05667305	11.47877	0.344384	0.787644
	31.02033997	20.1381073	10.88223	-0.25216	1.190986
	31.90005112	20.63667107	11.26338	0.128991	0.914471
		Mean ΔCt (control)	11.13439		
				Fold gene expression	1.010597
				Standard deviation	0.159861
				Standard error of the mean	0.071492
				Relative standard error of mean	7.074255
Female					
	31.13170242	21.61183929	9.519863	-1.61453	3.062109
	33.99454498	23.12124252	10.8733	-0.26109	1.198381
	31.12455177	20.55188942	10.57266	-0.56173	1.476034
	30.08351898	20.89955521	9.183964	-1.95042	3.864884
				Fold gene expression	2.400352
				Standard deviation	1.275653
				Standard error of the mean	0.637827
				Relative standard error of mean	26.57221

Table S.1.11: *Cyp2e1* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2e1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	25.65829277	20.44839668	5.209896	0.795858	0.576001
	25.30113029	21.11756516	4.183565	-0.23047	1.17322
	24.88606644	20.65575409	4.230312	-0.18373	1.135814
	26.14256287	21.05667305	5.08589	0.671851	0.627701
	23.60245705	20.1381073	3.46435	-0.94969	1.931456
	24.94688797	20.63667107	4.310217	-0.10382	1.074616
		Mean ΔCt (control)	4.414038		
				Fold gene expression	1.086468
				Standard deviation	0.488907
				Standard error of the mean	0.199595
				Relative standard error of mean	18.37104
Female	24.98876572	21.86377716	3.124989	-1.28905	2.443671
	23.17398262	21.61183929	1.562143	-2.8519	7.21948
	22.96647835	20.75888824	2.20759	-2.20645	4.615376
	22.78383446	20.55188942	2.231945	-2.18209	4.538115
	24.2583828	20.89955521	3.358828	-1.05521	2.078022
				Fold gene expression	4.178933
				Standard deviation	2.060909
				Standard error of the mean	0.921667
				Relative standard error of mean	22.05507

Table S.1.12: *Cyp2j3* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2j3*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	26.68292427	21.19024277	5.492682	-0.5398	1.453772
	27.1415844	21.41108322	5.730501	-0.30198	1.232836
	27.69579124	20.65575409	7.040037	1.007555	0.497388
	27.2524395	21.7329464	5.519493	-0.51299	1.427004
	26.89409065	20.46039772	6.433693	0.401211	0.757223
	27.20636559	21.22787857	5.978487	-0.054	1.038136
		Mean ΔCt (control)	6.032482		
				Fold gene expression	1.067726
				Standard deviation	0.381561
				Standard error of the mean	0.155772
				Relative standard error of mean	14.58912
Female	27.23317146	21.80290604	5.430265	-0.60222	1.518047
	26.30326462	21.69820595	4.605059	-1.42742	2.689659
	27.68857956	23.57600403	4.112576	-1.91991	3.783986
	27.19836998	21.27204323	5.926327	-0.10616	1.076356
	26.26378822	21.57160187	4.692186	-1.3403	2.532032
	26.77512932	21.63104248	5.144087	-0.8884	1.851116
				Fold gene expression	2.241866
				Standard deviation	0.969315
				Standard error of the mean	0.395721
				Relative standard error of mean	17.65143

Table S.1.13: *Cyp2j4* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2j4*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	24.88828468	21.19024277	3.698042	-0.79473	1.734756
	25.57577705	21.41108322	4.164694	-0.32808	1.255343
	27.3547802	23.41542816	3.939352	-0.55342	1.467563
	26.62948799	21.7329464	4.896542	0.403767	0.755882
	26.09538651	20.46039772	5.634989	1.142214	0.453064
	25.85091019	21.22787857	4.623032	0.130257	0.913669
		Mean ΔCt (control)	4.492775		
				Fold gene expression	1.096713
				Standard deviation	0.476182
				Standard error of the mean	0.194401
				Relative standard error of mean	17.72575
Female	26.51693726	21.80290604	4.714031	0.221256	0.857818
	25.38801003	21.69820595	3.689804	-0.80297	1.74469
	25.78979492	21.27204323	4.517752	0.024977	0.982836
	24.92934799	21.57160187	3.357746	-1.13503	2.19623
	25.56069183	21.63104248	3.929649	-0.56313	1.477467
				Fold gene expression	1.451808
				Standard deviation	0.550763
				Standard error of the mean	0.246309
				Relative standard error of mean	16.96565

Table S.1.14: *Cyp2j10* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2j10*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	33.66636276	21.19024277	12.47612	0.984301	0.505471
	32.99433136	21.41108322	11.58325	0.091429	0.938593
	31.50067139	20.65575409	10.84492	-0.6469	1.565802
	32.44746399	21.7329464	10.71452	-0.7773	1.713922
	33.06817245	21.22787857	11.84029	0.348475	0.785414
		Mean ΔCt (control)	11.49182		
				Fold gene expression	1.10184
				Standard deviation	0.517769
				Standard error of the mean	0.231553
				Relative standard error of mean	21.01512
Female	32.1833725	21.80290604	10.38047	-1.11135	2.160482
	32.82197189	21.69820595	11.12377	-0.36805	1.29061
	33.14074326	21.27204323	11.8687	0.376881	0.770101
	33.77165222	21.57160187	12.20005	0.708231	0.61207
	33.09469986	21.63104248	11.46366	-0.02816	1.019712
				Fold gene expression	1.170595
				Standard deviation	0.610203
				Standard error of the mean	0.272891
				Relative standard error of mean	23.31216

Table S.1.15: *Cyp3a2* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	33.68899918	22.86250496	10.82649	-0.63033	1.547923
	34.66284943	22.36817551	12.29467	0.837846	0.559478
	34.50880051	23.12959099	11.37921	-0.07762	1.055275
	34.19684982	22.78125954	11.41559	-0.04124	1.028996
	34.2376442	22.8694725	11.36817	-0.08866	1.063379
		Mean ΔCt (control)	11.45683		
				Fold gene expression	1.05101
				Standard deviation	0.349708
				Standard error of the mean	0.156394
				Relative standard error of mean	14.88035
Female	35.65810394	25.21422005	10.44388	-1.01294	2.018025
	34.7634964	23.18468285	11.57881	0.121986	0.918922
	35.52947235	23.29874611	12.23073	0.773898	0.584835
	32.70921326	22.336092	10.37312	-1.08371	2.119475
	32.52546692	21.34239578	11.18307	-0.27376	1.208952
				Fold gene expression	1.370042
				Standard deviation	0.675933
				Standard error of the mean	0.302286
				Relative standard error of mean	22.06402

Table S.1.16: *Cyp3a23* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a23*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	29.25986862	21.7662735	7.493595	-0.92593	1.899909
	29.97011375	22.06328773	7.906826	-0.5127	1.426717
	31.88621712	21.89413071	9.992086	1.572561	0.336211
	29.0117569	21.03207779	7.979679	-0.43985	1.35646
	30.41083336	21.68539238	8.725441	0.305915	0.808929
		Mean ΔCt (control)	8.419526		
				Fold gene expression	1.165645
				Standard deviation	0.603929
				Standard error of the mean	0.270085
				Relative standard error of mean	23.17044
Female	30.167696	22.53539467	7.632301	-0.78722	1.725751
	29.09408951	22.48576355	6.608326	-1.8112	3.50934
	29.3111763	22.18027306	7.130903	-1.28862	2.442947
	29.20411301	21.98749924	7.216614	-1.20291	2.302038
				Fold gene expression	2.495019
				Standard deviation	0.743992
				Standard error of the mean	0.371996
				Relative standard error of mean	14.90955

Table S.1.17: *Cyp4a1* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	28.21507835	21.19024277	7.024836	-0.74626	1.677438
	28.80516052	21.41108322	7.394077	-0.37702	1.298654
	30.39070892	20.65575409	9.734955	1.96386	0.256342
	28.91800117	21.7329464	7.185055	-0.58604	1.501121
	27.7267971	20.46039772	7.266399	-0.5047	1.418824
	29.24912453	21.22787857	8.021246	0.250151	0.840808
		Mean ΔCt (control)	7.771095		
				Fold gene expression	1.165531
				Standard deviation	0.526995
				Standard error of the mean	0.215145
				Relative standard error of mean	18.45895
Female	28.3837204	21.80290604	6.580814	-1.19028	2.281971
	28.31004715	21.69820595	6.611841	-1.15925	2.233418
	29.10734367	23.57600403	5.53134	-2.23975	4.723168
	27.51332474	21.27204323	6.241282	-1.52981	2.887484
	27.57800484	21.57160187	6.006403	-1.76469	3.398014
	28.09321594	21.63104248	6.462173	-1.30892	2.477562
				Fold gene expression	3.00027
				Standard deviation	0.950425
				Standard error of the mean	0.388009
				Relative standard error of mean	12.93248

Table S.1.18: *Cyp4a2* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	36.9072113	21.3415451	15.56567	-0.92179	1.894459
	37.74897385	21.55198669	16.19699	-0.29046	1.223034
	36.7227478	20.66747475	16.05527	-0.43218	1.34927
	38.39699173	20.26511002	18.13188	1.64443	0.319873
		Mean ΔCt (control)	16.48745		
				Fold gene expression	1.196659
				Standard deviation	0.653112
				Standard error of the mean	0.326556
				Relative standard error of mean	27.28896
Female					
	37.12036896	20.45787621	16.66249	0.175041	0.885743
	39.28878021	23.97945786	15.30932	-1.17813	2.262832
	39.78359222	21.98205376	17.80154	1.314086	0.40218
	38.68133163	21.74609947	16.93523	0.44778	0.73317
	36.59297562	20.99609566	15.59688	-0.89057	1.853911
				Fold gene expression	1.227567
				Standard deviation	0.791615
				Standard error of the mean	0.354021
				Relative standard error of mean	28.83923

Table S.1.19: *Cyp4a3* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a3*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	34.75954056	21.93746185	12.82208	0.799525	0.574538
	33.94125748	22.16553879	11.77572	-0.24684	1.186601
	33.30577087	22.12517929	11.18059	-0.84196	1.792486
	34.62602615	22.91962242	11.7064	-0.31615	1.245004
	33.64625549	21.66824532	11.97801	-0.04454	1.031357
	35.2222023	22.54968262	12.67252	0.649966	0.637295
		Mean ΔCt (control)	12.02255		
				Fold gene expression	1.07788
				Standard deviation	0.447224
				Standard error of the mean	0.182578
				Relative standard error of mean	16.93864
Female	34.84775925	23.05732346	11.79044	-0.23212	1.174558
	35.12662888	22.89714622	12.22948	0.206929	0.86638
	35.63805008	21.75164413	13.88641	1.863852	0.274742
	35.51810455	21.95197487	13.56613	1.543576	0.343034
	35.82263947	22.31215477	13.51048	1.487931	0.356523
				Fold gene expression	0.603047
				Standard deviation	0.397534
				Standard error of the mean	0.177783
				Relative standard error of mean	29.48072

Table S.1.20: *Cyp4f1* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	27.99660683	21.93746185	6.059145	1.07968	0.473134
	27.13925743	22.16553879	4.973719	-0.00575	1.003991
	26.42750168	22.12517929	4.302322	-0.67714	1.598969
	28.21333313	22.91962242	5.293711	0.314246	0.804271
	25.93667221	21.66824532	4.268427	-0.71104	1.636981
		Mean ΔCt (control)	4.979465		
				Fold gene expression	1.103469
				Standard deviation	0.506679
				Standard error of the mean	0.226594
				Relative standard error of mean	20.53466
Female	26.77590942	23.05732346	3.718586	-1.26088	2.396417
	26.09575272	22.89714622	3.198606	-1.78086	3.436305
	27.04598045	24.28857994	2.757401	-2.22206	4.665605
	25.25510406	21.75164413	3.50346	-1.476	2.781773
	26.04194069	21.95197487	4.089966	-0.8895	1.852533
	26.57153511	22.31215477	4.25938	-0.72008	1.647278
				Fold gene expression	2.796652
				Standard deviation	1.120265
				Standard error of the mean	0.457346
				Relative standard error of mean	16.35336

Table S.1.21: *Cyp4f4* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f4*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	31.81648636	22.16553879	9.650948	-0.62922	1.54673
	32.06219864	22.12517929	9.937019	-0.34315	1.268523
	34.97869492	22.91962242	12.05907	1.778904	0.291405
	31.31488037	21.66824532	9.646635	-0.63353	1.55136
	32.65685272	22.54968262	10.10717	-0.173	1.127399
		Mean ΔCt (control)	10.28017		
				Fold gene expression	1.157083
				Standard deviation	0.517199
				Standard error of the mean	0.231298
				Relative standard error of mean	19.98977
Female	31.54910088	23.05732346	8.491777	-1.78839	3.454295
	31.76424599	22.89714622	8.8671	-1.41307	2.663031
	30.97224236	21.75164413	9.220598	-1.05957	2.084311
	29.91296196	21.95197487	7.960987	-2.31918	4.990491
	31.72716331	22.31215477	9.415009	-0.86516	1.821542
				Fold gene expression	3.002734
				Standard deviation	1.275657
				Standard error of the mean	0.570491
				Relative standard error of mean	18.99905

Table S.1.22: *Cyp4f5* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f5*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	23.18008041	20.44839668	2.731684	0.413446	0.750828
	22.81097031	21.11756516	1.693405	-0.62483	1.542031
	22.67821503	20.65575409	2.022461	-0.29578	1.227545
	22.84887886	21.05667305	1.792206	-0.52603	1.439963
	22.48275757	20.1381073	2.34465	0.026413	0.981859
	23.961689	20.63667107	3.325018	1.006781	0.497656
		Mean ΔCt (control)	2.318237		
				Fold gene expression	1.073314
				Standard deviation	0.405379
				Standard error of the mean	0.165495
				Relative standard error of mean	15.41908
Female	23.19177437	21.86377716	1.327997	-0.99024	1.986516
	22.12547493	21.61183929	0.513636	-1.8046	3.493327
	22.42471123	20.75888824	1.665823	-0.65241	1.571796
	22.01683044	20.55188942	1.464941	-0.8533	1.806624
	23.30839348	20.89955521	2.408838	0.090601	0.939131
				Fold gene expression	1.959479
				Standard deviation	0.944483
				Standard error of the mean	0.422386
				Relative standard error of mean	21.55602

Table S.1.23: *Cyp4f6* mRNA expression in the heart of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f6*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	23.12285233	20.44839668	2.674456	-0.10512	1.075587
	24.0228138	21.11756516	2.905249	0.125669	0.916579
	23.4430542	20.65575409	2.7873	0.007721	0.994663
	24.04642677	21.05667305	2.989754	0.210174	0.864433
	22.64389992	20.1381073	2.505793	-0.27379	1.208977
	23.45159721	20.63667107	2.814926	0.035347	0.975797
		Mean ΔCt (control)	2.779579		
				Fold gene expression	1.006006
				Standard deviation	0.122573
				Standard error of the mean	0.05004
				Relative standard error of mean	4.974129
Female	22.92057037	21.86377716	1.056793	-1.72279	3.300733
	23.2191391	21.61183929	1.6073	-1.17228	2.253675
	23.83021355	23.12124252	0.708971	-2.07061	4.200638
	22.76478958	20.75888824	2.005901	-0.77368	1.709623
	22.65598297	20.55188942	2.104094	-0.67549	1.597135
	23.19455338	20.89955521	2.294998	-0.48458	1.39918
				Fold gene expression	2.410164
				Standard deviation	1.113307
				Standard error of the mean	0.454506
				Relative standard error of mean	18.85787

S.2 Calculation of the fold change in the liver level of target genes between female and male rats normalized to the housekeeping gene using the ΔΔCT method:

Table S.2.1: *Cyp1a1* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp1a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	27.1903019	21.88467026	5.305632	-0.67301	1.594398
	27.54239464	21.40517998	6.137215	0.158571	0.895912
	28.3407402	21.32709694	7.013643	1.035	0.488016
	27.38173103	22.04953957	5.332191	-0.64645	1.565314
	27.83932114	21.73478508	6.104536	0.125893	0.916437
		Mean ΔCt (control)	5.978643		
				Fold gene expression	1.092015
				Standard deviation	0.4771
				Standard error of the mean	0.213366
				Relative standard error of mean	19.53872
Female	25.96431923	20.89143944	5.07288	-0.90576	1.873536
	27.02539635	20.72109985	6.304296	0.325653	0.797937
	26.12791252	21.08501244	5.0429	-0.93574	1.912876
	27.49214745	20.66811371	6.824034	0.84539	0.55656
	26.22910309	20.28797722	5.941126	-0.03752	1.026346
				Fold gene expression	1.233451
				Standard deviation	0.624915
				Standard error of the mean	0.27947
				Relative standard error of mean	22.65759

Table S.2.2: *Cyp1a2* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp1a2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	19.89443588	21.88467026	-1.99023	-0.31153	1.241024
	20.33478546	21.40517998	-1.07039	0.608309	0.655965
	20.1892395	21.32709694	-1.13786	0.540846	0.687368
	19.78228569	22.04953957	-2.26725	-0.58855	1.503735
	20.22178459	21.73478508	-1.513	0.165703	0.891494
	20.02577019	22.11924934	-2.09348	-0.41478	1.333092
		Mean ΔCt (control)	-1.6787		
				Fold gene expression	1.052113
				Standard deviation	0.356194
				Standard error of the mean	0.145415
				Relative standard error of mean	13.82128
Female	18.56800842	20.89143944	-2.32343	-0.64473	1.563444
	18.61347771	20.72109985	-2.10762	-0.42892	1.346224
	19.01803207	20.0019474	-0.98392	0.694788	0.6178
	19.36067581	21.08501244	-1.72434	-0.04563	1.032136
	19.1503315	20.66811371	-1.51778	0.160921	0.894454
	18.05700874	20.28797722	-2.23097	-0.55227	1.466386
				Fold gene expression	1.153407
				Standard deviation	0.36658
				Standard error of the mean	0.149656
				Relative standard error of mean	12.97508

Table S.2.3: *Cyp1b1* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp1b1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	32.04344559	21.88467026	10.15878	0.216345	0.860743
	31.14527512	21.40517998	9.740095	-0.20233	1.150559
	31.12107658	21.32709694	9.79398	-0.14845	1.108378
	31.87917519	22.04953957	9.829636	-0.11279	1.081321
	31.92444992	21.73478508	10.18966	0.247235	0.84251
		Mean ΔCt (control)	9.94243		
				Fold gene expression	1.008702
				Standard deviation	0.14564
				Standard error of the mean	0.065132
				Relative standard error of mean	6.457025
Female	32.96253967	20.89143944	12.0711	2.12867	0.228669
	32.2551651	20.72109985	11.53407	1.591635	0.331795
	32.72870636	20.0019474	12.72676	2.784329	0.145156
	31.74835968	21.08501244	10.66335	0.720917	0.606712
	31.26067543	20.66811371	10.59256	0.650132	0.637222
	31.07182503	20.28797722	10.78385	0.841418	0.558095
				Fold gene expression	0.417941
				Standard deviation	0.210247
				Standard error of the mean	0.085833
				Relative standard error of mean	20.53708

Table S.2.4: *Cyp2a1* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	18.4530735	22.33282661	-3.87975	-0.4252	1.34276
	16.77977371	20.00734138	-3.22757	0.226984	0.854419
	18.48085594	22.09959602	-3.61874	-0.16419	1.120536
	17.07998276	20.5872097	-3.50723	-0.05268	1.037187
	16.21551514	18.93590355	-2.72039	0.734163	0.601167
	16.51438141	20.28801346	-3.77363	-0.31908	1.247535
		Mean ΔCt (control)	-3.45455		
				Fold gene expression	1.033934
				Standard deviation	0.271302
				Standard error of the mean	0.110758
				Relative standard error of mean	10.71233
Female	14.4031105	19.47748566	-5.07438	-1.61982	3.073375
	15.28843021	21.30310631	-6.01468	-2.56012	5.897587
	15.90442657	20.04458618	-4.14016	-0.68561	1.60838
	15.78352928	20.70932961	-4.9258	-1.47125	2.772618
	14.43437099	19.17353249	-4.73916	-1.28461	2.436162
	14.34364605	19.71036148	-5.36672	-1.91216	3.763732
				Fold gene expression	3.258642
				Standard deviation	1.475773
				Standard error of the mean	0.602482
				Relative standard error of mean	18.48873

