**SUPPLEMENTARY DATA TABLES**

**Supplementary table 1 :** Effect of neonatal administration ofursolic acid on terminal body mass

**Parameter Sex DMSO+PW DMSO+FW UA+PW UA+FW FR+PW FR+FW UAFR+PW UAFR+FW**

Body mass (g) M 469.94± 42.48a 504.34± 45.58c 481.79± 34.94e 526.97±55.35g 486.70± 36.88i 524.07± 53.07k 462.47± 30.51m 513.90± 41.67

F 276.78± 13.08b 280.58± 15.48d 279.80± 17.27f 299.93± 24.66h 280.26± 13.89j 291.55± 21.36l 288.77± 24.90n 297.35± 21.54

All data presented as mean ± standard deviation. a = significantly higher body mass in male rats receiving dimethylsulphoxide in early life and plain drinking water in adulthood (DMSO + PW) compared to female rats receiving dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW; P< 0.05), female rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW; P< 0.05), female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW; P< 0.05), female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW; P< 0.05), female rats receiving fructose alone in early life and fructose in drinking water (FR + FW; P< 0.05), female rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR +FW; P< 0.05). b = significantly lower body mass in female rats receiving dimethylsulphoxide in early life and plain drinking water in adulthood (DMSO + PW) compared to male rats receiving dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW; P< 0.05), male rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW; P< 0.05), male rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW; P< 0.05) and male rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW; P< 0.05). c = significantly greater body mass in male rats receiving dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW) compared to female rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW; P< 0.05), female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW; P< 0.05), female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW; P< 0.05), female rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR +FW; P< 0.05). d = significantly lower body mass in female rats receiving dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW) compared to male rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW; P< 0.05), male rats receiving rats ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW; P< 0.05), male rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW; P< 0.05), male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05) and male rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). e = significantly greater body mass in male rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW) compared to female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW; P< 0.05), female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW; P< 0.05), female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.05), female rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR +FW; P< 0.05). f = significantly lower body mass in female rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW) compared to male rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW; P< 0.05), male rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW; P< 0.05), male rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.05), male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05) and male rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). g = significantly higher body mass in male rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW) compared to female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW; P< 0.05), female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.05), female rats receiving ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). h = significantly lower body mass in female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW) compared to male rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.05), male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05) and male rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). i = significantly greater body mass in male rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW) compared to female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.05), female rats receiving ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). j = significantly lower body mass in female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW) compared to male rats ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05) and male rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). k = significantly higher body mass in male rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW) compared to female rats receiving ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). l = significantly lower body mass in female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW) compared to male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05) and male rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). m = significantly higher body mass in male rats receiving ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW) compared to female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). n = significantly lower body mass in female rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR + PW) compared to male rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). DMSO + PW =10 mg/kg b.w dimethylsulphoxide in early life + plain water in adulthood (n=14; 8 M, 6 F); DMSO + FW =10 mg/kg b.w dimethylsulphoxide + 20% fructose solution as drinking fluid (n=13; 7 M, 6 F); UA + PW =10 mg/kg b.w ursolic acid + plain water (n=14; 7 M, 7 F); UA + FW =10 mg/kg b.w ursolic acid + 20% fructose as drinking fluid (n=13; 7 M, 6 F); FR + PW =10 mg/kg b.w fructose + plain water (n=13; 6 M, 7 F); FR + FW =10 mg/kg b.w fructose + 20% fructose as drinking fluid (n=14; 6 M, 8 F); UAFR + PW =10 mg/kg b.w ursolic acid and fructose + plain water (n=14; 7 M, 7 F); UAFR + FW =10 mg/kg b.w ursolic acid and fructose + 20% fructose as drinking fluid (n=12; 6 M, 6 F).

