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| Paper | Methods/Exposure | Results |
| (Roos *et al.*, 2009*a*) | Human term-placental extracts used to measure 14CMeAIB, 3HTaurine, and 3HLeucine uptake when incubated with 100nM rapamycin | Rapamycin reduced TAUT, system A and system L transport  Rapamycin reduced expression of pS6K and p4E-BP1, downstream effectors of mTORC1.  Protein expression of SNAT2, SNAT4, LAT2, and TAUT was unaffected by rapamycin.  mRNA expression of LAT1 and TAUT were reduced whereas that of SNAT1, SNAT2, SNAT4, and LAT2 was unchanged with rapamycin. |
| (Roos *et al.*, 2007) | Human term-placental extracts from AGA, LGA and SGA/IUGR deliveries incubated with radiolabeled amino acids transported by system A, system L and taurine. | Expression of mTOR was detected in the syncytiotrophoblasts.  Rapamycin 100nM reduced system L activity but not system A or taurine activity.  mTORC1 expression was upregulated by 51% along with 45% reduction of pS6K in IUGR placentas, downregulated by 39% with no change in pS6K in LGA placentas. |
| (Roos *et al.*, 2009*b*) | Human term-placental explants used to determine amino acid transport with varying glucose concentrations, insulin, IGF1, and rapamycin. | Rapamycin reduced system L activity in presence of 16mM glucose standard glucose concentration).  Reductions in glucose concentrations from 16 to 4.5 and 0.5 caused decreased system L activity in a dose-dependent manner, but adding rapamycin did not cause further reductions to the activity at the lower glucose concentrations.  Reductions in glucose concentrations did not affect system A activity, but at the lower glucose concentrations (4.5 and 0.5 mM) rapamycin increased its system A activity in a dose-dependent manner compared to cells incubated with rapamycin and 16mM glucose.  Taurine transporter activity was increased with lower glucose concentrations in presence and absence of rapamycin, though at the respective concentrations (at 16 and 0.5mM glucose), rapamycin reduced activity.  In 16mM glucose, insulin increased System A and system L activity, but this increase was abolished when insulin and rapamycin were both added.  IGF1 increased system A activity only but this was abolished with rapamycin +IGF1 incubation.  Protein expression of pS6K was significantly reduced only when glucose levels were lowest at 0.5mM but expression as unchanged between 16 and 4.5mM. p4E-BP1 expression was unchanged at all three glucose concentrations.  AMPK and REDD1 expression was unchanged at all glucose concentrations. |
| (Xu *et al.*, 2015) | JEG-3 human choriocarcinoma cell line used to determine GLUT3 expression | Treating cells with rapamycin reduced GLUT3 mRNA expression by 60% and reduced protein expression by 28%  Raptor knockdown to inhibit mTORC1 reduced GLUT3 mRNA expression by 41% and reduced protein by 50%. |
| (Lager *et al.*, 2014) | Human term-placental extracts used to assess amino acid uptake using isotope-labeled tracers when incubated with saturated and unsaturated fatty acids (DHA 22:6 polyunsaturated, OA 18:1 monounsaturated, PA16:0 saturated). | DHA reduced system A and system L amino acid uptake and reduced phosphorylated mTORC1, reduced p4E-BP1 expression with no effect on pS6K1 (reduced mTORC1 signal).    DHA+OA incubation increased system A amino acid uptake, but did not affect system L. Had no effect on phosphorylated mTORC1, p4E-BP1, or pS6K1 (no effect on mTORC1).  OA increased system A uptake but did not affect system L. Oa increased phosphorylated mTORC1, and increased pS6K1 but did not affect 4E-BP1 expression (increased mTORC1 activity).  PA did not cause changes in amino acid uptake. PA did not affect mTORC1 signaling or downstream targets. |
| (Hennig *et al.*, 2017) | Pregnant mice treated with subcutaneous injections of rapamycin (5mg/kg body weight) every 12 hours starting at E15.5 until delivery  Treatment of rapamycin starting at E11.5 | Offspring of dams treated with rapamycin at E11.5 every 12 hours died at E16.5 and had severe growth restriction and malformations.  Using mice treated at E15.5:  PND1 offspring tissue (heart, kidney, and lung) showed reduced mTORC1 verifying fetal mTORC1 inhibition.  Rapamycin treatment caused reduced offspring weight at PND1 with reduced heart weight by 34.5%. Kidney weight was reduced by 19.7%  mTORC1 inhibition at E15.5 till delivery had no effect on fetal lethality. |