Table S.2.5: *Cyp2b1* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2b1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	25.49092293	22.33282661	3.158096	0.746702	0.595964
	21.14013481	20.00734138	1.132793	-1.2786	2.426036
	24.68083382	22.09959602	2.581238	0.169844	0.888939
	22.44049072	20.5872097	1.853281	-0.55811	1.472342
	22.26746559	18.93590355	3.331562	0.920168	0.528448
			Mean ΔCt (control)	2.411394	
				Fold gene expression	1.182346
				Standard deviation	0.788729
				Standard error of the mean	0.35273
				Relative standard error of mean	29.83311
Female	23.88619041	19.47748566	4.408705	1.997311	0.250466
	27.43149376	21.30310631	6.128387	3.716993	0.076045
	26.25716782	20.04458618	6.212582	3.801188	0.071735
	24.9078331	20.70932961	4.198503	1.787109	0.289752
	25.42348862	19.17353249	6.249956	3.838562	0.0699
	24.61631966	19.71036148	4.905958	2.494564	0.177444
				Fold gene expression	0.15589
				Standard deviation	0.098163
				Standard error of the mean	0.040075
				Relative standard error of mean	25.70708

Table S.2.6: *Cyp2b2* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2b2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	20.05709267	22.33282661	-2.27573	-0.12226	1.088437
	16.89903641	20.00734138	-3.1083	-0.95483	1.93835
	19.86379814	22.09959602	-2.2358	-0.08232	1.058721
	19.27927017	20.5872097	-1.30794	0.845536	0.556504
	17.24253845	18.93590355	-1.69337	0.460111	0.72693
	17.98830032	20.28801346	-2.29971	-0.14624	1.106679
		Mean ΔCt (control)	-2.15348		
				Fold gene expression	1.07927
				Standard deviation	0.476803
				Standard error of the mean	0.194654
				Relative standard error of mean	18.03569
Female	17.26698112	19.47748566	-2.2105	-0.05703	1.040321
	20.46083832	21.30310631	-0.84227	1.311208	0.402983
	20.24387932	20.04458618	0.199293	2.352769	0.19577
	18.24297714	20.70932961	-2.46635	-0.31288	1.242182
	19.45895195	19.17353249	0.285419	2.438895	0.184425
	18.26835251	19.71036148	-1.44201	0.711467	0.610699
				Fold gene expression	0.61273
				Standard deviation	0.442796
				Standard error of the mean	0.180771
				Relative standard error of mean	29.50253

Table S.2.7: *Cyp2c6* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c6*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	18.30450439	22.33282661	-4.02832	-0.86967	1.827239
	17.07195473	20.00734138	-2.93539	0.22327	0.856622
	18.48781204	22.09959602	-3.61178	-0.45313	1.369005
	17.60372734	20.5872097	-2.98348	0.175174	0.88566
	16.7560215	18.93590355	-2.17988	0.978775	0.507411
	17.07493019	20.28801346	-3.21308	-0.05443	1.038446
		Mean ΔCt (control)	-3.15866		
				Fold gene expression	1.08073
				Standard deviation	0.460247
				Standard error of the mean	0.187895
				Relative standard error of mean	17.38594
Female	15.96260357	19.47748566	-3.51488	-0.35623	1.280072
	16.42355156	20.04458618	-3.62103	-0.46238	1.377811
	17.28323555	20.70932961	-3.42609	-0.26744	1.203668
	15.78431797	19.17353249	-3.38921	-0.23056	1.173288
	15.87950802	19.71036148	-3.83085	-0.6722	1.593497
				Fold gene expression	1.325667
				Standard deviation	0.169288
				Standard error of the mean	0.075708
				Relative standard error of mean	5.710935

Table S.2.8: *Cyp2c11* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c11*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	16.40513229	22.33282661	-5.92769	-0.80642	1.748871
	15.24024487	20.00734138	-4.7671	0.354174	0.782318
	16.46564293	22.09959602	-5.63395	-0.51268	1.426701
	15.21088886	20.5872097	-5.37632	-0.25505	1.193378
	15.03774738	18.93590355	-3.89816	1.223114	0.428357
	15.16361237	20.28801346	-5.1244	-0.00313	1.002172
		Mean ΔCt (control)	-5.12127		
				Fold gene expression	1.096966
				Standard deviation	0.468621
				Standard error of the mean	0.191314
				Relative standard error of mean	17.44026
Female					
	26.28154755	21.30310631	4.978441	10.09971	0.000911
	26.10057068	20.04458618	6.055984	11.17725	0.000432
	25.51708221	20.70932961	4.807753	9.929023	0.001026
	25.46457291	19.17353249	6.29104	11.41231	0.000367
	25.4253521	19.71036148	5.714991	10.83626	0.000547
				Fold gene expression	0.000657
				Standard deviation	0.000295
				Standard error of the mean	0.000132
				Relative standard error of mean	20.08128

Table S.2.9: *Cyp2c12* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c12*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	30.055336	22.33282661	7.722509	1.003765	0.498697
	24.32423019	20.00734138	4.316889	-2.40186	5.284823
	28.42908859	20.5872097	7.841879	1.123135	0.459095
	26.90167809	18.93590355	7.965775	1.247031	0.421314
	26.03468132	20.28801346	5.746668	-0.97208	1.961661
		Mean ΔCt (control)	6.718744		
				Fold gene expression	1.725118
				Standard deviation	2.093698
				Standard error of the mean	0.93633
				Relative standard error of mean	54.27628
Female	19.28835678	19.47748566	-0.18913	-6.90787	120.0817
	19.08397102	21.30310631	-2.21914	-8.93788	490.4218
	19.26565742	20.04458618	-0.77893	-7.49767	180.7276
	21.42381096	20.70932961	0.714481	-6.00426	64.18937
	19.81147766	19.71036148	0.101116	-6.61763	98.19841
				Fold gene expression	190.7238
				Standard deviation	172.8301
				Standard error of the mean	77.29198
				Relative standard error of mean	40.52562

Table S.2.10: *Cyp2c13* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c13*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	16.92094994	22.33282661	-5.41188	-0.48094	1.395653
	14.83981609	20.00734138	-5.16753	-0.23659	1.178204
	16.39010429	22.09959602	-5.70949	-0.77856	1.715413
	15.9002533	20.5872097	-4.68696	0.24398	0.844413
	15.28989124	18.93590355	-3.64601	1.284924	0.410392
	15.3242588	20.28801346	-4.96375	-0.03282	1.023009
		Mean ΔCt (control)	-4.93094		
				Fold gene expression	1.094514
				Standard deviation	0.451418
				Standard error of the mean	0.184291
				Relative standard error of mean	16.83766
Female					
	25.75004387	21.30310631	4.446938	9.377874	0.001503
	25.67071533	20.04458618	5.626129	10.55707	0.000664
	25.67986488	20.70932961	4.970535	9.901471	0.001046
	25.45578194	19.17353249	6.282249	11.21319	0.000421
	25.90918732	19.71036148	6.198826	11.12976	0.000446
				Fold gene expression	0.000816
				Standard deviation	0.000458
				Standard error of the mean	0.000205
				Relative standard error of mean	25.1233

Table S.2.11: *Cyp2c23* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c23*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	15.66025448	21.88467026	-6.22442	-0.34325	1.268612
	15.91801167	21.40517998	-5.48717	0.393997	0.761018
	15.85260105	21.32709694	-5.4745	0.406669	0.754363
	16.08489227	22.04953957	-5.96465	-0.08348	1.059572
	15.95038223	21.73478508	-5.7844	0.096762	0.935129
	15.7673893	22.11924934	-6.35186	-0.4707	1.385777
		Mean ΔCt (control)	-5.88117		
				Fold gene expression	1.027412
				Standard deviation	0.261409
				Standard error of the mean	0.10672
				Relative standard error of mean	10.38726
Female	15.4875412	20.89143944	-5.4039	0.477267	0.718337
	15.31864643	20.72109985	-5.40245	0.478712	0.717618
	15.85948563	20.0019474	-4.14246	1.738703	0.299639
	15.6661129	21.08501244	-5.4189	0.462265	0.725846
	15.53650284	20.66811371	-5.13161	0.749554	0.594787
	14.84587955	20.28797722	-5.4421	0.439067	0.737611
				Fold gene expression	0.632306
				Standard deviation	0.171227
				Standard error of the mean	0.069903
				Relative standard error of mean	11.05526

Table S.2.12: *Cyp2d2* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2d2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	23.96702957	21.47598076	2.491049	0.438255	0.738027
	22.2126503	20.26247215	1.950178	-0.10262	1.073719
	23.28487587	20.97448921	2.310387	0.257593	0.836483
	23.06319427	20.92868996	2.134504	0.08171	0.944937
	23.00608063	20.9538002	2.05228	-0.00051	1.000356
	22.05823326	20.67986679	1.378366	-0.67443	1.595964
		Mean ΔCt (control)	2.052794		
				Fold gene expression	1.031581
				Standard deviation	0.301006
				Standard error of the mean	0.122885
				Relative standard error of mean	11.91231
Female	20.70548439	19.73490524	0.970579	-1.08221	2.117284
	21.9311657	20.25279045	1.678375	-0.37442	1.296317
	22.03750229	20.39632988	1.641172	-0.41162	1.33018
	20.27261925	20.09247208	0.180147	-1.87265	3.662039
	20.80827522	20.48305702	0.325218	-1.72758	3.311709
				Fold gene expression	2.343506
				Standard deviation	1.101199
				Standard error of the mean	0.492471
				Relative standard error of mean	21.01429

Table S.2.13: *Cyp2d3* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2d3*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	21.05870438	21.47598076	-0.41728	-0.23108	1.17371
	20.64422607	20.26247215	0.381754	0.567954	0.674573
	20.85568237	20.97448921	-0.11881	0.067394	0.954361
	20.79410553	20.92868996	-0.13458	0.051616	0.964855
	20.4638958	20.9538002	-0.4899	-0.3037	1.234309
	20.34148216	20.67986679	-0.33838	-0.15218	1.111251
		Mean ΔCt (control)	-0.1862		
				Fold gene expression	1.018843
				Standard deviation	0.202259
				Standard error of the mean	0.082572
				Relative standard error of mean	8.104475
Female	20.32961273	19.73490524	0.594707	0.780908	0.582
	20.62394905	20.25279045	0.371159	0.557359	0.679545
	20.78073311	18.72257614	2.058157	2.244357	0.211048
	21.78439331	20.39632988	1.388063	1.574264	0.335814
	20.56531906	20.09247208	0.472847	0.659047	0.633296
	20.9396019	20.48305702	0.456545	0.642745	0.640493
				Fold gene expression	0.5137
				Standard deviation	0.192765
				Standard error of the mean	0.078696
				Relative standard error of mean	15.31942

Table S.2.14: *Cyp2d4* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2d4*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	28.76899529	21.47598076	7.293015	0.113128	0.924581
	27.19094658	20.26247215	6.928474	-0.25141	1.190372
	28.8094101	20.97448921	7.834921	0.655034	0.63506
	28.35194397	20.92868996	7.423254	0.243367	0.844771
	27.32574654	20.9538002	6.371946	-0.80794	1.75071
	27.90757751	20.67986679	7.227711	0.047824	0.967394
		Mean ΔCt (control)	7.179887		
				Fold gene expression	1.052148
				Standard deviation	0.386657
				Standard error of the mean	0.157852
				Relative standard error of mean	15.00284
Female	27.16774178	19.73490524	7.432837	0.25295	0.839179
	28.01287842	20.25279045	7.760088	0.580201	0.668871
	26.75129318	18.72257614	8.028717	0.84883	0.555235
	28.10928917	20.39632988	7.712959	0.533072	0.691081
	27.00345612	20.09247208	6.910984	-0.2689	1.204891
	27.11522675	20.48305702	6.63217	-0.54772	1.461771
				Fold gene expression	0.903505
				Standard deviation	0.35443
				Standard error of the mean	0.144695
				Relative standard error of mean	16.01489

Table S.2.15: *Cyp2e1* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2e1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	17.13682938	21.88467026	-4.74784	0.770882	0.586059
	16.604105	21.40517998	-4.80107	0.717648	0.608088
	15.93671608	21.32709694	-5.39038	0.128342	0.914882
	16.03761482	22.04953957	-6.01192	-0.4932	1.407565
	15.62899399	21.73478508	-6.10579	-0.58707	1.502191
	16.06392288	22.11924934	-6.05533	-0.5366	1.450553
		Mean ΔCt (control)	-5.51872		
				Fold gene expression	1.078223
				Standard deviation	0.4282
				Standard error of the mean	0.174812
				Relative standard error of mean	16.21297
Female	14.77024651	20.89143944	-6.12119	-0.60247	1.518314
	15.0603714	20.72109985	-5.66073	-0.14201	1.103438
	14.62727261	20.0019474	-5.37467	0.144048	0.904976
	15.01053524	21.08501244	-6.07448	-0.55575	1.469937
	14.86835861	20.66811371	-5.79976	-0.28103	1.215064
	14.34446526	20.28797722	-5.94351	-0.42479	1.342376
				Fold gene expression	1.259017
				Standard deviation	0.232445
				Standard error of the mean	0.094895
				Relative standard error of mean	7.537234

Table S.2.16: *Cyp2j3* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2j3*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	21.25211906	21.88467026	-0.63255	0.0593	0.95973
	21.33333778	21.40517998	-0.07184	0.620009	0.650667
	20.96491814	21.32709694	-0.36218	0.329672	0.795717
	20.95210457	22.04953957	-1.09743	-0.40558	1.324625
	20.83299446	21.73478508	-0.90179	-0.20994	1.15664
	21.03394127	22.11924934	-1.08531	-0.39346	1.313537
		Mean ΔCt (control)	-0.69185		
				Fold gene expression	1.033486
				Standard deviation	0.278166
				Standard error of the mean	0.113561
				Relative standard error of mean	10.98813
Female	20.60764885	20.89143944	-0.28379	0.40806	0.753636
	21.56151772	20.72109985	0.840418	1.532269	0.345733
	21.03738594	21.08501244	-0.04763	0.644224	0.639837
	21.83067703	20.66811371	1.162563	1.854414	0.276545
	21.32190323	20.28797722	1.033926	1.725777	0.302336
				Fold gene expression	0.463617
				Standard deviation	0.217984
				Standard error of the mean	0.097486
				Relative standard error of mean	21.02716

Table S.2.17: *Cyp2j4* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2j4*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	21.84089279	21.47598076	0.364912	-0.35876	1.282325
	20.95622063	20.26247215	0.693748	-0.02993	1.020959
	21.94081879	20.97448921	0.96633	0.242656	0.845188
	21.9086647	20.92868996	0.979975	0.256301	0.837232
	21.56383514	20.9538002	0.610035	-0.11364	1.081954
	21.40690994	20.67986679	0.727043	0.003369	0.997667
		Mean ΔCt (control)	0.723674		
				Fold gene expression	1.010888
				Standard deviation	0.165298
				Standard error of the mean	0.067483
				Relative standard error of mean	6.67559
Female	21.12786674	19.73490524	1.392962	0.669288	0.628817
	21.44385529	20.25279045	1.191065	0.467391	0.723271
	21.31331444	18.72257614	2.590738	1.867064	0.274131
	21.70187378	20.39632988	1.305544	0.58187	0.668097
	21.3146801	20.09247208	1.222208	0.498534	0.707826
	21.14585686	20.48305702	0.6628	-0.06087	1.043097
				Fold gene expression	0.674207
				Standard deviation	0.245673
				Standard error of the mean	0.100296
				Relative standard error of mean	14.8761

Table S.2.18: *Cyp2j10* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2j10*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	31.16314888	21.10664368	10.05651	-0.64912	1.568211
	30.35653496	18.86980438	11.48673	0.781106	0.581921
	31.36725807	21.02325821	10.344	-0.36162	1.284872
	30.54577827	20.01047897	10.5353	-0.17033	1.125312
	31.51574898	20.85785294	10.6579	-0.04773	1.033636
	30.63983536	19.48651886	11.15332	0.447692	0.733215
		Mean ΔCt (control)	10.70562		
				Fold gene expression	1.054528
				Standard deviation	0.360271
				Standard error of the mean	0.14708
				Relative standard error of mean	13.94747
Female	31.54032135	19.73880577	11.80152	1.095891	0.467847
	31.89519119	20.37353134	11.52166	0.816035	0.568001
	30.68645477	19.03637123	11.65008	0.944459	0.519624
	30.30920219	19.04911041	11.26009	0.554467	0.680908
	30.94412613	17.97408104	12.97005	2.264421	0.208133
	30.40797806	18.18707848	12.2209	1.515275	0.34983
				Fold gene expression	0.465724
				Standard deviation	0.167008
				Standard error of the mean	0.068181
				Relative standard error of mean	14.63977

Table S.2.19: *Cyp3a1* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	17.78360367	21.47598076	-3.69238	0.083422	0.943816
	16.49839973	20.26247215	-3.76407	0.011727	0.991905
	17.98199463	20.97448921	-2.99249	0.783305	0.581034
	17.20392227	20.92868996	-3.72477	0.051031	0.965246
	17.08751869	20.9538002	-3.86628	-0.09048	1.064726
	16.06506538	20.67986679	-4.6148	-0.839	1.788813
		Mean ΔCt (control)	-3.7758		
				Fold gene expression	1.055923
				Standard deviation	0.396891
				Standard error of the mean	0.16203
				Relative standard error of mean	15.34487
Female	16.05394554	19.73490524	-3.68096	0.094839	0.936376
	17.18310738	20.25279045	-3.06968	0.706116	0.612968
	17.4712429	18.72257614	-1.25133	2.524466	0.173804
	16.47821426	20.39632988	-3.91812	-0.14232	1.103676
	17.50841522	20.09247208	-2.58406	1.191742	0.437774
	17.13933563	20.48305702	-3.34372	0.432078	0.741194
				Fold gene expression	0.667632
				Standard deviation	0.336885
				Standard error of the mean	0.137533
				Relative standard error of mean	20.60009

Table S.2.20: *Cyp3a2* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	19.74202156	20.94281006	-1.20079	-0.1165	1.084099
	16.85701942	18.45859718	-1.60158	-0.51729	1.43126
	19.55093384	20.57956696	-1.02863	0.055659	0.962155
	19.21705246	19.27609253	-0.05904	1.025252	0.491324
	18.96092796	20.4620533	-1.50113	-0.41683	1.334994
	17.89879799	19.01338577	-1.11459	-0.0303	1.021221
		Mean ΔCt (control)	-1.08429		
				Fold gene expression	1.054176
				Standard deviation	0.33115
				Standard error of the mean	0.135191
				Relative standard error of mean	12.82438
Female					
	20.46822929	19.9620285	0.506201	1.590493	0.332058
	20.12581253	18.85101891	1.274794	2.359086	0.194915
	17.68200111	18.57664299	-0.89464	0.18965	0.876818
	19.21388435	18.01794052	1.195944	2.280236	0.205864
	17.55674362	18.18960571	-0.63286	0.45143	0.731318
				Fold gene expression	0.468195
				Standard deviation	0.315531
				Standard error of the mean	0.14111
				Relative standard error of mean	30.13914

Table S.2.21: *Cyp3a9* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a9*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	26.52981758	21.10664368	5.423174	0.613039	0.653818
	24.6495533	18.86980438	5.779749	0.969614	0.510643
	26.36856842	21.02325821	5.34531	0.535176	0.690075
	24.46473312	20.85785294	3.60688	-1.20325	2.302585
	23.38207817	19.48651886	3.895559	-0.91458	1.885014
		Mean ΔCt (control)	4.810135		
				Fold gene expression	1.208427
				Standard deviation	0.824338
				Standard error of the mean	0.368655
				Relative standard error of mean	30.50705
Female	21.68917656	19.73880577	1.950371	-2.85976	7.258964
	21.80817795	19.03637123	2.771807	-2.03833	4.107691
	20.47810936	19.04911041	1.428999	-3.38114	10.41893
	18.53935051	17.97408104	0.565269	-4.24487	18.95971
	19.56140137	18.18707848	1.374323	-3.43581	10.82137
				Fold gene expression	10.31333
				Standard deviation	5.542298
				Standard error of the mean	2.478591
				Relative standard error of mean	24.03288

Table S.2.22: *Cyp3a18* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a18*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	31.24169731	20.8724823	10.36922	0.285637	0.82038
	30.88352966	20.7446537	10.13888	0.055297	0.962396
	31.58528328	21.34989548	10.23539	0.151809	0.900121
	31.07600021	21.55722809	9.518772	-0.56481	1.479189
	31.27173042	21.11608887	10.15564	0.072063	0.951277
		Mean ΔCt (control)	10.08358		
				Fold gene expression	1.022672
				Standard deviation	0.261285
				Standard error of the mean	0.11685
				Relative standard error of mean	11.42596
Female	35.04505157	21.04141045	14.00364	3.920063	0.066061
	36.68312073	20.96590233	15.71722	5.63364	0.020142
	33.97431946	19.11339188	14.86093	4.777349	0.036465
	34.89445114	20.8316555	14.0628	3.979217	0.063407
	35.3510704	20.29788017	15.05319	4.969612	0.031915
				Fold gene expression	0.043598
				Standard deviation	0.020215
				Standard error of the mean	0.00904
				Relative standard error of mean	20.73543