**Supplementary table 2 :** Effect of neonatal administration ofursolic acid on food, fluid and total calorie intake

**Parameter Sex DMSO+PW DMSO+FW UA+PW UA+FW FR+PW FR+FW UAFR+PW UAFR+FW**

Food intake M 7.59± 0.48a 4.01± 0.60c 7.24± 0.50f 3.88± 0.33h 7.23± 0.42j 3.96± 0.46l 7.40± 0.47n 3.95± 0.28

F 8.33± 0.83a 4.70± 1.32c 7.95± 0.33f 4.57± 0.82h 7.88± 0.67j 3.98± 0.68l 7.55± 0.43n 3.92± 0.73

Fluid intake M 14.00± 2.37b 16.72± 4.33 13.35± 2.07g 17.74± 2.86 13.05± 1.98k 17.84± 3.49 12.93± 3.12o 17.87± 2.42

F 15.68± 1.91 23.37± 5.12d 17.29± 3.42 20.79± 4.79i 18.07± 2.84 21.24± 5.52m 18.47± 3.77 22.92± 2.85

Total calorie intake M 29.58± 1.87 28.94± 3.05 28.26± 1.93 29.20± 2.11 28.21± 1.64 29.83± 2.53 28.62± 1.67 29.75± 1.68

F 32.28± 2.98 37.10± 7.46e 30.99± 1.30 34.02± 3.53 30.75± 2.62 32.56± 3.66 29.45± 1.67 33.67± 2.43

All data presented as mean ± standard deviation. a = significantly (P< 0.05) increased food intake in male and female rats receiving dimethylsulphoxide in early life and plain drinking water in adulthood (DMSO + PW) compared to male and female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW), fructose alone in early life and fructose in drinking water in adulthood (FR + FW) and a combination of ursolic acid and fructose in early life and fructose in drinking water drinking water in adulthood (UAFR + FW). b = significantly (P< 0.05) lower fluid intake in male rats receiving dimethylsulphoxide in early life and plain drinking water in adulthood (DMSO + PW) compared to female rats receiving dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW), fructose alone in early life and fructose in drinking water in adulthood (FR + FW) and a combination of ursolic acid and fructose in early life and fructose in drinking water drinking water in adulthood (UAFR + FW). c = significantly (P< 0.05) lower food intake in male and female rats receiving dimethylsuphoxide in early life and fructose in drinking water (DMSO + FW) compared to male and female rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW), fructose alone in early life and plain drinking water in adulthood (FR + PW) and those receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW). d = significantly (P< 0.05) greater fluid intake in female rats receiving dimethylsuphoxide in early life and fructose in drinking water (DMSO + FW) compared to male rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW), fructose alone in early life and plain drinking water in adulthood (FR + PW) and those receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW). e = significantly (P< 0.05) greater total calories in female rats receiving dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW) compared to male rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW), female rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW), male rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW), male and female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW), male rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW), male and rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW) and a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW). f = significantly (P< 0.05) greater food intake in male and female rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW) compared to male and female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW), fructose alone in early life and plain drinking water in adulthood (FR + PW), fructose alone in early life and fructose in drinking water in adulthood (FR + FW) and a combination of ursolic acid and fructose in early life and fructose in drinking water drinking water in adulthood (UAFR + FW). g = significantly (P< 0.05) lower fluid intake in male rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW) compared to female rats receiving; ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW), fructose alone in early life and fructose in drinking water in adulthood (FR + FW) and a combination of ursolic acid and fructose in early life and fructose in drinking water drinking water in adulthood (UAFR + FW). h = significantly (P< 0.05) lower food intake in male and female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW) compared to male and female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW) and a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW). i = significantly (P< 0.05) greater fluid intake in female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW) compared to male rats receiving receiving fructose alone in early life and plain drinking water in adulthood (FR + PW) and a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW). j = significantly (P< 0.05) greater food intake male and female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW) compared to male and female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW) and a combination of ursolic acid and fructose in early life and fructose in drinking water drinking water in adulthood (UAFR + FW). k = significantly (P< 0.05) lower fluid intake in male rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW) compared to female rats receiving fructose alone in ealy life and fructose in drinking water in adulthood (FR + FW) and a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW). l = significantly (P< 0.05) lower food intake in male and female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW) compared to male and female rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW). m = significantly greater fluid intake in female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW) compared to male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05). n = siginificantly greater food intake in male and female rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW) compared to male and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water drinking water in adulthood (UAFR + FW; P< 0.05). o = significantly lower fluid intake in male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW) compared to female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water drinking water in adulthood (UAFR + FW; P< 0.05). DMSO + PW =10 mg/kg b.w dimethylsulphoxide in early life + plain water in adulthood (n=14; 8 M, 6 F); DMSO + FW =10 mg/kg b.w dimethylsulphoxide + 20% fructose solution as drinking fluid (n=13; 7 M, 6 F); UA + PW =10 mg/kg b.w ursolic acid + plain water (n=14; 7 M, 7 F); UA + FW =10 mg/kg b.w ursolic acid + 20% fructose as drinking fluid (n=13; 7 M, 6 F); FR + PW =10 mg/kg b.w fructose + plain water (n=13; 6 M, 7 F); FR + FW =10 mg/kg b.w fructose + 20% fructose as drinking fluid (n=14; 6 M, 8 F); UAFR + PW =10 mg/kg b.w ursolic acid and fructose + plain water (n=14; 7 M, 7 F); UAFR + FW =10 mg/kg b.w ursolic acid and fructose + 20% fructose as drinking fluid (n=12; 6 M, 6 F).

