The most recent reviews (several are listed below) in this area address placental transport of macronutrients in obesity and gestational diabetes, the effect of cytokines and maternal hormonal signals on the growth and function of the placenta, and the altered placental macronutrient transport. Relative to what we propose, these reviews do not encompass the anatomical, mechanistic and metabolic aspects that influence the placental physiology. There have also been several recent key findings published this year addressing the compartmentalized function of the placental metabolism (Kolahi *et al.*, 2017), micronutrient roles in placental growth and development (Schulz *et al.*, 2017), insights gleaned from the altered placental transcriptome in light of maternal obesity (Altmäe *et al.*, 2017; Musial *et al.*, 2017), novel findings on placental lipid transporters localization and expression (Yang *et al.*, 2017), and advances in determining mechanistic pathways controlling placental function and transport (Rosario *et al.*, 2017*b*, 2017*a*). These new data have not been considered in existing reviews.

We propose that our review will encompass and critique these latest findings along with previously published research in the physiology of placental transport. We hope that this will help advance the field and allow us to develop mechanistic theories from the pool of evidence. Our proposed review will focus on the mechanisms and metabolic pathways that cause the altered placental micro- and macronutrient transporters and flux in pregnancies complicated by maternal obesity. Altered function of the placenta in pregnancies with maternal obesity and its effect on the offspring health remain poorly understood and understudied.

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