Table S.2.23: *Cyp3a23* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a23*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	18.23514175	21.10664368	-2.8715	0.226627	0.85463
	16.25152397	18.86980438	-2.61828	0.479849	0.717053
	18.53732872	21.02325821	-2.48593	0.6122	0.654198
	16.53012276	20.01047897	-3.48036	-0.38223	1.303352
	17.75306892	20.85785294	-3.10478	-0.00665	1.004623
	15.45859528	19.48651886	-4.02792	-0.92979	1.905004
		Mean ΔCt (control)	-3.09813		
				Fold gene expression	1.073144
				Standard deviation	0.468988
				Standard error of the mean	0.191463
				Relative standard error of mean	17.84136
Female	16.46657181	19.73880577	-3.27223	-0.1741	1.128264
	17.5465374	20.37353134	-2.82699	0.271135	0.828667
	17.74831581	19.03637123	-1.28806	1.810074	0.285176
	15.51676464	19.04911041	-3.53235	-0.43422	1.351177
	16.39876938	17.97408104	-1.57531	1.522818	0.348006
	15.97563839	18.18707848	-2.21144	0.886689	0.540854
				Fold gene expression	0.747024
				Standard deviation	0.431749
				Standard error of the mean	0.176261
				Relative standard error of mean	23.59506

Table S.2.24: *Cyp4a1* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	21.02525902	21.88467026	-0.85941	-0.02779	1.019446
	21.30592918	21.40517998	-0.09925	0.732375	0.601912
	21.27701378	21.32709694	-0.05008	0.781542	0.581744
	21.09216309	22.04953957	-0.95738	-0.12575	1.091075
	20.35990143	21.73478508	-1.37488	-0.54326	1.45726
	20.47050095	22.11924934	-1.64875	-0.81712	1.761889
		Mean ΔCt (control)	-0.83163		
				Fold gene expression	1.085554
				Standard deviation	0.466418
				Standard error of the mean	0.190414
				Relative standard error of mean	17.54074
Female	19.23550034	20.89143944	-1.65594	-0.82431	1.770692
	18.66377068	20.72109985	-2.05733	-1.2257	2.338695
	20.0784111	20.0019474	0.076464	0.908089	0.53289
	20.26852798	21.08501244	-0.81648	0.015141	0.98956
	19.99027252	20.66811371	-0.67784	0.153784	0.898889
	19.10308075	20.28797722	-1.1849	-0.35327	1.277454
				Fold gene expression	1.301363
				Standard deviation	0.655234
				Standard error of the mean	0.267498
				Relative standard error of mean	20.55521

Table S.2.25: *Cyp4a2* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	18.02228355	20.8724823	-2.8502	0.591914	0.663462
	17.504879	20.7446537	-3.23977	0.202338	0.869141
	18.159132	21.34989548	-3.19076	0.251349	0.84011
	17.97693634	21.55722809	-3.58029	-0.13818	1.100515
	17.72946548	22.07900047	-4.34953	-0.90742	1.875691
			Mean ΔCt (control)	-3.44211	
				Fold gene expression	1.069784
				Standard deviation	0.476586
				Standard error of the mean	0.213136
				Relative standard error of mean	19.92324
Female					
	28.64541245	20.96590233	7.67951	11.12162	0.000449
	27.9602375	19.11339188	8.846846	12.28896	0.0002
	28.15448189	20.8316555	7.322826	10.76494	0.000575
	29.38304329	20.86181259	8.521231	11.96334	0.00025
	28.95898056	20.29788017	8.6611	12.10321	0.000227
				Fold gene expression	0.00034
				Standard deviation	0.000164
				Standard error of the mean	7.32E-05
				Relative standard error of mean	21.52928

Table S.2.26: *Cyp4a3* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a3*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	18.83239746	20.8724823	-2.04008	0.033601	0.976979
	18.80909157	20.7446537	-1.93556	0.138123	0.9087
	19.2974205	21.34989548	-2.05247	0.02121	0.985406
	19.02155495	21.55722809	-2.53567	-0.46199	1.377438
	19.31145668	21.11608887	-1.80463	0.269053	0.829864
		Mean ΔCt (control)	-2.07369		
				Fold gene expression	1.015677
				Standard deviation	0.211693
				Standard error of the mean	0.094672
				Relative standard error of mean	9.321066
Female	18.9805069	21.04141045	-2.0609	0.012782	0.991179
	18.61083412	20.96590233	-2.35507	-0.28138	1.215359
	18.51231956	19.11339188	-0.60107	1.472613	0.360329
	19.00722885	20.8316555	-1.82443	0.249259	0.841329
	19.07697487	20.86181259	-1.78484	0.288848	0.818556
	18.78233337	20.29788017	-1.51555	0.558139	0.679178
				Fold gene expression	0.817655
				Standard deviation	0.288847
				Standard error of the mean	0.117921
				Relative standard error of mean	14.4219

Table S.2.27: *Cyp4a8* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a8*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	35.93387222	20.8724823	15.06139	0.522375	0.696225
	35.91472626	20.7446537	15.17007	0.631058	0.645703
	35.8786087	21.34989548	14.52871	-0.0103	1.007166
	35.93473434	21.55722809	14.37751	-0.16151	1.118456
	35.74394608	21.11608887	14.62786	0.088842	0.940277
	35.5475502	22.07900047	13.46855	-1.07047	2.10011
		Mean ΔCt (control)	14.53901		
				Fold gene expression	1.084656
				Standard deviation	0.52966
				Standard error of the mean	0.216233
				Relative standard error of mean	19.93561
Female	35.97494888	21.04141045	14.93354	0.394524	0.760741
	35.08459473	19.11339188	15.9712	1.432188	0.370568
	36.28350067	20.8316555	15.45185	0.91283	0.531142
	37.85520172	20.86181259	16.99339	2.454374	0.182457
	35.62527466	20.29788017	15.32739	0.78838	0.578994
				Fold gene expression	0.48478
				Standard deviation	0.218874
				Standard error of the mean	0.097884
				Relative standard error of mean	20.19131

Table S.2.28: *Cyp4f1* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	16.8526535	20.8724823	-4.01983	0.343711	0.788012
	16.50281715	20.7446537	-4.24184	0.121703	0.919102
	16.89003944	21.34989548	-4.45986	-0.09632	1.069041
	17.26995087	21.55722809	-4.28728	0.076262	0.948512
	16.77445984	21.11608887	-4.34163	0.02191	0.984928
	17.24819183	22.07900047	-4.83081	-0.46727	1.38249
		Mean ΔCt (control)	-4.36354		
				Fold gene expression	1.015347
				Standard deviation	0.201997
				Standard error of the mean	0.082465
				Relative standard error of mean	8.121839
Female	17.07052994	21.04141045	-3.97088	0.392659	0.761724
	16.98641396	20.96590233	-3.97949	0.384051	0.766283
	17.18163109	19.11339188	-1.93176	2.431779	0.185337
	17.26861572	20.8316555	-3.56304	0.8005	0.57415
	17.37354469	20.86181259	-3.48827	0.875271	0.545151
	16.61227226	20.29788017	-3.68561	0.677931	0.625061
				Fold gene expression	0.576284
				Standard deviation	0.212923
				Standard error of the mean	0.086925
				Relative standard error of mean	15.08376

Table S.2.29: *Cyp4f4* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f4*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	19.58791351	20.8724823	-1.28457	0.080768	0.945554
	19.55678749	20.7446537	-1.18787	0.177471	0.884252
	20.3129673	21.34989548	-1.03693	0.328409	0.796415
	19.98579597	21.55722809	-1.57143	-0.2061	1.153562
	20.00549126	21.11608887	-1.1106	0.254739	0.838139
	20.07837296	22.07900047	-2.00063	-0.63529	1.553251
		Mean ΔCt (control)	-1.36534		
				Fold gene expression	1.028529
				Standard deviation	0.285934
				Standard error of the mean	0.116732
				Relative standard error of mean	11.34944
Female	19.95122147	21.04141045	-1.09019	0.275148	0.826366
	19.77783394	20.96590233	-1.18807	0.177268	0.884376
	19.5415535	19.11339188	0.428162	1.793498	0.288472
	19.99121475	20.8316555	-0.84044	0.524896	0.695009
	19.86571503	20.86181259	-0.9961	0.369239	0.774191
	19.12087059	20.29788017	-1.17701	0.188327	0.877623
				Fold gene expression	0.724339
				Standard deviation	0.224875
				Standard error of the mean	0.091805
				Relative standard error of mean	12.67426

Table S.2.30: *Cyp4f5* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f5*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	24.76859283	20.8724823	3.896111	-0.34808	1.272867
	24.69163322	20.7446537	3.94698	-0.29721	1.228768
	26.22362328	21.34989548	4.873728	0.629536	0.646384
	25.45830536	21.55722809	3.901077	-0.34311	1.268492
	25.93483162	21.11608887	4.818743	0.574551	0.671495
	26.10751534	22.07900047	4.028515	-0.21568	1.161249
		Mean ΔCt (control)	4.244192		
				Fold gene expression	1.041543
				Standard deviation	0.299161
				Standard error of the mean	0.122132
				Relative standard error of mean	11.72605
Female	26.00374031	21.04141045	4.96233	0.718138	0.607882
	25.39862633	20.96590233	4.432724	0.188532	0.877498
	25.12063026	19.11339188	6.007238	1.763046	0.294625
	24.80643654	20.8316555	3.974781	-0.26941	1.205316
	25.6361084	20.86181259	4.774296	0.530104	0.692505
	24.71218109	20.29788017	4.414301	0.170109	0.888776
				Fold gene expression	0.7611
				Standard deviation	0.307557
				Standard error of the mean	0.12556
				Relative standard error of mean	16.49713

Table S.2.31: *Cyp4f6* mRNA expression in the liver of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f6*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	23.78008461	21.88467026	1.895414	-0.17112	1.125932
	24.18930626	21.40517998	2.784126	0.717592	0.608112
	23.3608532	21.32709694	2.033756	-0.03278	1.02298
	24.5755558	22.04953957	2.526016	0.459482	0.727248
	23.54052353	21.73478508	1.805738	-0.2608	1.19814
	23.47340584	22.11924934	1.354156	-0.71238	1.638503
		Mean ΔCt (control)	2.066535		
				Fold gene expression	1.053486
				Standard deviation	0.367189
				Standard error of the mean	0.149904
				Relative standard error of mean	14.22935
Female	22.72532654	20.89143944	1.833887	-0.23265	1.174989
	22.93718719	20.72109985	2.216087	0.149553	0.90153
	23.35550499	20.0019474	3.353558	1.287023	0.409796
	23.8314743	21.08501244	2.746462	0.679927	0.624197
	23.29389572	20.66811371	2.625782	0.559247	0.678656
	22.76893044	20.28797722	2.480953	0.414419	0.750322
				Fold gene expression	0.756582
				Standard deviation	0.260758
				Standard error of the mean	0.106454
				Relative standard error of mean	14.07037

S.3 Calculation of the fold change in the kidney level of target genes between female and male rats normalized to the housekeeping gene using the ΔΔCT method:

Table S.3.1: *Cyp1a1* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp1a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	27.0172863	21.44843102	5.568855	0.010524	0.992732
	26.90682793	20.36410713	6.542721	0.98439	0.505439
	27.00440216	20.92403412	6.080368	0.522037	0.696388
	25.0068264	20.36148262	4.645344	-0.91299	1.88294
	26.14905357	21.19468689	4.954367	-0.60396	1.519887
		Mean ΔCt (control)	5.558331		
				Fold gene expression	1.119477
				Standard deviation	0.573436
				Standard error of the mean	0.256448
				Relative standard error of mean	22.90787
Female	20.73973083	20.15422821	0.585503	-4.97283	31.40295
	23.42601204	21.36679268	2.059219	-3.49911	11.30674
	20.66752052	20.15905762	0.508463	-5.04987	33.12545
	23.18659592	21.71059608	1.476	-4.08233	16.93964
	21.16689491	21.34286499	-0.17597	-5.7343	53.23492
				Fold gene expression	29.20194
				Standard deviation	16.34338
				Standard error of the mean	7.308983
				Relative standard error of mean	25.0291

Table S.3.2: *Cyp1a2* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp1a2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	29.06984901	20.36410713	8.705742	-0.04391	1.030907
	29.76661682	20.92403412	8.842583	0.092927	0.937618
	30.68917084	21.1464119	9.542759	0.793103	0.577101
	28.79200363	20.36148262	8.430521	-0.31913	1.247582
	29.42136002	21.19468689	8.226673	-0.52298	1.436923
		Mean ΔCt (control)	8.749656		
				Fold gene expression	1.046026
				Standard deviation	0.326074
				Standard error of the mean	0.145825
				Relative standard error of mean	13.94081
Female	29.45443153	20.15422821	9.300203	0.550548	0.682761
	29.37855339	21.36679268	8.011761	-0.73789	1.66774
	29.56826591	20.80569077	8.762575	0.01292	0.991085
	28.72387314	20.15905762	8.564816	-0.18484	1.136691
	29.58572006	21.34286499	8.242855	-0.5068	1.420896
				Fold gene expression	1.179835
				Standard deviation	0.381029
				Standard error of the mean	0.170401
				Relative standard error of mean	14.44282

Table S.3.3: *Cyp1b1* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp1b1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	26.20146561	20.6704731	5.530993	-0.08746	1.062496
	25.3973484	19.91502762	5.482321	-0.13613	1.098952
	25.60379028	20.17363167	5.430159	-0.18829	1.139413
	26.28948021	20.20077324	6.088707	0.470257	0.721836
	25.80596733	20.43040276	5.375565	-0.24288	1.183357
	26.35974121	20.55678749	5.802954	0.184504	0.879951
		Mean ΔCt (control)	5.61845		
				Fold gene expression	1.014334
				Standard deviation	0.177374
				Standard error of the mean	0.072413
				Relative standard error of mean	7.13892
Female	26.32404518	19.731493	6.592552	0.974103	0.509056
	26.9568615	20.44017982	6.516682	0.898232	0.536544
	27.86956787	19.90690994	7.962658	2.344208	0.196935
	25.98503113	18.70401764	7.281013	1.662564	0.315877
	26.5469799	20.82141685	5.725563	0.107114	0.928444
	26.00157547	18.24569321	7.755882	2.137433	0.227284
				Fold gene expression	0.452357
				Standard deviation	0.272575
				Standard error of the mean	0.111278
				Relative standard error of mean	24.59968

Table S.3.4: *Cyp2a1* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	30.78098869	20.33044052	10.45055	-0.64262	1.561165
	33.46582413	21.64178658	11.82404	0.730866	0.602542
	32.90471649	21.69516945	11.20955	0.116375	0.922502
	29.86737442	18.9788208	10.88855	-0.20462	1.152381
		Mean ΔCt (control)	11.09317		
				Fold gene expression	1.059648
				Standard deviation	0.403267
				Standard error of the mean	0.201634
				Relative standard error of mean	19.02837
Female	36.00477982	20.74038124	15.2644	4.171227	0.055505
	37.58100128	23.71830177	13.8627	2.769528	0.146652
	34.07191467	22.45113373	11.62078	0.527609	0.693703
	33.37465286	21.98809242	11.38656	0.293389	0.815983
	33.24389648	20.23757744	13.00632	1.913147	0.265513
				Fold gene expression	0.395471
				Standard deviation	0.339172
				Standard error of the mean	0.151682
				Relative standard error of mean	38.35477

Table S.3.5: *Cyp2b1* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2b1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	30.08128357	21.44843102	8.632853	-0.05513	1.038951
	29.82489204	20.36410713	9.460785	0.772805	0.585279
	31.02060699	21.1464119	9.874195	1.186215	0.439454
	28.02316475	20.36148262	7.661682	-1.0263	2.036791
	29.00507355	21.19468689	7.810387	-0.87759	1.837308
		Mean ΔCt (control)	8.68798		
				Fold gene expression	1.187557
				Standard deviation	0.722471
				Standard error of the mean	0.323099
				Relative standard error of mean	27.20702
Female	30.06482315	20.15422821	9.910595	1.222615	0.428505
	29.56221008	21.36679268	8.195417	-0.49256	1.406942
	29.68480873	20.80569077	8.879118	0.191138	0.875915
	28.9195137	20.15905762	8.760456	0.072476	0.951005
	28.98249245	21.34286499	7.639627	-1.04835	2.068167
				Fold gene expression	1.146107
				Standard deviation	0.621339
				Standard error of the mean	0.277871
				Relative standard error of mean	24.24481

Table S.3.6: *Cyp2b2* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2b2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	27.84736252	22.29681969	5.550543	-0.92456	1.898103
	27.30856323	21.2739296	6.034634	-0.44047	1.357044
	31.03978729	22.47080231	8.568985	2.093884	0.234249
	26.5728817	21.93065071	4.642231	-1.83287	3.562451
	29.60146141	22.0223484	7.579113	1.104012	0.465221
		Mean ΔCt (control)	6.475101		
				Fold gene expression	1.503414
				Standard deviation	1.332803
				Standard error of the mean	0.596048
				Relative standard error of mean	39.6463
Female	21.98049355	21.44104385	0.53945	-5.93565	61.20813
	28.75837898	24.35465431	4.403725	-2.07138	4.202875
	26.60241127	23.930933	2.671478	-3.80362	13.96383
	22.37498474	22.16269875	0.212286	-6.26282	76.78833
				Fold gene expression	39.04079
				Standard deviation	35.39681
				Standard error of the mean	17.6984
				Relative standard error of mean	45.33311

Table S.3.7: *Cyp2c6* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c6*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	31.19462585	21.2739296	9.920696	-0.40614	1.325137
	33.10131073	22.35676956	10.74454	0.417703	0.748616
	32.9033165	22.47080231	10.43251	0.105676	0.929369
	33.62343597	21.93065071	11.69279	1.365947	0.38798
	30.86600304	22.0223484	8.843655	-1.48318	2.79565
		Mean ΔCt (control)	10.32684		
				Fold gene expression	1.23735
				Standard deviation	0.934231
				Standard error of the mean	0.417801
				Relative standard error of mean	33.76575
Female	32.25588226	21.44104385	10.81484	0.488	0.713013
	32.7257843	24.35465431	8.37113	-1.95571	3.879063
	32.53884125	24.16374207	8.375099	-1.95174	3.868406
	30.6821804	21.61458778	9.067593	-1.25925	2.393706
	33.75783157	23.930933	9.826899	-0.49994	1.414154
	32.98618317	22.16269875	10.82348	0.496646	0.708753
				Fold gene expression	2.162849
				Standard deviation	1.461819
				Standard error of the mean	0.596785
				Relative standard error of mean	27.59255

Table S.3.8: *Cyp2c11* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c11*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	23.4070015	20.84217834	2.564823	-1.30236	2.466327
	26.0033474	20.97036934	5.032978	1.165791	0.44572
	26.1450634	21.33662796	4.808435	0.941248	0.520782
	25.41716003	22.14450264	3.272657	-0.59453	1.509981
	24.84078979	21.18374634	3.657043	-0.21014	1.156804
		Mean ΔCt (control)	3.867188		
				Fold gene expression	1.219923
				Standard deviation	0.82611
				Standard error of the mean	0.369448
				Relative standard error of mean	30.2845
Female	29.71196556	20.82183647	8.890129	5.022942	0.030757
	30.10930252	23.80994415	6.299358	2.432171	0.185286
	29.63360596	23.01904488	6.614561	2.747374	0.148922
	28.98827362	20.93088341	8.05739	4.190203	0.05478
	29.81073952	21.30577278	8.504967	4.637779	0.040169
				Fold gene expression	0.091983
				Standard deviation	0.070294
				Standard error of the mean	0.031436
				Relative standard error of mean	34.17637

Table S.3.9: *Cyp2c23* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c23*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	18.03046227	19.53005981	-1.4996	0.490877	0.711592
	18.16113281	19.37013245	-1.209	0.781475	0.581772
	18.17616272	19.68417549	-1.50801	0.482462	0.715755
	17.42055702	20.35167122	-2.93111	-0.94064	1.919378
	17.90238953	20.21253204	-2.31014	-0.31967	1.248043
	17.92873955	20.41372299	-2.48498	-0.49451	1.408841
		Mean ΔCt (control)	-1.99048		
				Fold gene expression	1.097563
				Standard deviation	0.520713
				Standard error of the mean	0.21258
				Relative standard error of mean	19.36837
Female	17.5458107	20.22820854	-2.6824	-0.69192	1.615435
	18.24902916	21.51779556	-3.26877	-1.27829	2.425515
	17.60991669	21.09210587	-3.48219	-1.49171	2.812229
	17.00697899	20.30070305	-3.29372	-1.30325	2.46784
	18.69623375	22.05726624	-3.36103	-1.37056	2.585705
	16.89379501	19.99714088	-3.10335	-1.11287	2.162756
				Fold gene expression	2.344913
				Standard deviation	0.415522
				Standard error of the mean	0.169636
				Relative standard error of mean	7.234215