**Supplementary table 3 :** Effect of neonatal administration ofursolic acid on cholesteol concentration and visceral fat accumulation

**Parameter Sex DMSO+PW DMSO+FW UA+PW UA+FW FR+PW FR+FW UAFR+PW UAFR+FW**

\*Cholesterol M  1.70± 0.16 1.50± 0.35a 1.50± 0.21 1.70±0.27 1.70± 0.19 1.80± 0.34 1.45± 0.24 1.83± 0.27

F  1.85± 0.25 2.09± 0.27b 1.96± 1.18 2.03± 0.33 1.94± 0.28 1.99± 0.26 1.94± 0.44c 2.13± 0.33

Visceral fat (% BM) M 2.37± 0.58de 3.40± 0.72g 2.35± 0.45i 4.03± 0.92k 2.70± 0.49m 4.59± 0.54o 2.30± 0.68r 4.19± 0.95

F 3.91± 1.17f 6.40± 1.35h  3.97± 1.37j 6.07± 1.90l 3.79± 0.72n 6.49± 1.13p 4.20± 1.40 6.51±1.53

\*= mmol/L

All data presented as mean ± standard deviation. a = significantly lower circulating cholesterol in male rats receiving dimethylsuphoxide in early life and fructose in drinking water (DMSO + FW) compared to female rats receiving a combination of ursolic and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). b = significantly higher circulating cholesterol in female rats receiving dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW) compared to to male rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW; P< 0.05) and male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05). c = significantly higher circulating cholesterol in female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water drinking water in adulthood (UAFR + FW) compared to male rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW; P< 0.05) and male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05). d = significantly lower visceral fat accumulation in male rats receiving dimethylsuphoxide in early life and plain drinking water in adulthood (DMSO + PW) compared to female rats receiving dimethylsuphoxide in early life and fructose in drinking water (DMSO + FW; P< 0.05), female rats receiving rats ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW; P< 0.05), female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.05) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). e = significantly lower visceral fat accumulation in male rats receiving dimethylsuphoxide in early life and plain drinking water (DMSO + PW) compared to male rats receiving fructose alone in early life and fructose in drinking water (FR + FW; P< 0.05). f = significantly lower visceral fat accumulation in female rats receiving dimethylsulphoxide in early life and plain drinking water in adulthood (DMSO + PW) compared to female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.05) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). g = significantly lower visceral fat accumulation in male rats receiving dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW) compared to female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW; P< 0.05), female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.05) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). h = significantly greater visceral fat accumulation in female rats receiving dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW) compared to male and female rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW; P< 0.05), male rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW; P< 0.05), male and female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW; P< 0.05) and male and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). i = significantly lower visceral fat accumulation in male rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW) compared to female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW; P< 0.05), male and female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.05) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). j = significantly lower visceral fat accumulation in female rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW) compared to female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.05) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). k = significantly lower visceral fat accumulation in male rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW) compared to female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.05) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). l = significantly higher visceral fat accumulation in female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW) compared to male and female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW; P< 0.05) and male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05). m = significantly lower visceral fat accumulation in male rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW) compared to female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.05) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). n = significantly lower visceral fat acuumulation in female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW) compared to female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). o = significantly greater visceral fat accumulation in male rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW) compared to male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05). p = significantly greater visceral fat accumulation in female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW) compared to male and female rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.05) and male rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). r = significantly lower visceral fat accumulation in male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW) compared to female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). DMSO + PW =10 mg/kg b.w dimethylsulphoxide in early life + plain water in adulthood (n=14; 8 M, 6 F); DMSO + FW =10 mg/kg b.w dimethylsulphoxide + 20% fructose solution as drinking fluid (n=13; 7 M, 6 F); UA + PW =10 mg/kg b.w ursolic acid + plain water (n=14; 7 M, 7 F); UA + FW =10 mg/kg b.w ursolic acid + 20% fructose as drinking fluid (n=13; 7 M, 6 F); FR + PW =10 mg/kg b.w fructose + plain water (n=13; 6 M, 7 F); FR + FW =10 mg/kg b.w fructose + 20% fructose as drinking fluid (n=14; 6 M, 8 F); UAFR + PW =10 mg/kg b.w ursolic acid and fructose + plain water (n=14; 7 M, 7 F); UAFR + FW =10 mg/kg b.w ursolic acid and fructose + 20% fructose as drinking fluid (n=12; 6 M, 6 F).

