

Abstract Submitted
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A model for gas and nutrient exchange in the chorionic vasculature system of the mouse placenta PARISA MIRBOD, Clarkson University, JOHN SLED, University of Toronto & Hospital for Sick Children — The aim of this study is to develop an analytical model for the oxygen and nutrient transport from the umbilical cord to the small villous capillaries. The nutrient and carbon dioxide removal from the fetal cotyledons in the mouse placental system has also been considered. This model describes the mass transfer between the fetal and the maternal red blood cells in the chorionic arterial vasculature system. The model reveals the detail fetal vasculature system and its geometry and the precise mechanisms of mass transfer through the placenta. The dimensions of the villous capillaries, the total length of the villous trees, the total villi surface area, and the total resistance to mass transport in the fetal villous trees has also been defined. This is the first effort to explain the reason why there are at least 7 lobules in the mouse placenta from the fluid dynamics point of view.

Parisa Mirbod
Clarkson University

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