Table S.3.10: *Cyp2d2* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2d2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	26.99505615	21.44843102	5.546625	-0.98519	1.979571
	26.5629406	20.36410713	6.198833	-0.33298	1.259612
	28.65539932	20.92403412	7.731365	1.199553	0.43541
	27.98278046	21.1464119	6.836369	0.304556	0.809691
	26.58566856	20.36148262	6.224186	-0.30763	1.23767
	27.84818459	21.19468689	6.653498	0.121685	0.919114
		Mean ΔCt (control)	6.531813		
				Fold gene expression	1.106845
				Standard deviation	0.524685
				Standard error of the mean	0.214202
				Relative standard error of mean	19.35246
Female	27.44242477	20.15422821	7.288197	0.756384	0.591978
	30.07309914	21.36679268	8.706306	2.174494	0.22152
	28.77518654	20.80569077	7.969496	1.437683	0.36916
	27.63694572	20.15905762	7.477888	0.946075	0.519042
	29.49430084	21.71059608	7.783705	1.251892	0.419897
	28.61740875	21.34286499	7.274544	0.742731	0.597607
				Fold gene expression	0.453201
				Standard deviation	0.145805
				Standard error of the mean	0.059525
				Relative standard error of mean	13.13429

Table S.3.11: *Cyp2d3* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2d3*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	32.96843719	20.36410713	12.60433	-0.97505	1.965714
	34.16418839	20.92403412	13.24015	-0.33923	1.265081
	35.26021194	21.1464119	14.1138	0.534416	0.690438
	34.72073364	20.36148262	14.35925	0.779867	0.58242
		Mean ΔCt (control)	13.57938		
				Fold gene expression	1.125913
				Standard deviation	0.634995
				Standard error of the mean	0.317498
				Relative standard error of mean	28.19911
Female	37.07509995	20.15422821	16.92087	3.657394	0.079253
	35.50923157	21.36679268	14.14244	0.878961	0.543759
	35.92437744	20.15905762	15.76532	2.501842	0.176551
	37.17380142	21.34286499	15.83094	2.567458	0.168701
				Fold gene expression	0.242066
				Standard deviation	0.205914
				Standard error of the mean	0.102957
				Relative standard error of mean	42.53255

Table S.3.12: *Cyp2d4* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2d4*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	27.71310043	19.53005981	8.183041	0.585552	0.666394
	26.88541222	19.37013245	7.51528	-0.08221	1.058637
	27.67696953	19.68417549	7.992794	0.395306	0.760328
	27.85234642	20.35167122	7.500675	-0.09681	1.069409
	27.44627571	20.21253204	7.233744	-0.36374	1.286762
	27.57312012	20.41372299	7.159397	-0.43809	1.354811
		Mean ΔCt (control)	7.597488		
				Fold gene expression	1.032723
				Standard deviation	0.275205
				Standard error of the mean	0.112352
				Relative standard error of mean	10.87919
Female	28.45509529	20.22820854	8.226887	0.629398	0.646446
	31.38321114	21.51779556	9.865416	2.267927	0.207628
	30.03599167	21.09210587	8.943886	1.346397	0.393273
	28.57620811	20.30070305	8.275505	0.678017	0.625024
	30.57167816	22.05726624	8.514412	0.916924	0.529637
	29.08075142	19.99714088	9.083611	1.486122	0.356971
				Fold gene expression	0.45983
				Standard deviation	0.170648
				Standard error of the mean	0.069667
				Relative standard error of mean	15.15053

Table S.3.13: *Cyp2e1* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2e1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	18.97686958	19.53005981	-0.55319	0.515709	0.699449
	18.88059616	19.37013245	-0.48954	0.579363	0.669259
	18.84788704	19.68417549	-0.83629	0.23261	0.851094
	18.32757378	20.35167122	-2.0241	-0.9552	1.938847
	19.27022934	20.21253204	-0.9423	0.126596	0.91599
	18.84574509	20.41372299	-1.56798	-0.49908	1.413311
		Mean ΔCt (control)	-1.0689		
				Fold gene expression	1.081325
				Standard deviation	0.498303
				Standard error of the mean	0.203431
				Relative standard error of mean	18.81314
Female	17.8197155	20.22820854	-2.40849	-1.33959	2.530801
	18.68653679	21.51779556	-2.83126	-1.76236	3.392526
	17.32378769	21.09210587	-3.76832	-2.69942	6.495404
	17.24805641	20.30070305	-3.05265	-1.98375	3.955192
	18.87420464	22.05726624	-3.18306	-2.11416	4.329387
	17.29385567	19.99714088	-2.70329	-1.63439	3.104555
				Fold gene expression	3.967978
				Standard deviation	1.390021
				Standard error of the mean	0.567474
				Relative standard error of mean	14.30133

Table S.3.14: *Cyp2j3* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2j3*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	24.78109169	19.53005981	5.251032	0.51916	0.697778
	24.33361626	19.37013245	4.963484	0.231612	0.851683
	24.43241119	19.68417549	4.748236	0.016363	0.988722
	25.01156425	20.35167122	4.659893	-0.07198	1.051158
	24.53747749	20.21253204	4.324945	-0.40693	1.325858
	24.85736656	20.41372299	4.443644	-0.28823	1.22114
		Mean ΔCt (control)	4.731872		
				Fold gene expression	1.022723
				Standard deviation	0.231546
				Standard error of the mean	0.094528
				Relative standard error of mean	9.24282
Female	24.15125465	20.22820854	3.923046	-0.80883	1.751785
	25.74804497	21.51779556	4.230249	-0.50162	1.415805
	25.7058506	21.09210587	4.613745	-0.11813	1.085325
	25.60566711	20.30070305	5.304964	0.573092	0.672175
	25.86975861	22.05726624	3.812492	-0.91938	1.891302
				Fold gene expression	1.363279
				Standard deviation	0.496837
				Standard error of the mean	0.222192
				Relative standard error of mean	16.29838

Table S.3.15: *Cyp2j4* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2j4*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	25.71083069	21.44843102	4.2624	0.138124	0.9087
	24.42203903	20.36410713	4.057932	-0.06634	1.04706
	24.92321587	20.92403412	3.999182	-0.12509	1.090579
	25.47284126	21.1464119	4.326429	0.202153	0.869252
	25.20201683	20.36148262	4.840534	0.716258	0.608674
	24.45386696	21.19468689	3.25918	-0.8651	1.821461
		Mean ΔCt (control)	4.124276		
				Fold gene expression	1.057621
				Standard deviation	0.410819
				Standard error of the mean	0.167716
				Relative standard error of mean	15.85788
Female	25.36391258	20.15422821	5.209684	1.085408	0.471259
	26.14167976	21.36679268	4.774887	0.650611	0.637011
	25.95587158	20.80569077	5.150181	1.025905	0.491102
	25.59830093	20.15905762	5.439243	1.314967	0.401935
	26.42259979	21.71059608	4.712004	0.587728	0.66539
				Fold gene expression	0.533339
				Standard deviation	0.113016
				Standard error of the mean	0.050542
				Relative standard error of mean	9.476556

Table S.3.16: *Cyp2j10* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2j10*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	34.65837097	21.44843102	13.20994	-0.63978	1.558089
	33.91353989	20.36410713	13.54943	-0.30029	1.231388
	35.96679306	20.92403412	15.04276	1.193041	0.43738
	34.63116074	21.1464119	13.48475	-0.36497	1.287854
	34.45147324	20.36148262	14.08999	0.240273	0.846585
	34.91612244	21.19468689	13.72144	-0.12828	1.092992
		Mean ΔCt (control)	13.84972		
				Fold gene expression	1.075715
				Standard deviation	0.390434
				Standard error of the mean	0.159394
				Relative standard error of mean	14.81749
Female	34.55791092	20.15422821	14.40368	0.553965	0.681146
	33.5796051	21.36679268	12.21281	-1.63691	3.10998
	34.26272964	20.80569077	13.45704	-0.39268	1.312829
	34.64805603	20.15905762	14.489	0.639281	0.642033
	34.03968811	21.34286499	12.69682	-1.15289	2.223596
				Fold gene expression	1.593917
				Standard deviation	1.062213
				Standard error of the mean	0.475036
				Relative standard error of mean	29.80308

Table S.3.17: *Cyp3a1* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	34.30351257	18.7430172	15.5605	-0.79485	1.734902
	38.3971138	21.22470284	17.17241	0.817062	0.567597
	37.59463882	21.17545128	16.41919	0.063838	0.956715
	36.89120865	19.68737793	17.20383	0.848481	0.555369
	34.52952957	19.10870743	15.42082	-0.93453	1.911264
		Mean ΔCt (control)	16.35535		
				Fold gene expression	1.145169
				Standard deviation	0.642584
				Standard error of the mean	0.287372
				Relative standard error of mean	25.09429
Female	37.00455475	20.61572647	16.38883	0.033479	0.977061
	37.08632278	21.51637077	15.56995	-0.7854	1.723567
	35.9864006	19.91755867	16.06884	-0.28651	1.219684
	38.3658638	22.14803505	16.21783	-0.13752	1.100013
	37.46936035	21.31115723	16.1582	-0.19715	1.146428
				Fold gene expression	1.233351
				Standard deviation	0.287888
				Standard error of the mean	0.128747
				Relative standard error of mean	10.43882

Table S.3.18: *Cyp3a2* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	34.46009445	18.7430172	15.71708	1.488748	0.356322
	36.56611633	21.22470284	15.34141	1.113084	0.462305
	34.27514267	21.17545128	13.09969	-1.12864	2.186522
	32.79494476	19.68737793	13.10757	-1.12076	2.174618
	32.98460388	19.10870743	13.8759	-0.35243	1.276712
		Mean ΔCt (control)	14.22833		
				Fold gene expression	1.291296
				Standard deviation	0.886468
				Standard error of the mean	0.396441
				Relative standard error of mean	30.701
Female					
	33.75891113	22.99111748	10.76779	-3.46054	11.00842
	33.00808334	21.51637077	11.49171	-2.73662	6.665054
	33.25848007	19.91755867	13.34092	-0.88741	1.849849
	33.80696487	21.31115723	12.49581	-1.73252	3.323081
				Fold gene expression	5.711601
				Standard deviation	4.065444
				Standard error of the mean	2.032722
				Relative standard error of mean	35.58936

Table S.3.19: *Cyp3a9* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a9*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	34.0511322	19.86431313	14.18682	0.35606	0.781295
	34.71797943	20.96670532	13.75127	-0.07948	1.05664
	35.27788544	21.0174675	14.26042	0.429659	0.742437
	33.58153915	20.51798058	13.06356	-0.7672	1.701963
	33.46962357	19.57789993	13.89172	0.060965	0.958623
		Mean ΔCt (control)	13.83076		
				Fold gene expression	1.048192
				Standard deviation	0.387373
				Standard error of the mean	0.173238
				Relative standard error of mean	16.52736
Female	35.39659882	20.31739998	15.0792	1.24844	0.420903
	34.45935822	21.91688538	12.54247	-1.28829	2.442377
	31.73126602	19.66669464	12.06457	-1.76619	3.401538
	37.22182846	22.88987923	14.33195	0.501191	0.706523
	34.31126785	20.18359756	14.12767	0.296912	0.813993
				Fold gene expression	1.557067
				Standard deviation	1.299259
				Standard error of the mean	0.581046
				Relative standard error of mean	37.31673

Table S.3.20: *Cyp3a23* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a23*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	30.25981331	19.86431313	10.3955	-0.28118	1.215184
	33.15713882	20.96670532	12.19043	1.513758	0.350198
	32.32994461	21.0174675	11.31248	0.635802	0.643583
	30.07069588	20.51798058	9.552715	-1.12396	2.179444
	29.51015091	19.57789993	9.932251	-0.74442	1.675306
		Mean ΔCt (control)	10.67668		
				Fold gene expression	1.212743
				Standard deviation	0.74438
				Standard error of the mean	0.332897
				Relative standard error of mean	27.44992
Female	30.75619888	20.31739998	10.4388	-0.23788	1.179256
	31.16948891	21.91688538	9.252604	-1.42407	2.683418
	29.66583443	19.66669464	9.99914	-0.67754	1.599405
	30.44386101	20.18359756	10.26026	-0.41641	1.334604
				Fold gene expression	1.699171
				Standard deviation	0.678704
				Standard error of the mean	0.339352
				Relative standard error of mean	19.97162

Table S.3.21: *Cyp4a1* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	19.91963768	20.89357758	-0.97394	-0.74817	1.679659
	19.9793663	19.86431313	0.115053	0.340825	0.78959
	19.96125603	20.96670532	-1.00545	-0.77968	1.716747
	21.54629517	21.0174675	0.528828	0.754599	0.592711
	20.2638607	20.51798058	-0.25412	-0.02835	1.019844
	19.81289864	19.57789993	0.234999	0.46077	0.726598
		Mean ΔCt (control)	-0.22577		
				Fold gene expression	1.087525
				Standard deviation	0.49295
				Standard error of the mean	0.201246
				Relative standard error of mean	18.50496
Female	20.83655357	20.31739998	0.519154	0.744925	0.596699
	22.4444294	22.59498405	-0.15055	0.075217	0.949199
	20.9527607	21.91688538	-0.96412	-0.73835	1.66827
	20.85179329	19.66669464	1.185099	1.41087	0.376085
	22.2225914	22.88987923	-0.66729	-0.44152	1.358031
	20.75555611	20.18359756	0.571959	0.79773	0.575254
				Fold gene expression	0.92059
				Standard deviation	0.504351
				Standard error of the mean	0.2059
				Relative standard error of mean	22.36613

Table S.3.22: *Cyp4a2* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	18.50077629	20.89357758	-2.3928	-0.35147	1.275862
	17.91036987	19.86431313	-1.95394	0.087385	0.941227
	18.37908554	20.96670532	-2.58762	-0.54629	1.460327
	19.3446846	21.0174675	-1.67278	0.368546	0.774563
	18.34843636	20.51798058	-2.16954	-0.12822	1.092941
	18.10661888	19.57789993	-1.47128	0.570048	0.673595
		Mean ΔCt (control)	-2.04133		
				Fold gene expression	1.036419
				Standard deviation	0.299832
				Standard error of the mean	0.122406
				Relative standard error of mean	11.81048
Female	24.86208725	20.31739998	4.544687	6.586016	0.010409
	26.35299301	22.59498405	3.758009	5.799338	0.017957
	24.8263092	19.66669464	5.159615	7.200943	0.006797
	26.93806648	22.88987923	4.048187	6.089516	0.014685
	23.79533195	20.18359756	3.611734	5.653063	0.019873
				Fold gene expression	0.013944
				Standard deviation	0.005371
				Standard error of the mean	0.002402
				Relative standard error of mean	17.2251

Table S.3.23: *Cyp4a3* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a3*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	18.78629303	20.582304	-1.79601	0.139024	0.908133
	18.39201546	19.87765503	-1.48564	0.449396	0.73235
	18.79459953	20.79586792	-2.00127	-0.06623	1.046979
	19.45201492	21.4719944	-2.01998	-0.08494	1.060647
	18.725914	21.09819221	-2.37228	-0.43724	1.354014
			Mean ΔCt (control)	-1.93504	
				Fold gene expression	1.020425
				Standard deviation	0.228693
				Standard error of the mean	0.102275
				Relative standard error of mean	10.02274
Female	19.34219742	20.18075752	-0.83856	1.096475	0.467658
	20.04523468	22.27972412	-2.23449	-0.29945	1.230679
	18.8917942	21.04664612	-2.15485	-0.21982	1.164586
	20.49616814	23.84099388	-3.34483	-1.40979	2.656986
	19.84767151	20.96439171	-1.11672	0.818315	0.567104
				Fold gene expression	1.217402
				Standard deviation	0.874696
				Standard error of the mean	0.391176
				Relative standard error of mean	32.13201

Table S.3.24: *Cyp4a8* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a8*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	33.2581749	20.582304	12.67587	-1.64706	3.131948
	35.19928741	19.87765503	15.32163	0.998701	0.50045
	34.73405838	20.79586792	13.93819	-0.38474	1.305625
	38.2901268	21.4719944	16.81813	2.495201	0.177366
	33.95902252	21.09819221	12.86083	-1.4621	2.755093
		Mean ΔCt (control)	14.32293		
				Fold gene expression	1.574097
				Standard deviation	1.322621
				Standard error of the mean	0.591494
				Relative standard error of mean	37.57673
Female					
	34.92519379	24.4500885	10.47511	-3.84783	14.39829
	32.1306572	22.27972412	9.850933	-4.472	22.19247
	33.94862366	21.04664612	12.90198	-1.42095	2.677625
	33.98335266	23.84099388	10.14236	-4.18057	18.13334
	33.77131271	20.96439171	12.80692	-1.51601	2.85999
				Fold gene expression	12.05234
				Standard deviation	8.911913
				Standard error of the mean	3.985529
				Relative standard error of mean	33.0685

Table S.3.25: *Cyp4f1* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	19.92054939	20.582304	-0.66175	-0.03506	1.024601
	19.26861954	19.87765503	-0.60904	0.017657	0.987836
	21.16665077	20.79586792	0.370783	0.997475	0.500876
	20.55848312	21.4719944	-0.91351	-0.28682	1.219947
	19.98826408	20.58220482	-0.59394	0.032752	0.977554
	19.74549675	21.09819221	-1.3527	-0.726	1.65405
		Mean ΔCt (control)	-0.62669		
				Fold gene expression	1.060811
				Standard deviation	0.375327
				Standard error of the mean	0.153227
				Relative standard error of mean	14.4443
Female	19.63010979	20.18075752	-0.55065	0.076045	0.948655
	22.1161232	24.4500885	-2.33397	-1.70727	3.26543
	20.41456795	22.27972412	-1.86516	-1.23846	2.359471
	19.15427589	21.04664612	-1.89237	-1.26568	2.404401
	21.9608326	23.84099388	-1.88016	-1.25347	2.38414
	19.2966404	20.96439171	-1.66775	-1.04106	2.057737
				Fold gene expression	2.236639
				Standard deviation	0.750241
				Standard error of the mean	0.306285
				Relative standard error of mean	13.69397

Table S.3.26: *Cyp4f4* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f4*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	29.40390396	20.84189224	8.562012	-1.03432	2.048142
	31.44765091	20.75020409	10.69745	1.101119	0.466155
	32.02010345	21.57505989	10.44504	0.848716	0.555279
	29.77568245	20.87166214	8.90402	-0.69231	1.615866
	30.52752113	21.15440559	9.373116	-0.22321	1.16733
		Mean ΔCt (control)	9.596328		
				Fold gene expression	1.170554
				Standard deviation	0.678825
				Standard error of the mean	0.30358
				Relative standard error of mean	25.93472
Female					
	30.72869301	23.19133377	7.537359	-2.05897	4.166882
	30.13213539	22.58960342	7.542532	-2.0538	4.151969
	29.30051613	20.96542549	8.335091	-1.26124	2.397012
	28.56533051	20.82875443	7.736576	-1.85975	3.629451
				Fold gene expression	3.586329
				Standard deviation	0.831329
				Standard error of the mean	0.415665
				Relative standard error of mean	11.59026

Table S.3.27: *Cyp4f5* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f5*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	24.50182152	22.29681969	2.205002	-0.45799	1.373626
	24.18658447	21.2739296	2.912655	0.249664	0.841092
	24.66133308	22.35676956	2.304564	-0.35843	1.282028
	24.7171669	22.47080231	2.246365	-0.41663	1.334803
	24.33512306	21.93065071	2.404472	-0.25852	1.19625
	25.92723846	22.0223484	3.90489	1.241899	0.422816
		Mean ΔCt (control)	2.662991		
				Fold gene expression	1.075103
				Standard deviation	0.372638
				Standard error of the mean	0.152129
				Relative standard error of mean	14.15016
Female	24.25989723	21.44104385	2.818853	0.155862	0.897596
	25.4653492	24.35465431	1.110695	-1.5523	2.932836
	24.92349815	24.16374207	0.759756	-1.90324	3.74051
	24.83056068	23.930933	0.899628	-1.76336	3.394887
	24.45025826	22.16269875	2.28756	-0.37543	1.297228
				Fold gene expression	2.452611
				Standard deviation	1.27771
				Standard error of the mean	0.571409
				Relative standard error of mean	23.29799

Table S.3.28: *Cyp4f6* mRNA expression in the kidney of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f6*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	23.98557663	22.29681969	1.688757	-0.41763	1.335733
	23.92938042	21.2739296	2.655451	0.549062	0.683464
	25.51048088	22.35676956	3.153711	1.047323	0.483865
	23.90467453	22.47080231	1.433872	-0.67252	1.59385
	23.51361084	21.93065071	1.58296	-0.52343	1.437367
	24.14592743	22.0223484	2.123579	0.017191	0.988155
		Mean ΔCt (control)	2.106388		
				Fold gene expression	1.087072
				Standard deviation	0.442245
				Standard error of the mean	0.180546
				Relative standard error of mean	16.60846
Female	23.30430603	21.44104385	1.863262	-0.24313	1.183555
	24.89033699	24.35465431	0.535683	-1.57071	2.9705
	24.3901062	24.16374207	0.226364	-1.88002	3.680813
	23.67495537	21.61458778	2.060368	-0.04602	1.032413
	25.06542778	23.930933	1.134495	-0.97189	1.961413
	23.30242538	22.16269875	1.139727	-0.96666	1.954313
				Fold gene expression	2.130501
				Standard deviation	1.026762
				Standard error of the mean	0.419174
				Relative standard error of mean	19.67489