**Supplementary table 4:** Effect of neonatal administration ofursolic acid on hepatic lipid accumulation (determined by solvent extraction)

**Parameter Sex DMSO+PW DMSO+FW UA+PW UA+FW FR+PW FR+FW UAFR+PW UAFR+FW**

Lipid content\* M 4.18±0.10a 4.54±0.23c 3.70±0.03e 4.28±0.07g 4.32 ± 0.24i 3.93 ± 0.23k 3.29± 0.16m 2.49± 0.26

F 4.33±0.16b 6.39±0.15d 3.63±0.44f 5.12±0.27h 4.12 ± 0.07j 12.57±0.71l 9.33±0.19n 4.91± 0.35

\* % liver mass

All data presented as mean ± standard deviation. a = significantly (P< 0.0001) lower hepatic lipid accumulation in male rats receiving dimethylsuphoxide in early life and plain drinking water in adulthood (DMSO + PW) compared to female rats receiving; dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW), ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW), fructose alone in early life and fructose in drinking water in adulthood (FR + FW), a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW) and significantly lower hepatic lipid accumulation in male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P = 0.0015) and a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.0001). b = significantly greater hepatic lipid accumulation in female rats receiving dimethylsuphoxide in early life and plain drinking water in adulthood (DMSO + PW) compared to male rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW; P = 0.0270), a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.0001), a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.0001) and significantly lower hepatic lipid accumulation compared to female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW; P = 0.0010) and fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.0001). c = significantly (P< 0.0001) greater hepatic lipid accumulation in male rats receiving dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW) compared to male rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW), female rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW) and significantly (P< 0.0001) lower hepatic lipid accumulation compared to female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW) and a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW). d = significantly (P< 0.0001) greater hepatic lipid accumulation in female rats receiving dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW) compared to male rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW), ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW), fructose alone in early life and plain drinking water in adulthood (FR + PW), fructose alone in early life and fructose in drinking water in adulthood (FR + FW), a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW), a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW) and female rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW). e = significantly (P< 0.0001) lower hepatic lipid accumulation in male rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW) compared to female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW), fructose alone in early life and plain drinking water in adulthood (FR + PW), fructose alone in early life and fructose in drinking water in adulthood (FR + FW), a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW), a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW) and significantly higher hepatic lipd accumulation than male rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW; P= 0.0335) and a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.0001). f = significantly lower hepatic lipid accumulation in male rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW) compared male rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW; P = 0.0086), fructose alone in early life and plain drinking water in adulthood (FR + PW; P = 0.0073), female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.0001), a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.0001) and significantly greater hepatic lipid accumulation than male rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.0001). g = significantly lower hepatic lipid accumulation in male rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW) compared to female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.0001), a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.0001), a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P = 0.0248) and significantly greater hepatic lipid accumulation than male rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.0001). h = significantly greater hepatic lipid accumulation in female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW) compared to male rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW; P= 0.0008), fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.0001), a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.0001), a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.0001), female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW; P< 0.0001) and significantly lower hepatic lipid accumulation than female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.0001). i = significantly (P< 0.0001) lower hepatic lipid accumulation in male rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW) compared to female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW), a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW) and significantly greater hepatic lipid accumulation than male rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.0001). j = significantly greater hepatic lipid accumulation in female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW) compared to male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.0001), a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.0001) and significantly lower hepatic lipds than female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P = 0.0006). k = significantly greater hepatic lipid accumulation in male rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW) compared to male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P = 0.0171), a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.0001) and significantly lower hepatic lipids compared to female rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.0001) and a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.0001). l = significantly greater hepatic lipid accumulation in female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW) compared to male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW; P< 0.0001), a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.0001) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.0001). m = significantly lower hepatic lipid accumulation in male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW) compares to female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.0001). n = significantly greater hepatic lipid accumulation in female rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW) compared to male rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.0001). DMSO + PW =10 mg/kg b.w dimethylsulphoxide in early life + plain water in adulthood (n=14; 8 M, 6 F); DMSO + FW =10 mg/kg b.w dimethylsulphoxide + 20% fructose in drinking water (n=13; 7 M, 6 F); UA + PW =10 mg/kg b.w ursolic acid + plain water (n=14; 7 M, 7 F); UA + FW =10 mg/kg b.w ursolic acid + 20% fructose as drinking fluid (n=13; 7 M, 6 F); FR + PW =10 mg/kg b.w fructose + plain water (n=13; 6 M, 7 F); FR + FW =10 mg/kg b.w fructose + 20% fructose as drinking fluid (n=14; 6 M, 8 F); UAFR + PW =10 mg/kg b.w ursolic acid and fructose + plain water (n=14; 7 M, 7 F); UAFR + FW =10 mg/kg b.w ursolic acid and fructose + 20% fructose as drinking fluid (n=12; 6 M, 6 F).