| (Jansson *et al.*, 2013) | Placentas from term-pregnancies with available pre-pregnancy maternal BMI | Pre-pregnancy body mass index (BMI) was positively correlated with placental mTORC1 activity and birth weight.  System A and system L amino acid transporter activity was unchanged with increased maternal pre-pregnancy BMI.  System A SNAT2 protein expression was positively associated with offspring birth weight |
| (Rosario *et al.*, 2016). | Mouse model of obesity fed high fat,high sugar diet starting at 13 weeks of age and for 4-6 weeks prior to mating to establish 25% increase in weight. Dams were maintained on their control or experimental diets during pregnancy. | E18.5 experimental fetuses had 18% increase in weight.  No difference in litter size.  Placental weights at E18.5 were the same.  Placental pS6 and 4E-BP1 had increased phosphorylation by 150 and 89%, respectively indicating increased placental mTORC1 signaling.  Placental AMPK, upstream mTORC1 inhibitor, had reduced phosphorylation by 75%.  Placental insulin/IGF-I signaling was increased with higher phosphorylated IRS1 and Akt by 50% and 90%, respectively. |
| (Gaccioli *et al.*, 2013) | Rats fed high fat diet at 6 weeks of age for 7 weeks then mated. Rats maintained on diet throughout pregnancy.  Trophoblast plasma membranes were assessed for LPL activity and for amino acid transport activity. | E21 fetal weight increased significantly  Fetal blood glucose was higher but not significant  Fetal plasma triglyceride, plasma insulin, and plasma leptin were significantly higher.  E21 placental weight was not significantly different.  Placental mTORC1 signal increased as shown by increased phosphorylation of downstream targets.  Placental AMPK phosphorylation was significantly reduced (AMPK is inhibitor of mTORC1).  System A: decreased SNAT1 protein expression in HF placentas, and unchanged SNAT2 and SNAT4.  No change in placental glucose transporters: GLUT1, 3 and 9.  No change in LPL or fatty acid transporter expression (FATP4 and FATP6). |
| (Jones *et al.*, 2009) | 8-week old mice fed high fat diet for 8 weeks prior to mating and during pregnancy.  *In vivo*  and *ex vivo p*lacental studies to assess glucose and amino acid transporter activity. | E18.5 fetuses had 43% increased weights.  Placental weight was not different.  *In vivo* transport showed increased placental clearance of radiolabeled glucose by 5-fold and amino acid (MeAIB) by 10-fold in HF placentas.  HF placentas had increased GLUT1 and SNAT2 protein expression *ex vivo.* SNAT4 and GLUT3 were unaffected. |
| (Song *et al.*, 2017) | Rats fed a high fat diet starting at E2 and throughout gestation. | On E21, placental total thickness was unchanged, but labyrinth thickness was reduced and inversely, decidual thickness increased. Placental weight was not affected.  Fetal weight was reduced only in females of HF dams, no change in males.  GLUT3 mRNA expression increased in male placentas of HF diet, but not in female placentas.  GLUT1 and SNAT1 were unchanged in male and female placentas.  SNAT2 mRNA expression was increased in male placentas only but unchanged in female placentas.  mTORC1 signaling was increased in male placentas as evident by reduced total 4E-BP1 levels which caused increased ratio of p4E-BP1:total 4E-BP1. No change in other downstream targets of mTORC1 and no change in mTORC1 signal in female placentas.  *Igf2* mRNA expression was increased in female placentas. |
| (Rosario *et al.*, 2015) | Mice fed high fat, high sugar diet starting at 13 weeks of age. Mice were then mated after a 25% increase in body weight was achieved, maternal obesity.  Trophoblast plasma membranes isolated for glucose and amino acid transport activity. | E18.5 fetal weight was increased by 18%, no change in placental weights.  Placental weights unchanged.  SNAT2 protein expression increased in TPM of HF dams. No change in SNAT4 expression. System A amino acid uptake was increased by 1.9 fold.  LAT1 protein expression increased (system L amino acid transporter), but no change in LAT2. System L amino acid uptake increased by 2.1 fold.  GLUT1 and GLUT3 protein expression was increased in HF dam placentas. |
| (Dubé *et al.*, 2012) | Womn prospectively enrolled in study with varying pre-pregnancy BMI. Placentas collected at term delivery to assess LPL activity and linoleic acid uptake. | Newborns of obese mothers had increased total cholesterol and LDL plasma levels, but had similar TG and FFA.  Placental expression of FABP1 mRNA and protein was reduced in placentas of obese women.  FABP3 mRNA expression was unchanged, but FABP3 protein was reduced in placentas of obese women.  LPL protein and mRNA expression was unchanged, but LPL activity was increased in 3rd trimester placentas from obese women compared to lean. |