S.4 Calculation of the fold change in the lung level of target genes between female and male rats normalized to the housekeeping gene using the ΔΔCT method:

Table S.4.1: *Cyp1a1* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp1a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	22.92127228	17.87739372	5.043879	0.43672	0.738813
	23.39588547	18.78137016	4.614515	0.007356	0.994914
	24.70204353	19.61618996	5.085854	0.478695	0.717627
	22.8150177	18.69833565	4.116682	-0.49048	1.404909
	23.2163372	19.04147148	4.174866	-0.43229	1.349377
		Mean ΔCt (control)	4.607159		
				Fold gene expression	1.041128
				Standard deviation	0.326166
				Standard error of the mean	0.145866
				Relative standard error of mean	14.01038
Female	22.48679352	18.92680931	3.559984	-1.04717	2.066479
	24.05761147	18.64676285	5.410849	0.80369	0.572882
	21.62118721	18.72934532	2.891842	-1.71532	3.283688
	23.25413704	18.08415794	5.169979	0.56282	0.676978
	22.0242157	19.15018082	2.874035	-1.73312	3.32447
				Fold gene expression	1.984899
				Standard deviation	1.340933
				Standard error of the mean	0.599684
				Relative standard error of mean	30.21229

Table S.4.2: *Cyp1a2* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp1a2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	26.82986832	17.87739372	8.952475	-0.14126	1.102865
	27.35612488	18.78137016	8.574755	-0.51898	1.432937
	28.65088081	19.61618996	9.034691	-0.05904	1.041772
	27.89149475	18.69833565	9.193159	0.099429	0.933402
	28.75504303	19.04147148	9.713572	0.619841	0.650742
		Mean ΔCt (control)	9.09373		
				Fold gene expression	1.032344
				Standard deviation	0.283261
				Standard error of the mean	0.126678
				Relative standard error of mean	12.27091
Female					
	27.893013	18.55441666	9.338596	0.244866	0.843894
	29.1862278	18.72934532	10.45688	1.363152	0.388732
	28.41287041	18.08415794	10.32871	1.234982	0.424848
	28.88457108	19.15018082	9.73439	0.64066	0.641419
				Fold gene expression	0.574723
				Standard deviation	0.211311
				Standard error of the mean	0.105655
				Relative standard error of mean	18.3837

Table S.4.3: *Cyp1b1* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp1b1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	22.38321114	17.87739372	4.505817	0.496854	0.70865
	22.62660599	18.3462429	4.280363	0.271399	0.828515
	23.49168205	18.78137016	4.710312	0.701348	0.614997
	23.34890366	19.61618996	3.732714	-0.27625	1.211043
	22.3320179	18.69833565	3.633682	-0.37528	1.297092
	22.23236465	19.04147148	3.190893	-0.81807	1.763046
		Mean ΔCt (control)	4.008964		
				Fold gene expression	1.070557
				Standard deviation	0.43536
				Standard error of the mean	0.177735
				Relative standard error of mean	16.60209
Female	23.1882515	18.92680931	4.261442	0.252479	0.839453
	22.27731323	18.64676285	3.63055	-0.37841	1.299911
	22.54185867	18.55441666	3.987442	-0.02152	1.015029
	23.95024681	18.72934532	5.220901	1.211938	0.431688
	22.37326431	18.08415794	4.289106	0.280143	0.82351
	22.13584709	19.15018082	2.985666	-1.0233	2.032559
				Fold gene expression	1.073692
				Standard deviation	0.548392
				Standard error of the mean	0.22388
				Relative standard error of mean	20.85144

Table S.4.4: *Cyp2b1* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2b1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	19.55262947	18.99743843	0.555191	0.571249	0.673034
	19.74834633	19.06721306	0.681133	0.697191	0.616772
	18.61517525	19.44244194	-0.82727	-0.81121	1.754681
	19.68612289	20.28934479	-0.60322	-0.58716	1.502291
	19.668993	19.13036537	0.538628	0.554686	0.680805
	18.90013123	19.34094238	-0.44081	-0.42475	1.342343
		Mean ΔCt (control)	-0.01606		
				Fold gene expression	1.094988
				Standard deviation	0.498108
				Standard error of the mean	0.203352
				Relative standard error of mean	18.57115
Female	18.47485161	19.32472038	-0.84987	-0.83381	1.782387
	17.61610985	19.25806427	-1.64195	-1.6259	3.086339
	18.17307472	19.08437729	-0.9113	-0.89524	1.859925
	17.70389557	19.70411301	-2.00022	-1.98416	3.956321
	18.18362617	19.19081879	-1.00719	-0.99113	1.987748
	18.32147217	19.74034691	-1.41887	-1.40282	2.644173
				Fold gene expression	2.552816
				Standard deviation	0.855077
				Standard error of the mean	0.349084
				Relative standard error of mean	13.67445

Table S.4.5: *Cyp2b2* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2b2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	29.08254433	18.99743843	10.08511	-0.55304	1.46717
	30.22611427	19.06721306	11.1589	0.520759	0.697005
	31.10868835	19.44244194	11.66625	1.028104	0.490354
	30.29436302	20.28934479	10.00502	-0.63312	1.550919
	29.23172569	19.13036537	10.10136	-0.53678	1.450733
	30.153162	19.34094238	10.81222	0.174078	0.886334
		Mean ΔCt (control)	10.63814		
				Fold gene expression	1.090419
				Standard deviation	0.456143
				Standard error of the mean	0.18622
				Relative standard error of mean	17.07779
Female	29.84101105	19.32472038	10.51629	-0.12185	1.08813
	28.76152992	19.25806427	9.503466	-1.13468	2.195693
	29.84632683	19.08437729	10.76195	0.123808	0.917762
	29.98189545	19.70411301	10.27778	-0.36036	1.283746
	30.74780464	19.19081879	11.55699	0.918844	0.528933
	29.32002068	19.74034691	9.579674	-1.05847	2.082719
				Fold gene expression	1.349497
				Standard deviation	0.661214
				Standard error of the mean	0.269939
				Relative standard error of mean	20.00296

Table S.4.6: *Cyp2c6* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c6*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	32.79861832	19.06721306	13.73141	0.733075	0.60162
	33.62251663	19.44244194	14.18007	1.181745	0.440818
	32.11355591	20.28934479	11.82421	-1.17412	2.25655
	32.25492859	19.13036537	13.12456	0.126233	0.91622
	31.47233772	19.34094238	12.1314	-0.86693	1.823784
		Mean ΔCt (control)	12.99833		
				Fold gene expression	1.207798
				Standard deviation	0.793733
				Standard error of the mean	0.354968
				Relative standard error of mean	29.38968
Female	32.89268875	19.32472038	13.56797	0.569638	0.673786
	33.08142853	19.08437729	13.99705	0.998721	0.500443
	32.06086349	19.70411301	12.35675	-0.64158	1.560036
	32.49713135	19.19081879	13.30631	0.307983	0.807771
	31.85897255	19.74034691	12.11863	-0.8797	1.839998
				Fold gene expression	1.076407
				Standard deviation	0.587999
				Standard error of the mean	0.262961
				Relative standard error of mean	24.42954

Table S.4.7: *Cyp2c11* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c11*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	29.29161263	18.99743843	10.29417	-0.71718	1.643963
	30.40301704	19.06721306	11.3358	0.324452	0.798601
	31.34239197	19.44244194	11.89995	0.888598	0.540139
	30.64749336	20.28934479	10.35815	-0.6532	1.572656
	30.34089088	19.13036537	11.21053	0.199174	0.871049
	30.3104496	19.34094238	10.96951	-0.04184	1.029429
		Mean ΔCt (control)	11.01135		
				Fold gene expression	1.075973
				Standard deviation	0.442158
				Standard error of the mean	0.18051
				Relative standard error of mean	16.77648
Female	30.63634872	19.32472038	11.31163	0.300277	0.812097
	30.25811386	19.25806427	11.00005	-0.0113	1.007865
	30.10378265	19.08437729	11.01941	0.008054	0.994433
	30.08021355	19.70411301	10.3761	-0.63525	1.553208
	30.51275253	19.19081879	11.32193	0.310582	0.806316
				Fold gene expression	1.034784
				Standard deviation	0.305329
				Standard error of the mean	0.136547
				Relative standard error of mean	13.19574

Table S.4.8: *Cyp2c23* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c23*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	22.77787781	18.38732338	4.390554	0.014815	0.989784
	22.6652565	18.35128784	4.313969	-0.06177	1.043746
	22.53532028	18.76119232	3.774128	-0.60161	1.517411
	23.10972023	18.19241142	4.917309	0.541569	0.687023
	22.97971916	18.49698067	4.482738	0.106999	0.928518
		Mean ΔCt (control)	4.37574		
				Fold gene expression	1.033296
				Standard deviation	0.303007
				Standard error of the mean	0.135509
				Relative standard error of mean	13.11423
Female	22.82199287	18.6565609	4.165432	-0.21031	1.156935
	22.31262016	18.44511795	3.867502	-0.50824	1.422311
	22.75278664	18.72841454	4.024372	-0.35137	1.275769
	22.8443737	18.43808937	4.406284	0.030545	0.979051
	22.54894447	17.74411392	4.804831	0.429091	0.74273
	22.94019127	18.40876198	4.531429	0.15569	0.897703
				Fold gene expression	1.079083
				Standard deviation	0.252425
				Standard error of the mean	0.103052
				Relative standard error of mean	9.549951

Table S.4.9: *Cyp2d4* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2d4*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	26.43734169	18.38732338	8.050018	-0.62095	1.537885
	26.43478775	18.35128784	8.0835	-0.58747	1.502606
	27.03805542	18.76119232	8.276863	-0.3941	1.314126
	29.17103577	19.52798462	9.643051	0.972085	0.509769
	27.7983799	18.49698067	9.301399	0.630433	0.645983
		Mean ΔCt (control)	8.670966		
				Fold gene expression	1.102074
				Standard deviation	0.488408
				Standard error of the mean	0.218423
				Relative standard error of mean	19.81923
Female	27.12688637	18.6565609	8.470325	-0.20064	1.149209
	26.79421997	18.44511795	8.349102	-0.32186	1.249945
	30.28576851	18.43808937	11.84768	3.176713	0.11059
	29.29802132	18.40876198	10.88926	2.218293	0.214895
				Fold gene expression	0.68116
				Standard deviation	0.601537
				Standard error of the mean	0.300768
				Relative standard error of mean	44.15533

Table S.4.10: *Cyp2e1* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2e1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	21.81419182	18.57818794	3.236004	-0.24256	1.183093
	21.84495544	18.38136482	3.463591	-0.01498	1.010435
	21.95317459	18.97838593	2.974789	-0.50378	1.417923
	22.49595833	19.63236046	2.863598	-0.61497	1.531526
	22.26360512	18.45039368	3.813211	0.334644	0.79298
	23.04731178	18.52709961	4.520212	1.041645	0.485773
		Mean ΔCt (control)	3.478567		
				Fold gene expression	1.070288
				Standard deviation	0.392034
				Standard error of the mean	0.160047
				Relative standard error of mean	14.95367
Female	21.80897331	18.50517273	3.303801	-0.17477	1.128782
	21.83387566	18.7165184	3.117357	-0.36121	1.284503
	21.72060013	18.3507061	3.369894	-0.10867	1.078236
	21.21471214	17.98646927	3.228243	-0.25032	1.189475
	22.30658913	18.20016098	4.106428	0.627861	0.647135
				Fold gene expression	1.065626
				Standard deviation	0.246236
				Standard error of the mean	0.11012
				Relative standard error of mean	10.33382

Table S.4.11: *Cyp2j3* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2j3*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	24.35410118	16.40213203	7.951969	-0.57328	1.487906
	24.3428669	15.77114773	8.571719	0.046467	0.968305
	24.99538231	16.00558853	8.989794	0.464542	0.724701
	25.91841888	17.14575195	8.772667	0.247415	0.842405
	25.24705696	16.45843124	8.788626	0.263374	0.833137
	24.42102814	16.34428978	8.076738	-0.44851	1.364634
		Mean ΔCt (control)	8.525252		
				Fold gene expression	1.036848
				Standard deviation	0.313795
				Standard error of the mean	0.128106
				Relative standard error of mean	12.35536
Female	24.85449982	16.40930367	8.445196	-0.08006	1.057059
	24.52044868	16.24884605	8.271603	-0.25365	1.192219
	24.24489975	16.33191109	7.912989	-0.61226	1.528656
	24.82716179	16.53628731	8.290874	-0.23438	1.176399
	23.9208622	15.90371037	8.017152	-0.5081	1.422176
	24.68640137	16.67467499	8.011726	-0.51353	1.427535
				Fold gene expression	1.300674
				Standard deviation	0.184058
				Standard error of the mean	0.075141
				Relative standard error of mean	5.777114

Table S.4.12: *Cyp2j4* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2j4*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	24.37016296	18.57818794	5.791975	-0.41707	1.335216
	24.35871696	18.38136482	5.977352	-0.2317	1.174214
	25.20401001	18.97838593	6.225624	0.016576	0.988576
	25.64874458	19.63236046	6.016384	-0.19266	1.142872
	25.43470383	18.45039368	6.98431	0.775262	0.584282
	24.78574181	18.52709961	6.258642	0.049594	0.966208
		Mean ΔCt (control)	6.209048		
				Fold gene expression	1.031895
				Standard deviation	0.257341
				Standard error of the mean	0.105059
				Relative standard error of mean	10.18118
Female	25.07962608	18.50517273	6.574453	0.365405	0.776251
	24.46627235	18.7165184	5.749754	-0.45929	1.374869
	24.27939606	18.7470932	5.532303	-0.67675	1.598529
	25.50915337	18.3507061	7.158447	0.949399	0.517848
	23.99829292	17.98646927	6.011824	-0.19722	1.14649
	24.61742401	18.20016098	6.417263	0.208215	0.865608
				Fold gene expression	1.046599
				Standard deviation	0.401943
				Standard error of the mean	0.164092
				Relative standard error of mean	15.67864

Table S.4.13: *Cyp2j10* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2j10*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	30.84857368	16.40213203	14.44644	-0.12772	1.092568
	30.40653038	15.77114773	14.63538	0.061218	0.958454
	30.69090843	16.00558853	14.68532	0.111156	0.925846
	31.18015289	17.14575195	14.0344	-0.53976	1.453734
	31.91260147	16.45843124	15.45417	0.880006	0.543365
	30.5335598	16.34428978	14.18927	-0.38489	1.305764
		Mean ΔCt (control)	14.57416		
				Fold gene expression	1.046622
				Standard deviation	0.319573
				Standard error of the mean	0.130465
				Relative standard error of mean	12.46534
Female	30.49056244	16.40930367	14.08126	-0.49291	1.407276
	30.18668175	16.24884605	13.93784	-0.63633	1.554368
	30.4241333	16.33191109	14.09222	-0.48194	1.396622
	31.6965847	16.53628731	15.1603	0.586133	0.666126
	30.37435722	15.90371037	14.47065	-0.10352	1.07439
	32.01665878	16.67467499	15.34198	0.76782	0.587304
				Fold gene expression	1.114348
				Standard deviation	0.409726
				Standard error of the mean	0.16727
				Relative standard error of mean	15.01058

Table S.4.14: *Cyp3a2* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	33.79129791	18.69672966	15.09457	1.065265	0.477885
	34.06178284	19.07109451	14.99069	0.961385	0.513564
	33.04243469	20.00292778	13.03951	-0.9898	1.985904
	31.88895798	18.61770439	13.27125	-0.75805	1.691202
	32.4364624	18.68596458	13.7505	-0.27881	1.21319
		Mean ΔCt (control)	14.0293		
				Fold gene expression	1.176349
				Standard deviation	0.67988
				Standard error of the mean	0.304052
				Relative standard error of mean	25.84706
Female	34.78320313	18.77750015	16.0057	1.9764	0.254123
	32.60792542	18.58622551	14.0217	-0.0076	1.005284
	33.42826462	18.83141136	14.59685	0.56755	0.674762
	32.79399109	18.85993767	13.93405	-0.09525	1.06825
	34.10342026	18.42444038	15.67898	1.649677	0.318712
				Fold gene expression	0.664226
				Standard deviation	0.376574
				Standard error of the mean	0.168409
				Relative standard error of mean	25.35416

Table S.4.15: *Cyp3a9* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a9*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	26.31387329	18.62302208	7.690851	-0.19149	1.14194
	26.75233841	18.69672966	8.055609	0.173271	0.88683
	26.97164726	19.07109451	7.900553	0.018215	0.987454
		Mean ΔCt (control)	7.882338		
				Fold gene expression	1.005408
				Standard deviation	0.128499
				Standard error of the mean	0.074189
				Relative standard error of mean	7.379001
Female	28.16468811	18.77750015	9.387188	1.50485	0.352367
	27.47090149	18.58622551	8.884676	1.002338	0.49919
	26.27395821	18.83141136	7.442547	-0.43979	1.356408
	26.59047699	18.42444038	8.166037	0.283699	0.821482
				Fold gene expression	0.757362
				Standard deviation	0.444837
				Standard error of the mean	0.222419
				Relative standard error of mean	29.36757

Table S.4.16: *Cyp3a23* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a23*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	29.34032059	16.40213203	12.93819	-0.78537	1.723532
	29.72708893	15.77114773	13.95594	0.232384	0.851227
	31.24424934	16.00558853	15.23866	1.515104	0.349871
	29.9582901	17.14575195	12.81254	-0.91102	1.880373
	30.01674461	16.34428978	13.67245	-0.0511	1.036056
		Mean ΔCt (control)	13.72356		
				Fold gene expression	1.168212
				Standard deviation	0.633084
				Standard error of the mean	0.283124
				Relative standard error of mean	24.23564
Female	30.63632965	16.40930367	14.22703	0.503469	0.705408
	30.72545242	16.33191109	14.39354	0.669985	0.628513
	30.19988823	16.53628731	13.6636	-0.05996	1.042434
	30.33937454	15.90371037	14.43566	0.712107	0.610428
				Fold gene expression	0.746696
				Standard deviation	0.201413
				Standard error of the mean	0.100707
				Relative standard error of mean	13.48696

Table S.4.17: *Cyp4a1* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	25.17637634	18.62302208	6.553354	0.026118	0.982059
	24.97893333	18.69672966	6.282204	-0.24503	1.185119
	25.91881752	19.07109451	6.847723	0.320487	0.800799
	25.07326508	18.61770439	6.455561	-0.07168	1.050936
	25.18330193	18.68596458	6.497337	-0.0299	1.02094
		Mean ΔCt (control)	6.527236		
				Fold gene expression	1.007971
				Standard deviation	0.138733
				Standard error of the mean	0.062043
				Relative standard error of mean	6.155258
Female					
	24.39503098	18.58622551	5.808805	-0.71843	1.645391
	25.06937599	18.83141136	6.237965	-0.28927	1.222023
	24.81588936	18.85993767	5.955952	-0.57128	1.485845
	24.60747147	18.42444038	6.183031	-0.3442	1.269451
	25.71463203	19.72647858	5.988153	-0.53908	1.453048
				Fold gene expression	1.415152
				Standard deviation	0.171735
				Standard error of the mean	0.076802
				Relative standard error of mean	5.42713

Table S.4.18: *Cyp4a3* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a3*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	30.68878555	17.78814507	12.90064	-0.53887	1.452839
	30.86901855	17.76878548	13.10023	-0.33928	1.265127
	31.07027245	18.14568329	12.92459	-0.51493	1.428921
	33.37727356	19.40160942	13.97566	0.536149	0.689609
	32.9477005	18.65125275	14.29645	0.856933	0.552125
		Mean ΔCt (control)	13.43951		
				Fold gene expression	1.077724
				Standard deviation	0.426045
				Standard error of the mean	0.190533
				Relative standard error of mean	17.67921
Female	31.9852562	18.4491787	13.53608	0.096563	0.935259
	31.20719719	18.34965897	12.85754	-0.58198	1.496899
	32.93345261	18.3086586	14.62479	1.185279	0.439739
	31.0255127	17.64413452	13.38138	-0.05814	1.04112
	32.1522522	18.43346977	13.71878	0.279268	0.824009
				Fold gene expression	0.947405
				Standard deviation	0.382042
				Standard error of the mean	0.170854
				Relative standard error of mean	18.03393