**Supplementary table 5:** Effect of neonatal administration ofursolic acid on ALP concentration

**Parameter Sex DMSO+PW DMSO+FW UA+PW UA+FW FR+PW FR+FW UAFR+PW UAFR+FW**

ALP (U/L) M 132.10±29.85 126.70±24.87 129.00±29.91 105.00±27.18 113.30±41.7 108.30±26.8 127.60±40.52 110.00±8.60

F 105.00±54.59 80.83±18.1 84.14±15.91 73.83±10.94β  89.00±13.04 77.63±11.99β  84.86±15.84 70.83±14.84β

All data presented as mean ± standard deviation. β = significantly greater circulating ALP in male rats receiving dimethylsuphoxide in early life and plain drinking water in adulthood (DMSO + PW) compared to female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW; P< 0.05) and female rats receiving fructose alone in early life and fructose in drinking water (FR + FW; P< 0.05) and in male rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR + PW) compared to female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW; P< 0.05). DMSO + PW =10 mg/kg b.w dimethylsulphoxide in early life + plain water in adulthood (n=14; 8 M, 6 F); DMSO + FW =10 mg/kg b.w dimethylsulphoxide + 20% fructose as drinking fluid (n=13; 7 M, 6 F); UA + PW =10 mg/kg b.w ursolic acid + plain water (n=14; 7 M, 7 F); UA + FW =10 mg/kg b.w ursolic acid + 20% fructose as drinking fluid (n=13; 7 M, 6 F); FR + PW =10 mg/kg b.w fructose + plain water (n=13; 6 M, 7 F); FR + FW =10 mg/kg b.w fructose + 20% fructose as drinking fluid (n=14; 6 M, 8 F); UAFR + PW =10 mg/kg b.w ursolic acid and fructose + plain water (n=14; 7 M, 7 F); UAFR + FW =10 mg/kg b.w ursolic acid and fructose + 20% fructose as drinking fluid (n=12; 6 M, 6 F).

**Supplementary table 6**: Effect of ursolic acid on hepatic micro and macrovesicular steatosis, hypertrophy and inflammation (actual percentages)

**Parameter Sex DMSO+PW DMSO+FW UA+PW UA+FW FR+PW FR+FW UAFR+PW UAFR+FW**

\*Microvesicular M0.40±0.89 38.00±10.37c 10.00+13.69 11.00±7.42h 8.00±7.58 51.00±11.40afjl 7.00±6.71 23.00±13.51a

F 2.00±4.47 39.00±10.89be 4.00±5.48 13.00±4.47i 6.00±5.48k 57.00±2.04abgm 8.00±4.47 15.00±11.18a

\*Macrovesicular M 0.00±0.00 30.00±7.91d 0.00±0.00 5.00±7.07h 0.00±0.00 38.00±10.37abfjl 0.00±0.00 9.00±5.48 a

F 0.00±0.00 39.00±11.94e 0.00±0.00 6.00±5.48i 2.00±4.47k 49.00±14.32agm 4.00±5.48 19.00±9.62a

Hypertrophy M 0.00±0.00 35.00±9.35c 2.00±4.47 9.00±5.48h 4.00±5.48 46.00±17.82abfjl 2.00±4.47 22.00±14.40a

F 0.00±0.00 49.00±12.45e 0.00±0.00 11.00±13.87i 0.00±0.00 61.00±12.45agkm 5.00±7.07 9.00±12.45a

Inflammation M 0.20±0.45 0.80±0.45 0.20±0.45 0.40±0.55 0.20±0.55 0.10±0.71 0.40±0.55 0.80±0.45

F 0.00±0.00 0.60±0.55 0.00±0.00 0.40±0.55 0.20±0.45 1.20±0.45 0.00±0.00 0.80±0.45

\* = steatosis

All data presented as mean ± standard deviation. a = significantly (P< 0.0001) increased hypertrophy, microvesicular and macrovesicular steatosis in male rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW), a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW) compared to male rats receiving dimethylsulphoxide in early life and plain drinking water in adulthood (DMSO + PW). b = significantly increased hypertrophy, microvesicular and macrovesicular steatosis in female rats receiving dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW) compared to male and female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.0001). c = significantly (P< 0.05) increased hypertrophy and microvesicular steatosis in male rats receiving dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW) compared to male and female rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW), female rats receiving compared to female rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW), male and female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW), male and female rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW) and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW). d = significantly lower macrovesicular steatosis in male rats receiving dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW) compared to female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.0001). e = significantly (P< 0.0001) increased hypertrophy, microvesicular and macrovesicular steatosis in female rats receiving rats dimethylsulphoxide in early life and fructose in drinking water in adulthood (DMSO + FW) compared to male and female rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW), male rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW), male and female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW) and male and female rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW). f = significantly (P< 0.0001) lower hypertrophy, microvesicular and macrovesicular steatosis in male rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW) compared to male and female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW). g = significantly (P< 0.0001) lower hypertrophy, microvesicular and macrovesicular steatosis in female rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW) compared to male and female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW). h = significantly (P< 0.0001) lower hypertrophy, microvesicular and macrovesicular steatosis in male rats receiving ursolic acid alone in early life and fructose in drinking water in adulthood (UA + FW) compared to male and female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW). i = significantly (P< 0.0001) lower hypertrophy, microvesicular and macrovesicular steatosis in female rats receiving ursolic acid alone in early life and plain drinking water in adulthood (UA + PW) compared to male and female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW). j = significantly lower hypertrophy, microvesicular and macrovesicular steatosis in male rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW) compared to male and female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.0001). k = significantly lower hypertrophy, microvesicular and macrovesicular steatosis in female rats receiving fructose alone in early life and plain drinking water in adulthood (FR + PW) compared to male and female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW; P< 0.0001). l = significantly (P< 0.0001) increased hypertrophy, microvesicular and macrovesicular steatosis in male rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW) compared to male and female rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW) and male and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW). m = significantly (P< 0.0001) increased hypertrophy, microvesicular and macrovesicular steatosis in female rats receiving fructose alone in early life and fructose in drinking water in adulthood (FR + FW) compared to male and female rats receiving a combination of ursolic acid and fructose in early life and plain drinking water in adulthood (UAFR +PW) and male and female rats receiving a combination of ursolic acid and fructose in early life and fructose in drinking water in adulthood (UAFR + FW). DMSO + PW =10 mg/kg b.w dimethylsulphoxide in early life + plain water in adulthood (n=10; 5 M, 5 F); DMSO + FW =10 mg/kg b.w dimethylsulphoxide + 20% fructose as drinking fluid (n=10; 5 M, 5 F); UA + PW =10 mg/kg b.w ursolic acid + plain water (n=10; 5 M, 5 F) ; UA + FW =10 mg/kg b.w ursolic acid + 20% fructose as drinking fluid (n=10; 5 M, 5 F); FR + PW =10 mg/kg b.w fructose + plain water (n=10; 5 M, 5 F); FR + FW =10 mg/kg b.w fructose + 20% fructose as drinking fluid (n=10; 5 M, 5 F); UAFR + PW =10 mg/kg b.w ursolic acid and fructose + plain water (n=10; 5 M, 5 F) ; UAFR + FW =10 mg/kg b.w ursolic acid and fructose + 20% fructose as drinking fluid (n=10; 5 M, 5 F).