Table S.4.19: *Cyp4f1* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	31.08237648	17.78814507	13.29423	0.20195	0.869375
	31.69880104	17.76878548	13.93002	0.837734	0.559522
	31.53038216	18.14568329	13.3847	0.292418	0.816533
	31.50394821	19.40160942	12.10234	-0.98994	1.986106
	31.7729454	18.4796257	13.29332	0.201038	0.869924
	31.20033646	18.65125275	12.54908	-0.5432	1.457199
		Mean ΔCt (control)	13.09228		
				Fold gene expression	1.09311
				Standard deviation	0.527462
				Standard error of the mean	0.215336
				Relative standard error of mean	19.69936
Female	31.43117523	18.4491787	12.982	-0.11028	1.079441
	32.04748154	18.34965897	13.69782	0.605541	0.657225
	32.74836731	18.3086586	14.43971	1.347427	0.392992
	32.17800522	17.64413452	14.53387	1.441589	0.368161
				Fold gene expression	0.624455
				Standard deviation	0.330327
				Standard error of the mean	0.165164
				Relative standard error of mean	26.44923

Table S.4.20: *Cyp4f4* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f4*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	31.61248589	17.78814507	13.82434	0.85487	0.552915
	31.15543175	17.76878548	13.38665	0.417176	0.748889
	32.20957947	18.14568329	14.0639	1.094426	0.468322
	32.01199341	19.40160942	12.61038	-0.35909	1.282613
	30.17363548	18.4796257	11.69401	-1.27546	2.420761
	30.88879776	18.65125275	12.23755	-0.73193	1.660854
		Mean ΔCt (control)	12.96947		
				Fold gene expression	1.189059
				Standard deviation	0.757142
				Standard error of the mean	0.309102
				Relative standard error of mean	25.99552
Female	31.85640335	18.4491787	13.40722	0.437754	0.738283
	30.42624092	18.31050491	12.11574	-0.85373	1.807173
	31.10124969	18.34965897	12.75159	-0.21788	1.163023
	31.51767921	18.3086586	13.20902	0.23955	0.847009
	31.5107708	17.64413452	13.86664	0.897166	0.53694
	31.20701981	18.43346977	12.77355	-0.19592	1.145455
				Fold gene expression	1.039647
				Standard deviation	0.446353
				Standard error of the mean	0.182223
				Relative standard error of mean	17.52738

Table S.4.21: *Cyp4f5* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f5*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	22.49903679	17.78814507	4.710892	0.469703	0.722113
	22.18119049	17.76878548	4.412405	0.171216	0.888094
	22.31451988	18.14568329	4.168837	-0.07235	1.05143
	22.78550911	19.40160942	3.3839	-0.85729	1.811631
	22.40570831	18.4796257	3.926083	-0.31511	1.244103
	23.49627113	18.65125275	4.845018	0.603829	0.658005
		Mean ΔCt (control)	4.241189		
				Fold gene expression	1.062563
				Standard deviation	0.425252
				Standard error of the mean	0.173608
				Relative standard error of mean	16.33865
Female	22.37131882	18.4491787	3.92214	-0.31905	1.247508
	22.63340569	18.31050491	4.322901	0.081712	0.944936
	22.42640305	18.34965897	4.076744	-0.16444	1.120735
	22.50321579	18.3086586	4.194557	-0.04663	1.032851
	21.97297478	17.64413452	4.32884	0.087651	0.941054
	22.58729744	18.43346977	4.153828	-0.08736	1.062425
				Fold gene expression	1.058251
				Standard deviation	0.115724
				Standard error of the mean	0.047244
				Relative standard error of mean	4.464368

Table S.4.22: *Cyp4f6* mRNA expression in the lung of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f6*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	24.28021622	17.78814507	6.492071	0.192998	0.874786
	24.16589165	17.76878548	6.397106	0.098033	0.934306
	24.22339821	18.14568329	6.077715	-0.22136	1.16583
	25.06870079	19.40160942	5.667091	-0.63198	1.549692
	25.10493088	18.4796257	6.625305	0.326232	0.797617
	25.18640137	18.65125275	6.535149	0.236076	0.849052
		Mean ΔCt (control)	6.299073		
				Fold gene expression	1.028547
				Standard deviation	0.285836
				Standard error of the mean	0.116692
				Relative standard error of mean	11.34532
Female	24.25156212	18.4491787	5.802383	-0.49669	1.410972
	24.60692596	18.31050491	6.296421	-0.00265	1.00184
	24.59147263	18.34965897	6.241814	-0.05726	1.040487
	25.28375435	18.3086586	6.975096	0.676023	0.625888
	24.31830597	18.45649719	5.861809	-0.43726	1.354034
	25.18746758	18.43346977	6.753998	0.454925	0.729548
				Fold gene expression	1.027128
				Standard deviation	0.317669
				Standard error of the mean	0.129688
				Relative standard error of mean	12.62627

S.5 Calculation of the fold change in the brain level of target genes between female and male rats normalized to the housekeeping gene using the ΔΔCT method:

Table S.5.1: *Cyp1a1* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp1a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	29.85753632	21.95253754	7.904999	-0.30201	1.232859
	30.37665939	22.01350594	8.363153	0.156147	0.897419
	29.41322899	22.00631142	7.406918	-0.80009	1.741209
	30.44920921	21.12924385	9.319965	1.112959	0.462345
	29.52134705	21.48134804	8.039999	-0.16701	1.122728
		Mean ΔCt (control)	8.207007		
				Fold gene expression	1.091312
				Standard deviation	0.46813
				Standard error of the mean	0.209354
				Relative standard error of mean	19.18371
Female	30.63818169	21.29172325	9.346458	1.139452	0.453932
	30.29972458	21.2209301	9.078794	0.871788	0.546469
	30.91126251	21.59479332	9.316469	1.109462	0.463467
	29.87859535	21.26463318	8.613962	0.406955	0.754213
	30.99826622	21.23768806	9.760578	1.553571	0.340666
				Fold gene expression	0.511749
				Standard deviation	0.15406
				Standard error of the mean	0.068898
				Relative standard error of mean	13.46318

Table S.5.2: *Cyp1a2* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp1a2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	27.48363686	21.95253754	5.531099	-0.79458	1.734572
	29.45805359	22.01350594	7.444548	1.118869	0.460455
	28.02119827	22.00631142	6.014887	-0.31079	1.240389
	28.63006783	21.48134804	7.14872	0.823041	0.565249
	27.00094032	21.51179886	5.489141	-0.83654	1.785759
		Mean ΔCt (control)	6.325679		
				Fold gene expression	1.157285
				Standard deviation	0.626743
				Standard error of the mean	0.280288
				Relative standard error of mean	24.21943
Female	27.65212059	21.29172325	6.360397	0.034718	0.976222
	28.81288338	21.2209301	7.591953	1.266274	0.415732
	29.3457756	21.59479332	7.750982	1.425303	0.372341
	27.80597305	21.26463318	6.54134	0.215661	0.861152
	28.88311195	21.23768806	7.645424	1.319745	0.400606
	27.90197372	21.12900352	6.77297	0.447291	0.733419
				Fold gene expression	0.626579
				Standard deviation	0.264139
				Standard error of the mean	0.107834
				Relative standard error of mean	17.21001

Table S.5.3: *Cyp1b1* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp1b1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	24.50772476	21.95253754	2.555187	-0.57608	1.490795
	25.18506813	22.01350594	3.171562	0.040293	0.972457
	25.61454964	22.00631142	3.608238	0.476969	0.718485
	25.10695457	21.12924385	3.977711	0.846442	0.556155
	24.31092453	21.48134804	2.829576	-0.30169	1.23259
	24.15713882	21.51179886	2.64534	-0.48593	1.400488
		Mean ΔCt (control)	3.131269		
				Fold gene expression	1.061828
				Standard deviation	0.37668
				Standard error of the mean	0.153779
				Relative standard error of mean	14.48247
Female	24.23845863	21.29172325	2.946735	-0.18453	1.13645
	24.765728	21.2209301	3.544798	0.413529	0.750785
	24.08582306	21.59479332	2.49103	-0.64024	1.558588
	25.68128586	21.26463318	4.416653	1.285384	0.410262
	24.90360451	21.23768806	3.665916	0.534647	0.690327
	23.80375862	21.12900352	2.674755	-0.45651	1.372222
				Fold gene expression	0.986439
				Standard deviation	0.441335
				Standard error of the mean	0.180174
				Relative standard error of mean	18.26511

Table S.5.4: *Cyp2a1* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	34.17876434	21.95253754	12.22623	-1.68856	3.22334
	35.20835114	22.01350594	13.19485	-0.71994	1.647111
	36.75863266	22.00631142	14.75232	0.837538	0.559598
	36.33463669	21.48134804	14.85329	0.938506	0.521773
	36.05903244	21.51179886	14.54723	0.63245	0.64508
		Mean ΔCt (control)	13.91478		
				Fold gene expression	1.31938
				Standard deviation	1.161959
				Standard error of the mean	0.519644
				Relative standard error of mean	39.38546
Female	28.20470047	21.29172325	6.912977	-7.00181	128.1603
	33.10462952	21.2209301	11.8837	-2.03108	4.087117
	27.43479919	21.26463318	6.170166	-7.74462	214.4678
	31.88129616	21.23768806	10.64361	-3.27118	9.654322
	33.82952118	21.12900352	12.70052	-1.21427	2.320226
				Fold gene expression	71.73795
				Standard deviation	95.9233
				Standard error of the mean	42.8982
				Relative standard error of mean	59.79848

Table S.5.5: *Cyp2b1* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2b1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	27.04485893	20.6919651	6.352894	-1.26488	2.40308
	28.96102715	20.69056702	8.27046	0.652682	0.636097
	28.21276855	20.91047478	7.302294	-0.31548	1.24443
	28.14666557	20.16667366	7.979992	0.362214	0.77797
	28.91030884	20.7270565	8.183252	0.565474	0.675733
			Mean ΔCt (control)	7.617778	
				Fold gene expression	1.147462
				Standard deviation	0.742719
				Standard error of the mean	0.332154
				Relative standard error of mean	28.94684
Female	29.1765976	20.48005295	8.696545	1.078766	0.473434
	28.16078949	20.2576561	7.903133	0.285355	0.82054
	30.07255173	20.42548943	9.647062	2.029284	0.244977
	28.07061768	20.45305443	7.617563	-0.00022	1.000149
	29.40126228	20.31982613	9.081436	1.463658	0.362573
				Fold gene expression	0.580334
				Standard deviation	0.318299
				Standard error of the mean	0.142347
				Relative standard error of mean	24.52852

Table S.5.6: *Cyp2b2* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2b2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	28.43515968	21.95253754	6.482622	-0.87884	1.838898
	29.67820549	22.01350594	7.6647	0.303236	0.810433
	29.23870087	22.00631142	7.232389	-0.12907	1.093592
	28.97444916	21.12924385	7.845205	0.483741	0.715121
	29.06375122	21.48134804	7.582403	0.220939	0.858007
		Mean ΔCt (control)	7.361464		
				Fold gene expression	1.06321
				Standard deviation	0.455463
				Standard error of the mean	0.203689
				Relative standard error of mean	19.15795
Female	29.36781693	21.29172325	8.076094	0.71463	0.609361
	28.95804024	21.2209301	7.73711	0.375646	0.77076
	30.14954185	21.59479332	8.554749	1.193285	0.437306
	28.69236946	21.26463318	7.427736	0.066272	0.955103
	29.77027702	21.23768806	8.532589	1.171125	0.444075
				Fold gene expression	0.643321
				Standard deviation	0.221779
				Standard error of the mean	0.099182
				Relative standard error of mean	15.41724

Table S.5.7: *Cyp2c6* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c6*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	34.24165726	21.95253754	12.28912	-0.05387	1.038042
	34.65101624	22.01350594	12.63751	0.294525	0.815341
	34.79759979	22.00631142	12.79129	0.448303	0.732904
	34.06654358	21.12924385	12.9373	0.594315	0.662359
	32.99552917	21.48134804	11.51418	-0.8288	1.776212
	33.40031052	21.51179886	11.88851	-0.45447	1.370283
		Mean ΔCt (control)	12.34299		
				Fold gene expression	1.065857
				Standard deviation	0.432315
				Standard error of the mean	0.176492
				Relative standard error of mean	16.55867
Female					
	33.55820084	21.2209301	12.33727	-0.00571	1.003969
	33.02348328	21.59479332	11.42869	-0.9143	1.884648
	33.76731491	21.23768806	12.52963	0.186642	0.878649
	32.69213867	21.12900352	11.56314	-0.77985	1.716952
				Fold gene expression	1.371054
				Standard deviation	0.503534
				Standard error of the mean	0.251767
				Relative standard error of mean	18.36302

Table S.5.8: *Cyp2c11* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c11*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	28.23395538	21.95253754	6.281418	-0.47869	1.393476
	29.25510025	22.01350594	7.241594	0.481489	0.716238
	28.05605125	22.00631142	6.04974	-0.71037	1.636219
	28.623312	21.12924385	7.494068	0.733963	0.60125
	28.21505547	21.48134804	6.733707	-0.0264	1.018466
		Mean ΔCt (control)	6.760106		
				Fold gene expression	1.07313
				Standard deviation	0.439523
				Standard error of the mean	0.196561
				Relative standard error of mean	18.31657
Female	28.96500587	21.29172325	7.673283	0.913177	0.531014
	28.39972687	21.2209301	7.178797	0.418691	0.748103
	28.98079872	21.59479332	7.386005	0.6259	0.648015
	28.64322853	21.26463318	7.378595	0.61849	0.651352
	29.60293961	21.23768806	8.365252	1.605146	0.328702
				Fold gene expression	0.581438
				Standard deviation	0.160869
				Standard error of the mean	0.071943
				Relative standard error of mean	12.37328

Table S.5.9: *Cyp2c13* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c13*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	34.77687073	20.91020012	13.86667	-0.99182	1.988686
	36.55079651	21.23644829	15.31435	0.455862	0.729074
	35.66214752	21.20062065	14.46153	-0.39696	1.316729
	37.54246902	21.14937782	16.39309	1.534605	0.345174
	35.31303406	21.05624199	14.25679	-0.60169	1.517497
		Mean ΔCt (control)	14.85849		
				Fold gene expression	1.179432
				Standard deviation	0.649392
				Standard error of the mean	0.290417
				Relative standard error of mean	24.62345
Female	37.3074913	20.75029945	16.55719	1.698706	0.308062
	36.66149902	20.74041748	15.92108	1.062596	0.47877
	36.75853729	20.70553017	16.05301	1.194521	0.436931
	37.45233536	20.68715286	16.76518	1.906697	0.266703
	38.07253647	20.51906967	17.55347	2.694981	0.154429
	37.68747711	20.89987946	16.7876	1.929112	0.262591
				Fold gene expression	0.317914
				Standard deviation	0.120455
				Standard error of the mean	0.049176
				Relative standard error of mean	15.4682

Table S.5.10: *Cyp2c23* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2c23*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	28.88280869	20.91020012	7.972609	-0.56892	1.483411
	29.67432976	21.23644829	8.437881	-0.10365	1.074485
	30.19148636	21.20062065	8.990866	0.449339	0.732378
	30.34165001	20.83230591	9.509344	0.967818	0.511279
	29.57940865	21.14937782	8.430031	-0.1115	1.080348
	28.96467018	21.05624199	7.908428	-0.6331	1.550892
		Mean ΔCt (control)	8.541526		
				Fold gene expression	1.072132
				Standard deviation	0.407044
				Standard error of the mean	0.166175
				Relative standard error of mean	15.49948
Female					
	29.56397247	20.74041748	8.823555	0.282029	0.822434
	31.24544907	20.70553017	10.53992	1.998392	0.250279
	28.6942215	20.51906967	8.175152	-0.36637	1.289109
	31.86293793	20.89987946	10.96306	2.421532	0.186658
				Fold gene expression	0.63712
				Standard deviation	0.520254
				Standard error of the mean	0.260127
				Relative standard error of mean	40.8286

Table S.5.11: *Cyp2d4* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2d4*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	24.74249458	20.6919651	4.050529	-0.72336	1.651019
	25.50859261	20.69056702	4.818026	0.04414	0.969868
	26.12778282	20.91047478	5.217308	0.443422	0.735388
	25.75165749	20.16667366	5.584984	0.811098	0.569948
	25.15022469	20.7270565	4.423168	-0.35072	1.275195
	25.16477966	20.61547852	4.549301	-0.22458	1.168441
		Mean ΔCt (control)	4.773886		
				Fold gene expression	1.061643
				Standard deviation	0.390129
				Standard error of the mean	0.159269
				Relative standard error of mean	15.00217
Female	25.28174019	20.48005295	4.801687	0.027801	0.980914
	25.64151955	20.2576561	5.383863	0.609977	0.655207
	25.28036118	20.42548943	4.854872	0.080986	0.945411
	25.73700142	20.45305443	5.283947	0.510061	0.702193
	25.56605911	20.31982613	5.246233	0.472347	0.720791
				Fold gene expression	0.800903
				Standard deviation	0.150562
				Standard error of the mean	0.067333
				Relative standard error of mean	8.40718

Table S.5.12: *Cyp2e1* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2e1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	24.97688675	20.6919651	4.284922	-0.8663	1.822986
	26.75543594	20.69056702	6.064869	0.913644	0.530843
	26.70380592	20.91047478	5.793331	0.642106	0.640777
	25.93351936	20.7270565	5.206463	0.055238	0.962436
	25.02202034	20.61547852	4.406542	-0.74468	1.675607
		Mean ΔCt (control)	5.151225		
				Fold gene expression	1.12653
				Standard deviation	0.592508
				Standard error of the mean	0.264978
				Relative standard error of mean	23.52158
Female	25.61355209	20.48005295	5.133499	-0.01773	1.012363
	26.62290001	20.2576561	6.365244	1.214019	0.431066
	27.19693565	20.42548943	6.771446	1.620221	0.325286
	26.87777138	20.31982613	6.557945	1.40672	0.377168
	25.29464531	20.27284431	5.021801	-0.12942	1.093857
				Fold gene expression	0.647948
				Standard deviation	0.372862
				Standard error of the mean	0.166749
				Relative standard error of mean	25.73491

Table S.5.13: *Cyp2j3* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2j3*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	22.66023445	22.56298447	0.09725	-0.80681	1.74934
	23.89534569	22.7211895	1.174156	0.270095	0.829265
	22.96236992	22.25282288	0.709547	-0.19451	1.144339
	23.90988922	22.0347538	1.875135	0.971074	0.510126
	22.5336113	21.94296837	0.590643	-0.31342	1.242648
	22.76453781	21.78690338	0.977634	0.073573	0.950281
		Mean ΔCt (control)	0.904061		
				Fold gene expression	1.071
				Standard deviation	0.420137
				Standard error of the mean	0.17152
				Relative standard error of mean	16.01496
Female	23.69215202	22.32851219	1.36364	0.459579	0.727199
	23.40186501	21.3197937	2.082071	1.17801	0.441961
	23.34770775	22.2055912	1.142117	0.238056	0.847887
	23.75100327	22.27744484	1.473558	0.569497	0.673851
	22.46575737	21.60790634	0.857851	-0.04621	1.032549
				Fold gene expression	0.744689
				Standard deviation	0.218221
				Standard error of the mean	0.097591
				Relative standard error of mean	13.10498

Table S.5.14: *Cyp2j4* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2j4*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	27.88459206	22.56298447	5.321608	0.037323	0.974462
	27.99481392	22.7211895	5.273624	-0.01066	1.007417
	27.2287178	22.25282288	4.975895	-0.30839	1.238325
	27.78040886	22.0347538	5.745655	0.46137	0.726296
	27.04761124	21.94296837	5.104643	-0.17964	1.132603
		Mean ΔCt (control)	5.284285		
				Fold gene expression	1.015821
				Standard deviation	0.192842
				Standard error of the mean	0.086241
				Relative standard error of mean	8.489836
Female	27.90842247	22.32851219	5.57991	0.295625	0.814719
	26.9987545	21.3197937	5.678961	0.394676	0.76066
	27.68693542	22.2055912	5.481344	0.197059	0.872327
	27.68802834	22.48288155	5.205147	-0.07914	1.056387
	27.64679146	22.27744484	5.369347	0.085062	0.942744
	26.6769352	21.60790634	5.069029	-0.21526	1.16091
				Fold gene expression	0.934625
				Standard deviation	0.151406
				Standard error of the mean	0.061811
				Relative standard error of mean	6.613485

Table S.5.15: *Cyp2j10* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp2j10*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	28.47204971	22.56298447	5.909065	-0.40297	1.322225
	28.58550072	22.7211895	5.864311	-0.44772	1.363885
	28.43003654	22.25282288	6.177214	-0.13482	1.097956
	28.61799431	22.0347538	6.583241	0.271207	0.828626
	28.42879868	21.94296837	6.48583	0.173797	0.886506
	28.63944244	21.78690338	6.852539	0.540506	0.68753
		Mean ΔCt (control)	6.312033		
				Fold gene expression	1.031121
				Standard deviation	0.275649
				Standard error of the mean	0.112533
				Relative standard error of mean	10.91369
Female	28.45299149	22.32851219	6.124479	-0.18755	1.138831
	28.14215088	21.3197937	6.822357	0.510324	0.702065
	28.322052	22.2055912	6.116461	-0.19557	1.145179
	29.18748093	22.48288155	6.704599	0.392566	0.761773
	28.20519638	22.27744484	5.927752	-0.38428	1.30521
	28.0281868	21.60790634	6.42028	0.108247	0.927715
				Fold gene expression	0.996795
				Standard deviation	0.238405
				Standard error of the mean	0.097328
				Relative standard error of mean	9.764135

Table S.5.16: *Cyp3a1* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	34.74755478	20.6919651	14.05559	-0.28978	1.222457
	34.7414093	20.69056702	14.05084	-0.29453	1.226487
	35.03034592	20.91047478	14.11987	-0.2255	1.169185
	36.12369919	20.16667366	15.95703	1.611652	0.327224
	34.15901947	20.61547852	13.54354	-0.80183	1.743315
		Mean ΔCt (control)	14.34537		
				Fold gene expression	1.137733
				Standard deviation	0.509828
				Standard error of the mean	0.228002
				Relative standard error of mean	20.04003
Female					
	35.18642426	20.2576561	14.92877	0.583394	0.667392
	35.30002213	20.42548943	14.87453	0.529159	0.692959
	34.78128052	20.31982613	14.46145	0.11608	0.922691
	34.71193314	20.27284431	14.43909	0.093715	0.937107
				Fold gene expression	0.805037
				Standard deviation	0.144675
				Standard error of the mean	0.072338
				Relative standard error of mean	8.985615

Table S.5.17: *Cyp3a2* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a2*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	28.35564804	20.91020012	7.445448	-0.4318	1.348911
	29.4664669	21.23644829	8.230019	0.352775	0.783076
	29.22295761	21.20062065	8.022337	0.145094	0.904321
	28.77317429	20.83230591	7.940868	0.063625	0.956857
	28.89692307	21.14937782	7.747545	-0.1297	1.094065
		Mean ΔCt (control)	7.877243		
				Fold gene expression	1.017446
				Standard deviation	0.216297
				Standard error of the mean	0.096731
				Relative standard error of mean	9.507224
Female	29.07541847	20.75029945	8.325119	0.447876	0.733122
	28.70752335	20.74041748	7.967106	0.089862	0.939612
	30.04026222	20.70553017	9.334732	1.457489	0.364126
	28.63785744	20.68715286	7.950705	0.073461	0.950355
	29.50494766	20.51906967	8.985878	1.108635	0.463733
				Fold gene expression	0.69019
				Standard deviation	0.268952
				Standard error of the mean	0.120279
				Relative standard error of mean	17.42695

Table S.5.18: *Cyp3a9* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a9*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	27.48248291	21.86958313	5.6129	0.401224	0.757215
	27.58653641	21.931036	5.6555	0.443825	0.735183
	26.97591972	22.0233326	4.952587	-0.25909	1.196722
	26.75855064	21.61818314	5.140368	-0.07131	1.050669
	27.02022743	21.90874672	5.111481	-0.10019	1.071918
	26.72475052	21.9275341	4.797216	-0.41446	1.332799
		Mean ΔCt (control)	5.211675		
				Fold gene expression	1.024084
				Standard deviation	0.237818
				Standard error of the mean	0.097089
				Relative standard error of mean	9.480536
Female	26.95716286	21.78549576	5.171667	-0.04001	1.02812
	26.97912979	21.55132675	5.427803	0.216128	0.860873
	26.61027718	21.27036667	5.339911	0.128235	0.91495
	27.53744125	21.745224	5.792217	0.580542	0.668713
	27.09966469	21.42292404	5.676741	0.465065	0.724438
	26.75687599	21.66075897	5.096117	-0.11556	1.083394
				Fold gene expression	0.880081
				Standard deviation	0.163547
				Standard error of the mean	0.066768
				Relative standard error of mean	7.586539

Table S.5.19: *Cyp3a23* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp3a23*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	29.1442585	21.86958313	7.274675	-0.20085	1.149373
	30.353899	21.931036	8.422863	0.94734	0.518588
	29.05274391	22.0233326	7.029411	-0.44611	1.362363
	28.98163414	21.61818314	7.363451	-0.11207	1.080779
	29.195961	21.90874672	7.287214	-0.18831	1.139427
		Mean ΔCt (control)	7.475523		
				Fold gene expression	1.050106
				Standard deviation	0.315749
				Standard error of the mean	0.141207
				Relative standard error of mean	13.44695
Female	28.05164146	21.78549576	6.266146	-1.20938	2.312378
	28.60787392	21.55132675	7.056547	-0.41898	1.336978
	27.90856743	21.745224	6.163343	-1.31218	2.483164
	29.43889427	21.42292404	8.01597	0.540447	0.687558
	27.11496735	21.66075897	5.454208	-2.02131	4.059535
				Fold gene expression	2.175923
				Standard deviation	1.282583
				Standard error of the mean	0.573588
				Relative standard error of mean	26.3607

Table S.5.20: *Cyp4a1* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	30.0105381	22.66277885	7.347759	-0.30606	1.236327
	30.89823151	22.40570641	8.492525	0.838705	0.559145
	29.91341782	22.53338432	7.380033	-0.27379	1.208977
	29.78141975	22.07455635	7.706863	0.053043	0.963901
	29.86969948	22.52778053	7.341919	-0.3119	1.241342
		Mean ΔCt (control)	7.65382		
				Fold gene expression	1.041939
				Standard deviation	0.293526
				Standard error of the mean	0.131269
				Relative standard error of mean	12.59852
Female	29.76352692	22.17542458	7.588102	-0.06572	1.046605
	29.64139557	21.97904015	7.662355	0.008535	0.994101
	30.65661621	21.90332222	8.753294	1.099474	0.466687
	29.13052177	22.25868607	6.871836	-0.78198	1.719494
	30.74164581	21.83511353	8.906532	1.252712	0.419659
				Fold gene expression	0.929309
				Standard deviation	0.528231
				Standard error of the mean	0.236232
				Relative standard error of mean	25.42019

Table S.5.21: *Cyp4a3* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a3*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	34.31351471	20.6919651	13.62155	-0.40172	1.321083
	35.51944733	20.69056702	14.82888	0.80561	0.57212
	34.62796021	20.91047478	13.71749	-0.30579	1.236091
	35.36398697	20.7270565	14.63693	0.61366	0.653537
	33.92698669	20.61547852	13.31151	-0.71176	1.637804
		Mean ΔCt (control)	14.02327		
				Fold gene expression	1.084127
				Standard deviation	0.456442
				Standard error of the mean	0.204127
				Relative standard error of mean	18.82871
Female					
	37.29369736	20.2576561	17.03604	3.01277	0.123898
	38.43450165	20.42548943	18.00901	3.985741	0.063121
	35.36367798	20.31982613	15.04385	1.020581	0.492918
	37.94108582	20.27284431	17.66824	3.644971	0.079938
				Fold gene expression	0.189969
				Standard deviation	0.203585
				Standard error of the mean	0.101792
				Relative standard error of mean	53.5838

Table S.5.22: *Cyp4a8* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4a8*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	38.1027565	22.66277885	15.43998	-0.29835	1.229738
	39.00237274	22.53338432	16.46899	0.730659	0.602628
	38.14551926	22.07455635	16.07096	0.332634	0.794085
	38.48109818	22.52778053	15.95332	0.214989	0.861553
	37.11241531	22.35401726	14.7584	-0.97993	1.972371
		Mean ΔCt (control)	15.73833		
				Fold gene expression	1.092075
				Standard deviation	0.542072
				Standard error of the mean	0.242422
				Relative standard error of mean	22.19829
Female	38.01499557	22.17542458	15.83957	0.101242	0.93223
	37.75903702	21.97904015	15.78	0.041668	0.971531
	37.20704269	21.90332222	15.30372	-0.43461	1.351544
	38.44969177	22.25868607	16.19101	0.452677	0.730686
	38.71764374	21.98641777	16.73123	0.992897	0.502468
				Fold gene expression	0.897692
				Standard deviation	0.314929
				Standard error of the mean	0.14084
				Relative standard error of mean	15.68916

Table S.5.23: *Cyp4f1* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f1*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	26.03436661	22.66277885	3.371588	0.096731	0.93515
	25.75484848	22.40570641	3.349142	0.074285	0.949813
	26.02673912	22.53338432	3.493355	0.218498	0.85946
	25.07918549	22.07455635	3.004629	-0.27023	1.205998
	25.9437542	22.52778053	3.415974	0.141116	0.906817
	25.36847305	22.35401726	3.014456	-0.2604	1.197812
		Mean ΔCt (control)	3.274857		
				Fold gene expression	1.009175
				Standard deviation	0.152459
				Standard error of the mean	0.062241
				Relative standard error of mean	6.167524
Female	25.0563488	22.17542458	2.880924	-0.39393	1.313971
	25.15913391	21.97904015	3.180094	-0.09476	1.06789
	25.02727318	21.90332222	3.123951	-0.15091	1.110267
	25.40101814	22.25868607	3.142332	-0.13253	1.096211
	25.12705994	21.83511353	3.291946	0.017089	0.988225
	25.35582733	21.98641777	3.36941	0.094552	0.936563
				Fold gene expression	1.085521
				Standard deviation	0.130293
				Standard error of the mean	0.053192
				Relative standard error of mean	4.90014

Table S.5.24: *Cyp4f4* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f4*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	29.64159012	22.40570641	7.235884	0.257257	0.836677
	30.55644226	22.53338432	8.023058	1.044431	0.484836
	28.24415016	22.07455635	6.169594	-0.80903	1.752036
	30.02590942	22.52778053	7.498129	0.519502	0.697612
	28.32048607	22.35401726	5.966469	-1.01216	2.016926
		Mean ΔCt (control)	6.978627		
				Fold gene expression	1.157618
				Standard deviation	0.681723
				Standard error of the mean	0.304876
				Relative standard error of mean	26.3365
Female	27.9193821	22.17542458	5.743958	-1.23467	2.353274
	27.87650681	21.97904015	5.897467	-1.08116	2.115737
	27.45651054	21.90332222	5.553188	-1.42544	2.685961
	28.70817947	22.25868607	6.449493	-0.52913	1.443062
	27.96807289	21.83511353	6.132959	-0.84567	1.797096
	28.11343384	21.98641777	6.127016	-0.85161	1.804514
				Fold gene expression	2.033274
				Standard deviation	0.445345
				Standard error of the mean	0.181811
				Relative standard error of mean	8.941806

Table S.5.25: *Cyp4f5* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f5*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	25.70376587	22.66277885	3.040987	0.131496	0.912884
	26.49518776	22.40570641	4.089481	1.179991	0.441354
	25.23944473	22.53338432	2.70606	-0.20343	1.151433
	25.37679672	22.07455635	3.30224	0.39275	0.761676
	24.63045311	22.52778053	2.102673	-0.80682	1.749349
	24.56951904	22.35401726	2.215502	-0.69399	1.61775
		Mean ΔCt (control)	2.909491		
				Fold gene expression	1.105741
				Standard deviation	0.505066
				Standard error of the mean	0.206192
				Relative standard error of mean	18.64742
Female	24.37293053	22.17542458	2.197506	-0.71198	1.638056
	24.25177765	21.97904015	2.272738	-0.63675	1.554826
	24.21597099	21.90332222	2.312649	-0.59684	1.512402
	24.22727585	22.25868607	1.96859	-0.9409	1.919727
	24.29445648	21.83511353	2.459343	-0.45015	1.36618
	24.21575356	21.98641777	2.229336	-0.68015	1.602312
				Fold gene expression	1.598917
				Standard deviation	0.183334
				Standard error of the mean	0.074846
				Relative standard error of mean	4.68104

Table S.5.26: *Cyp4f6* mRNA expression in the brain of male and female Sprague Dawley rats normalized to β-actin housekeeping gene

Group	Ct (*Cyp4f6*)	Ct (B-ACTIN)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	24.8198452	22.66277885	2.157066	0.125634	0.916601
	25.20314789	22.40570641	2.797441	0.766009	0.588042
	24.31415749	22.53338432	1.780773	-0.25066	1.189751
	24.56652832	22.07455635	2.491972	0.460539	0.726714
	23.89409065	22.52778053	1.36631	-0.66512	1.585703
	23.949049	22.35401726	1.595032	-0.4364	1.353224
		Mean ΔCt (control)	2.031432		
				Fold gene expression	1.060006
				Standard deviation	0.383032
				Standard error of the mean	0.156372
				Relative standard error of mean	14.75199
Female	24.13739204	22.17542458	1.961967	-0.06947	1.049327
	24.38249969	21.97904015	2.40346	0.372027	0.772696
	25.05745316	21.90332222	3.154131	1.122698	0.459234
	24.28108597	22.25868607	2.0224	-0.00903	1.006281
	25.26451874	21.83511353	3.429405	1.397973	0.379462
	23.79139709	21.98641777	1.804979	-0.22645	1.169955
				Fold gene expression	0.806159
				Standard deviation	0.327131
				Standard error of the mean	0.133551
				Relative standard error of mean	16.5663

S.6 Calculation of the fold change in the small intestine level of target genes between female and male rats normalized to the housekeeping gene using the ΔΔCT method:

Table S.6.1: *Cyp1a1* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp1a1*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	21.42038918	15.0469017	6.373487	-0.07512	1.05345
	22.09064102	15.63680172	6.453839	0.00523	0.996382
	22.13542557	15.80290794	6.332518	-0.11609	1.083795
	22.58141327	15.58490181	6.996511	0.547902	0.684014
	21.87853813	15.65109253	6.227446	-0.22116	1.165674
	21.86164856	15.553792	6.307857	-0.14075	1.10248
		Mean ΔCt (control)	6.44861		
				Fold gene expression	1.014299
				Standard deviation	0.17115
				Standard error of the mean	0.069872
				Relative standard error of mean	6.888673
Female	21.78126526	15.26576138	6.515504	0.066894	0.954691
	21.81917953	15.58676243	6.232417	-0.21619	1.161664
	22.22576523	15.72859859	6.497167	0.048557	0.966903
	22.1903038	15.84080791	6.349496	-0.09911	1.071115
	21.86701012	15.89041996	5.97659	-0.47202	1.38705
	22.72870445	16.63667107	6.092033	-0.35658	1.280384
				Fold gene expression	1.136968
				Standard deviation	0.173322
				Standard error of the mean	0.070758
				Relative standard error of mean	6.223428

Table S.6.2: *Cyp1a2* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp1a2*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	22.54761505	14.88868523	7.65893	-0.1963	1.145752
	23.26819801	15.26900387	7.999194	0.143969	0.905026
	23.51773071	15.34797287	8.169758	0.314533	0.804111
	22.91939163	15.24869919	7.670692	-0.18453	1.136449
	23.09124374	15.07187366	8.01937	0.164145	0.892457
	22.89465904	15.28125191	7.613407	-0.24182	1.182482
		Mean ΔCt (control)	7.855225		
				Fold gene expression	1.011046
				Standard deviation	0.162103
				Standard error of the mean	0.066178
				Relative standard error of mean	6.545535
Female	22.90989685	15.29334736	7.616549	-0.23868	1.179909
	22.90000343	15.16924477	7.730759	-0.12447	1.090105
	23.16272354	15.29349518	7.869228	0.014003	0.990341
	23.49699783	15.89090347	7.606094	-0.24913	1.188491
	23.16763878	15.78082657	7.386812	-0.46841	1.383587
	24.96151352	16.44277382	8.51874	0.663514	0.631338
				Fold gene expression	1.077295
				Standard deviation	0.254288
				Standard error of the mean	0.103813
				Relative standard error of mean	9.636405

Table S.6.3: *Cyp1b1* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp1b1*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	22.43733978	15.0469017	7.390438	0.179531	0.88299
	22.75009346	15.63680172	7.113292	-0.09761	1.070003
	23.14750099	15.80290794	7.344593	0.133686	0.911499
	22.62650299	15.58490181	7.041601	-0.16931	1.124517
	22.89332008	15.65109253	7.242228	0.031321	0.978524
	22.68708038	15.553792	7.133288	-0.07762	1.055274
			Mean ΔCt (control)	7.210907	
				Fold gene expression	1.003801
				Standard deviation	0.095245
				Standard error of the mean	0.038884
				Relative standard error of mean	3.873654
Female	22.62806129	15.26576138	7.3623	0.151393	0.900381
	22.79387283	15.58676243	7.20711	-0.0038	1.002635
	23.04993057	15.72859859	7.321332	0.110425	0.926315
	23.18860626	15.84080791	7.347798	0.136892	0.909477
	23.87608337	15.89041996	7.985663	0.774757	0.584487
	24.67870331	16.63667107	8.042032	0.831126	0.562091
				Fold gene expression	0.814231
				Standard deviation	0.190215
				Standard error of the mean	0.077655
				Relative standard error of mean	9.537232

Table S.6.4: *Cyp2a1* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp2a1*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	34.42749405	14.88868523	19.53881	0.469621	0.722154
	33.82606125	15.26900387	18.55706	-0.51213	1.426155
	34.58669281	15.34797287	19.23872	0.169532	0.889131
	34.41130447	15.24869919	19.16261	0.093417	0.9373
	34.11862183	15.07187366	19.04675	-0.02244	1.015676
	34.15243912	15.28125191	18.87119	-0.198	1.147107
		Mean ΔCt (control)	19.06919		
				Fold gene expression	1.02292
				Standard deviation	0.24239
				Standard error of the mean	0.098955
				Relative standard error of mean	9.673785
Female	34.59760284	15.29334736	19.30426	0.235068	0.849645
	34.2593956	15.16924477	19.09015	0.020963	0.985575
	34.16900253	15.29349518	18.87551	-0.19368	1.143678
	34.72328186	15.89090347	18.83238	-0.23681	1.178384
	34.96700287	15.78082657	19.18618	0.116988	0.92211
	36.20910263	16.44277382	19.76633	0.697141	0.616793
				Fold gene expression	0.949364
				Standard deviation	0.206305
				Standard error of the mean	0.084224
				Relative standard error of mean	8.87159

Table S.6.5: *Cyp2b1* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp2b1*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	20.62836266	14.88868523	5.739677	-0.00457	1.003173
	21.12841606	15.26900387	5.859412	0.115164	0.923277
	21.22377396	15.34797287	5.875801	0.131553	0.912848
	20.8448925	15.24869919	5.596193	-0.14805	1.108074
	20.75500679	15.07187366	5.683133	-0.06111	1.043272
	20.99252319	15.28125191	5.711271	-0.03298	1.023121
		Mean ΔCt (control)	5.744248		
				Fold gene expression	1.002294
				Standard deviation	0.074226
				Standard error of the mean	0.030303
				Relative standard error of mean	3.023321
Female	20.77105522	15.29334736	5.477708	-0.26654	1.20292
	20.8916378	15.16924477	5.722393	-0.02186	1.015264
	21.0814209	15.29349518	5.787926	0.043678	0.970179
	22.27885628	15.89090347	6.387953	0.643705	0.640067
	21.37211418	15.78082657	5.591288	-0.15296	1.111849
	21.22587776	16.44277382	4.783104	-0.96114	1.946853
				Fold gene expression	1.147855
				Standard deviation	0.435827
				Standard error of the mean	0.177925
				Relative standard error of mean	15.50069

Table S.6.6: *Cyp2b2* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp2b2*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	20.54189491	15.0469017	5.494993	-0.04	1.028116
	21.3386898	15.63680172	5.701888	0.166892	0.890759
	21.4197731	15.80290794	5.616865	0.081869	0.944833
	21.00575256	15.58490181	5.420851	-0.11414	1.082333
	21.22142601	15.65109253	5.570333	0.035338	0.975803
	20.9588356	15.553792	5.405044	-0.12995	1.094257
		Mean ΔCt (control)	5.534996		
				Fold gene expression	1.002684
				Standard deviation	0.079966
				Standard error of the mean	0.032646
				Relative standard error of mean	3.255869
Female	20.83866119	15.26576138	5.5729	0.037904	0.974069
	20.98480415	15.58676243	5.398042	-0.13695	1.099581
	21.42878342	15.72859859	5.700185	0.165189	0.891812
	22.68405342	15.84080791	6.843246	1.30825	0.40381
	21.53352928	15.89041996	5.643109	0.108114	0.9278
	22.80368614	16.63667107	6.167015	0.632019	0.645273
				Fold gene expression	0.823724
				Standard deviation	0.253906
				Standard error of the mean	0.103657
				Relative standard error of mean	12.5839

Table S.6.7: *Cyp2c6* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp2c6*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	36.61317444	14.88868523	21.72449	1.267428	0.4154
	34.90011978	15.26900387	19.63112	-0.82595	1.772696
	34.67299652	15.34797287	19.32502	-1.13204	2.19168
	35.95380783	15.24869919	20.70511	0.248048	0.842035
	36.1480217	15.07187366	21.07615	0.619087	0.651083
	35.56173325	15.28125191	20.28048	-0.17658	1.130201
		Mean ΔCt (control)	20.45706		
				Fold gene expression	1.167183
				Standard deviation	0.686275
				Standard error of the mean	0.280171
				Relative standard error of mean	24.00401
Female	36.99253464	15.29334736	21.69919	1.242126	0.422749
	35.68371964	15.16924477	20.51447	0.057414	0.960985
	36.69110489	15.29349518	21.39761	0.940549	0.521035
	35.78203964	15.89090347	19.89114	-0.56592	1.480336
	35.76646042	15.78082657	19.98563	-0.47143	1.38648
				Fold gene expression	0.954317
				Standard deviation	0.483168
				Standard error of the mean	0.216079
				Relative standard error of mean	22.64228

Table S.6.8: *Cyp2c11* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp2c11*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	22.2719326	14.88868523	7.383247	-0.16109	1.118134
	22.98664284	15.26900387	7.717639	0.173299	0.886813
	23.23209	15.34797287	7.884117	0.339777	0.790164
	22.58089638	15.24869919	7.332197	-0.21214	1.158408
	22.65786552	15.07187366	7.585992	0.041651	0.971542
	22.6441021	15.28125191	7.36285	-0.18149	1.134055
		Mean ΔCt (control)	7.54434		
				Fold gene expression	1.009853
				Standard deviation	0.151056
				Standard error of the mean	0.061668
				Relative standard error of mean	6.106665
Female	22.63096428	15.29334736	7.337617	-0.20672	1.154064
	22.6428833	15.16924477	7.473639	-0.0707	1.050228
	22.89701462	15.29349518	7.603519	0.059179	0.95981
	23.30892372	15.89090347	7.41802	-0.12632	1.091506
	24.46821022	15.78082657	8.687384	1.143043	0.452803
	24.78164673	16.44277382	8.338873	0.794532	0.57653
				Fold gene expression	0.880824
				Standard deviation	0.293183
				Standard error of the mean	0.119691
				Relative standard error of mean	13.58856

Table S.6.9: *Cyp2c13* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp2c13*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	21.72068977	15.0469017	6.673788	0.018677	0.987137
	22.19749451	15.63680172	6.560693	-0.09442	1.067635
	22.58212471	15.80290794	6.779217	0.124106	0.917572
	22.21775627	15.58490181	6.632854	-0.02226	1.015546
	22.33726501	15.65109253	6.686172	0.031062	0.9787
	22.15173149	15.553792	6.597939	-0.05717	1.040424
		Mean ΔCt (control)	6.655111		
				Fold gene expression	1.001169
				Standard deviation	0.052641
				Standard error of the mean	0.021491
				Relative standard error of mean	2.146557
Female	22.2999115	15.26576138	7.03415	0.379039	0.768949
	22.45824814	15.58676243	6.871486	0.216375	0.860725
	22.44109535	15.72859859	6.712497	0.057386	0.961004
	22.56281853	15.84080791	6.722011	0.0669	0.954687
	24.93540382	15.89041996	9.044984	2.389873	0.190799
	24.06513596	16.63667107	7.428465	0.773354	0.585056
				Fold gene expression	0.720203
				Standard deviation	0.294491
				Standard error of the mean	0.120225
				Relative standard error of mean	16.69324

Table S.6.10: *Cyp2c23* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp2c23*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	35.11530304	14.99317646	20.12213	-0.0195	1.01361
	35.56125259	15.53057957	20.03067	-0.11096	1.079944
	35.26271439	15.73916912	19.52355	-0.61808	1.534835
	35.98874283	15.41041851	20.57832	0.436695	0.738825
	36.56649399	15.53924561	21.02725	0.885619	0.541255
	34.84709549	15.27923965	19.56786	-0.57377	1.488411
		Mean ΔCt (control)	20.14163		
				Fold gene expression	1.066147
				Standard deviation	0.395873
				Standard error of the mean	0.161614
				Relative standard error of mean	15.15875
Female	32.34098816	15.25453281	17.08646	-3.05517	8.311873
	33.9764595	15.24050331	18.73596	-1.40567	2.649413
	37.15181351	15.51179123	21.64002	1.498393	0.353947
	36.91116714	15.64538002	21.26579	1.124158	0.45877
				Fold gene expression	2.943501
				Standard deviation	3.732094
				Standard error of the mean	1.866047
				Relative standard error of mean	63.3955

Table S.6.11: *Cyp2e1* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp2e1*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	21.00891876	15.0469017	5.962017	0.034478	0.976385
	21.61394882	15.63680172	5.977147	0.049608	0.966199
	21.91149902	15.80290794	6.108591	0.181052	0.882059
	21.3314724	15.58490181	5.746571	-0.18097	1.133644
	21.53865433	15.65109253	5.887562	-0.03998	1.028097
	21.4371376	15.553792	5.883346	-0.04419	1.031106
		Mean ΔCt (control)	5.927539		
				Fold gene expression	1.002915
				Standard deviation	0.083877
				Standard error of the mean	0.034243
				Relative standard error of mean	3.414328
Female	21.18091965	15.26576138	5.915158	-0.01238	1.008619
	22.1549778	15.58676243	6.568215	0.640676	0.641412
	21.76470566	15.72859859	6.036107	0.108568	0.927508
	21.67921638	15.84080791	5.838408	-0.08913	1.063729
	21.79675484	15.89041996	5.906335	-0.0212	1.014806
	23.31801414	16.63667107	6.681343	0.753804	0.593038
				Fold gene expression	0.874852
				Standard deviation	0.204862
				Standard error of the mean	0.083634
				Relative standard error of mean	9.559831

Table S.6.12: *Cyp2j3* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp2j3*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	21.20621109	15.0469017	6.159309	-0.10035	1.072032
	21.78096199	15.63680172	6.14416	-0.1155	1.083349
	22.99167442	15.80290794	7.188766	0.929109	0.525183
	21.65578842	15.58490181	6.070887	-0.18877	1.139793
	21.70969009	15.65109253	6.058598	-0.20106	1.149543
	21.49001884	15.553792	5.936227	-0.32343	1.251303
		Mean ΔCt (control)	6.259658		
				Fold gene expression	1.036867
				Standard deviation	0.258647
				Standard error of the mean	0.105592
				Relative standard error of mean	10.18376
Female	21.29408836	15.26576138	6.028327	-0.23133	1.173917
	21.67180824	15.58676243	6.085046	-0.17461	1.128661
	21.8919754	15.72859859	6.163377	-0.09628	1.069014
	21.99642372	15.84080791	6.155616	-0.10404	1.074781
	22.43022537	15.89041996	6.539805	0.280148	0.823507
	23.48759651	16.63667107	6.850925	0.591268	0.663759
				Fold gene expression	0.98894
				Standard deviation	0.200315
				Standard error of the mean	0.081778
				Relative standard error of mean	8.269266

Table S.6.13: *Cyp2j4* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp2j4*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	21.63014984	14.90790844	6.722241	-0.24304	1.183481
	22.43364143	15.53313255	6.900509	-0.06477	1.045917
	23.24939537	16.04916191	7.200233	0.234956	0.849711
	23.12949944	15.88101864	7.248481	0.283203	0.821765
	22.36303902	15.43636131	6.926678	-0.0386	1.027117
	22.52326584	15.7297411	6.793525	-0.17175	1.126426
		Mean ΔCt (control)	6.965278		
				Fold gene expression	1.00907
				Standard deviation	0.145845
				Standard error of the mean	0.059541
				Relative standard error of mean	5.900578
Female	22.15753555	15.31814289	6.839393	-0.12589	1.091177
	22.18677902	15.23503971	6.951739	-0.01354	1.009428
	22.87580109	15.87814617	6.997655	0.032377	0.977808
	23.33951378	16.2695446	7.069969	0.104691	0.930004
	23.10550117	16.11947632	6.986025	0.020747	0.985722
	22.6664238	16.50775146	6.158672	-0.80661	1.749091
				Fold gene expression	1.123872
				Standard deviation	0.310828
				Standard error of the mean	0.126895
				Relative standard error of mean	11.29088

Table S.6.14: *Cyp2j10* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp2j10*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	31.6193409	14.90790844	16.71143	1.209574	0.432396
	30.89755058	15.53313255	15.36442	-0.13744	1.099952
	30.9431057	16.04916191	14.89394	-0.60791	1.524055
	30.86358452	15.88101864	14.98257	-0.51929	1.433252
	30.954216	15.43636131	15.51785	0.015996	0.988974
	31.27067757	15.7297411	15.54094	0.039078	0.973277
		Mean ΔCt (control)	15.50186		
				Fold gene expression	1.075318
				Standard deviation	0.390206
				Standard error of the mean	0.159301
				Relative standard error of mean	14.81432
Female	31.29132462	15.31814289	15.97318	0.471323	0.721303
	31.52470016	15.23503971	16.28966	0.787802	0.579226
	31.03298569	15.87814617	15.15484	-0.34702	1.27193
	31.09254265	16.2695446	14.823	-0.67886	1.600875
	31.11616707	16.11947632	14.99669	-0.50517	1.419288
	31.57313728	16.50775146	15.06539	-0.43647	1.353292
				Fold gene expression	1.157652
				Standard deviation	0.410174
				Standard error of the mean	0.167453
				Relative standard error of mean	14.46485

Table S.6.15: *Cyp3a1* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp3a1*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	35.7577095	15.53313255	20.22458	-0.62844	1.545896
	37.41846466	16.04916191	21.3693	0.516283	0.699171
	37.07433701	15.43636131	21.63798	0.784956	0.58037
	35.90996552	15.7297411	20.18022	-0.6728	1.594159
			Mean ΔCt (control)	20.85302	
				Fold gene expression	1.104899
				Standard deviation	0.539629
				Standard error of the mean	0.269815
				Relative standard error of mean	24.41985
Female	36.60176849	15.31814289	21.28363	0.430606	0.74195
	36.75820923	15.23503971	21.52317	0.67015	0.628442
	36.77846909	15.87814617	20.90032	0.047303	0.967744
	37.16514969	16.11947632	21.04567	0.192653	0.874995
	36.38945007	16.50775146	19.8817	-0.97132	1.960635
				Fold gene expression	1.034753
				Standard deviation	0.533407
				Standard error of the mean	0.238547
				Relative standard error of mean	23.05352

Table S.6.16: *Cyp3a2* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp3a2*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	25.19059181	14.90790844	10.28268	0.050117	0.965858
	25.76757813	15.53313255	10.23445	0.001879	0.998698
	26.27242661	16.04916191	10.22326	-0.0093	1.006468
	26.12583733	15.88101864	10.24482	0.012252	0.991543
	25.74394035	15.43636131	10.30758	0.075013	0.949334
	25.83234787	15.7297411	10.10261	-0.12996	1.094263
		Mean ΔCt (control)	10.23257		
				Fold gene expression	1.001027
				Standard deviation	0.050452
				Standard error of the mean	0.020597
				Relative standard error of mean	2.057577
Female	25.70596695	15.31814289	10.38782	0.155258	0.897972
	25.78372765	15.23503971	10.54869	0.316122	0.803226
	26.11230087	15.87814617	10.23415	0.001588	0.9989
	26.5971489	16.2695446	10.3276	0.095038	0.936248
	28.95790291	16.11947632	12.83843	2.60586	0.16427
	28.3625946	16.50775146	11.85484	1.622277	0.324822
				Fold gene expression	0.687573
				Standard deviation	0.352659
				Standard error of the mean	0.143972
				Relative standard error of mean	20.93921

Table S.6.17: *Cyp3a9* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp3a9*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	37.20720291	15.63680172	21.5704	1.199007	0.435575
	35.86162949	15.80290794	20.05872	-0.31267	1.242007
	34.38830566	15.65109253	18.73721	-1.63418	3.104114
	36.67303467	15.553792	21.11924	0.747848	0.595491
			Mean ΔCt (control)	20.37139	
				Fold gene expression	1.344297
				Standard deviation	1.223915
				Standard error of the mean	0.611958
				Relative standard error of mean	45.5225
Female	26.90587044	15.26576138	11.64011	-8.73129	424.9901
	31.63671494	15.58676243	16.04995	-4.32144	19.99326
	36.15457535	15.72859859	20.42598	0.054582	0.962873
	36.53848648	15.84080791	20.69768	0.326284	0.797588
	26.74207306	15.89041996	10.85165	-9.51974	734.0536
				Fold gene expression	236.1595
				Standard deviation	332.0377
				Standard error of the mean	148.4918
				Relative standard error of mean	62.87774

Table S.6.18: *Cyp3a23* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp3a23*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	21.01748848	14.90790844	6.10958	-0.03687	1.025887
	21.60243797	15.53313255	6.069305	-0.07715	1.054929
	22.36790657	16.04916191	6.318745	0.172293	0.887431
	22.15455437	15.88101864	6.273536	0.127084	0.91568
	21.68592644	15.43636131	6.249565	0.103113	0.931022
	21.58772087	15.7297411	5.85798	-0.28847	1.221346
		Mean ΔCt (control)	6.146452		
				Fold gene expression	1.006049
				Standard deviation	0.124098
				Standard error of the mean	0.050663
				Relative standard error of mean	5.035812
Female	21.42850304	15.31814289	6.11036	-0.03609	1.025332
	21.44103432	15.23503971	6.205995	0.059543	0.959568
	21.84907722	15.87814617	5.970931	-0.17552	1.129372
	22.43259048	16.2695446	6.163046	0.016594	0.988564
	22.30660629	16.11947632	6.18713	0.040678	0.972198
	24.13162231	16.50775146	7.623871	1.477419	0.359131
				Fold gene expression	0.905694
				Standard deviation	0.274689
				Standard error of the mean	0.112141
				Relative standard error of mean	12.38179

Table S.6.19: *Cyp4a1* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp4a1*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	22.4458313	15.0469017	7.39893	0.039977	0.972671
	23.17233849	15.63680172	7.535537	0.176584	0.884796
	23.34290695	15.80290794	7.539999	0.181046	0.882063
	22.71615982	15.58490181	7.131258	-0.22769	1.170962
	22.98096848	15.65109253	7.329876	-0.02908	1.020359
	22.77190971	15.553792	7.218118	-0.14084	1.102543
		Mean ΔCt (control)	7.358953		
				Fold gene expression	1.005566
				Standard deviation	0.116533
				Standard error of the mean	0.047574
				Relative standard error of mean	4.731117
Female	22.63911819	15.26576138	7.373357	0.014404	0.990066
	22.82960129	15.58676243	7.242839	-0.11611	1.083812
	23.07598114	15.72859859	7.347383	-0.01157	1.008052
	23.06615639	15.84080791	7.225348	-0.1336	1.097031
	22.95615959	15.89041996	7.06574	-0.29321	1.225366
	24.61741447	16.63667107	7.980743	0.621791	0.649864
				Fold gene expression	1.009032
				Standard deviation	0.194679
				Standard error of the mean	0.079477
				Relative standard error of mean	7.876582

Table S.6.20: *Cyp4a8* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp4a8*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male					
	35.37493515	15.63680172	19.73813	-0.31859	1.247111
	36.12532043	15.80290794	20.32241	0.265689	0.831802
	35.63024521	15.58490181	20.04534	-0.01138	1.007919
	36.1544342	15.65109253	20.50334	0.446618	0.733761
	35.22817993	15.553792	19.67439	-0.38234	1.303451
		Mean ΔCt (control)	20.05672		
			Fold gene expression		1.024809
			Standard deviation		0.249653
			Standard error of the mean		0.111648
			Relative standard error of mean		10.89452
Female					
	36.65815735	15.58676243	21.07139	1.014671	0.494941
	35.93002319	15.72859859	20.20142	0.144701	0.904567
	35.30750656	15.84080791	19.4667	-0.59003	1.505273
	35.41714096	15.89041996	19.52672	-0.53	1.443932
	36.95736313	16.63667107	20.32069	0.263968	0.832794
			Fold gene expression		1.036301
			Standard deviation		0.429516
			Standard error of the mean		0.192086
			Relative standard error of mean		18.53568

Table S.6.21: *Cyp4f1* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp4f1*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	25.97480392	14.37320328	11.6016	-1.28546	2.437598
	27.30628777	14.60536575	12.70092	-0.18614	1.137715
	28.27339172	15.02254772	13.25084	0.363783	0.777124
	28.93395424	14.93907642	13.99488	1.107817	0.463996
		Mean ΔCt (control)	12.88706		
				Fold gene expression	1.204108
				Standard deviation	0.867177
				Standard error of the mean	0.433589
				Relative standard error of mean	36.0091
Female	24.17294121	14.99263287	9.180308	-3.70675	13.05701
	26.8288784	14.84191036	11.98697	-0.90009	1.866186
	28.83596992	15.01529312	13.82068	0.933616	0.523545
	24.56740379	15.37995338	9.18745	-3.69961	12.99253
				Fold gene expression	7.109819
				Standard deviation	6.852009
				Standard error of the mean	3.426005
				Relative standard error of mean	48.18695

Table S.6.22: *Cyp4f4* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp4f4*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	22.38262939	14.37320328	8.009426	-0.32184	1.249928
	23.09357071	14.77818966	8.315381	-0.01589	1.011075
	22.99298477	14.57935047	8.413634	0.082363	0.944509
	22.9574337	14.60536575	8.352068	0.020797	0.985688
	23.49173927	15.02254772	8.469192	0.137921	0.908828
	23.36700058	14.93907642	8.427924	0.096653	0.9352
		Mean ΔCt (control)	8.331271		
				Fold gene expression	1.005871
				Standard deviation	0.12504
				Standard error of the mean	0.051047
				Relative standard error of mean	5.074945
Female	23.43267632	14.99263287	8.440043	0.108773	0.927377
	23.02902031	14.84191036	8.18711	-0.14416	1.105088
	23.29996872	15.01529312	8.284676	-0.0466	1.032825
	23.8758812	15.52533817	8.350543	0.019272	0.98673
	23.9055233	15.37995338	8.52557	0.194299	0.873997
	25.44578171	16.05649185	9.38929	1.058019	0.480291
				Fold gene expression	0.901051
				Standard deviation	0.221269
				Standard error of the mean	0.090333
				Relative standard error of mean	10.02526

Table S.6.23: *Cyp4f5* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp4f5*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	21.47459793	15.0469017	6.427696	0.402737	0.756422
	21.69128036	15.63680172	6.054479	0.029519	0.979747
	22.37661552	15.80290794	6.573708	0.548748	0.683613
	21.22067833	15.58490181	5.635777	-0.38918	1.309652
	21.40433693	15.65109253	5.753244	-0.27172	1.207242
	21.25864601	15.553792	5.704854	-0.32011	1.248422
		Mean ΔCt (control)	6.02496		
				Fold gene expression	1.03085
				Standard deviation	0.266337
				Standard error of the mean	0.108732
				Relative standard error of mean	10.54778
Female	21.15799141	15.26576138	5.89223	-0.13273	1.096366
	21.41794205	15.58676243	5.83118	-0.19378	1.143757
	21.77904892	15.72859859	6.05045	0.025491	0.982486
	21.6143589	15.84080791	5.773551	-0.25141	1.190369
	21.25339699	15.89041996	5.362977	-0.66198	1.582255
	21.94256592	16.63667107	5.305895	-0.71906	1.646115
				Fold gene expression	1.273558
				Standard deviation	0.273489
				Standard error of the mean	0.111651
				Relative standard error of mean	8.766888

Table S.6.24: *Cyp4f6* mRNA expression in the small intestine of male and female Sprague Dawley rats normalized to GAPDH housekeeping gene

Group	Ct (*Cyp4f6*)	Ct (GAPDH)	ΔCt	ΔΔCt	2^-(ΔΔCt)
Male	28.59749222	15.0469017	13.55059	-0.49322	1.407582
	29.52577782	15.58490181	13.94088	-0.10293	1.073955
	29.70816994	15.65109253	14.05708	0.013268	0.990845
	30.18048477	15.553792	14.62669	0.582884	0.667628
			Mean ΔCt (control)	14.04381	
				Fold gene expression	1.035002
				Standard deviation	0.303999
				Standard error of the mean	0.152
				Relative standard error of mean	14.68591
Female	27.54456329	15.26576138	12.2788	-1.76501	3.398757
	29.60769844	15.58676243	14.02094	-0.02287	1.015981
	30.53573418	15.72859859	14.80714	0.763326	0.589136
	27.59592628	15.89041996	11.70551	-2.3383	5.057074
				Fold gene expression	2.515237
				Standard deviation	2.097552
				Standard error of the mean	1.048776
				Relative standard error of mean	41.69691