

The Complex Structure of the Mouse Placental Labyrinth Revealed by Double Immunofluorescence Labeling of Slc2a1 and Gjb2

Chaw Kyi-Tha-Thu and Toshihiro Takizawa

Department of Molecular Medicine and Anatomy, Graduate School of Medicine, Nippon Medical School

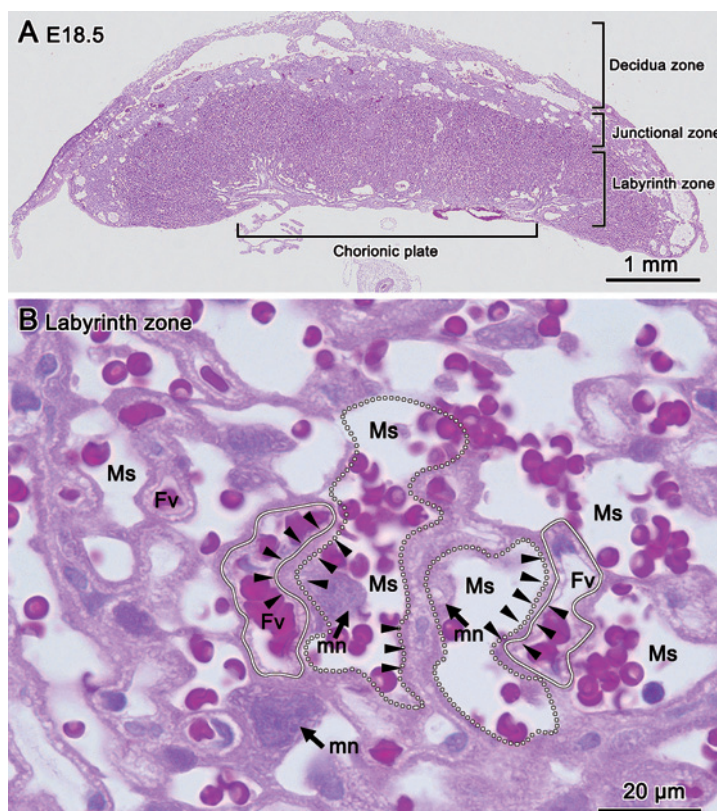


Fig. 1

The placenta is a feto-maternal interface during pregnancy. The mouse placenta consists of three major zones: the maternal decidua zone, the junctional zone, and the inner labyrinth zone (Fig. 1A). The labyrinth zone, which has the most complex structure of the three, includes maternal vascular sinusoids and fetal blood vessels, where the exchange of oxygen and nutrients occurs (Fig. 1B). Fetal vessels are separated from maternal blood by the blood-placental barrier, which is formed by a single layer of mononuclear trophoblast cells (layer I), a double layer of syncytiotrophoblast cells (layer II and III), and fetal vascular endothelial cells. To reveal the structure of the labyrinth zone at the light microscopic level, we carried out double immunofluorescence labeling of Slc2a1 (also known as glucose transporter type 1) and Gjb2 (also known as Connexin-26) (Fig. 2). Slc2a1 was primarily expressed on the syncytiotrophoblast cell surfaces facing maternal and fetal blood spaces (i.e., on both sides of the double layer of the syncytiotrophoblast) (Fig. 2B). In contrast, Gjb2 was mainly present between the two layers of the syncytiotrophoblast (i.e., between layers II and III) (Fig. 2E). This is consistent with the results of previous immunohistochemical studies of the rat placenta¹². Slc2a1 and Gjb2 immunohistochemistry is a useful tool to visualize the complex structure of the mouse placenta at the light microscopic level.

Conflict of Interest: The authors declare no conflicts of interest.

Correspondence to Toshihiro Takizawa, MD, Department of Molecular Medicine and Anatomy, Graduate School of Medicine, Nippon Medical School, 1-1-5 Sendagi, Bunkyo-ku, Tokyo 113-8602, Japan

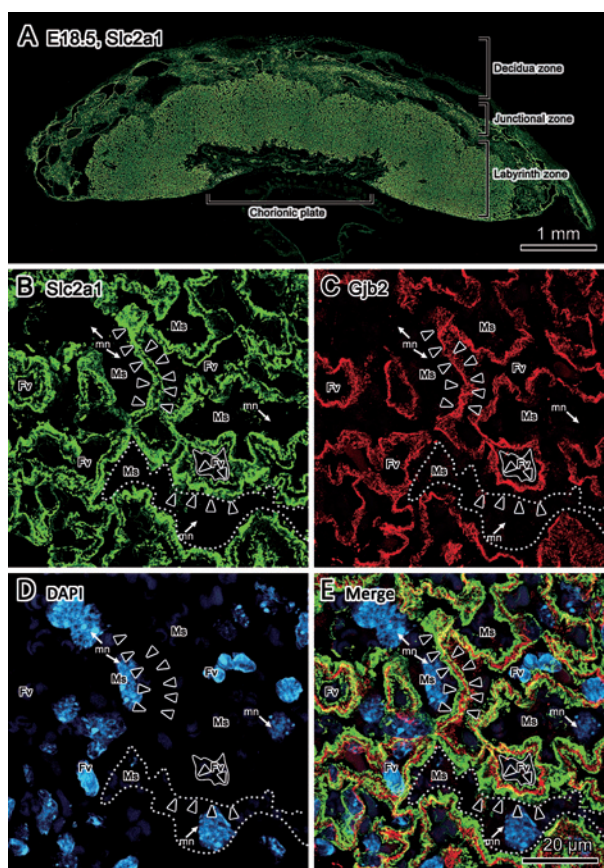


Fig. 2

Fig. 1 Representative hematoxylin and eosin (H&E) stained sections from a formalin-fixed, paraffin-embedded mouse placenta at E18.5 embryonic day. (A) A low-magnification view of the mouse placenta. (B) A higher-magnification view of the labyrinth zone. Fetal blood vessels (Fv) are separated from maternal blood sinusoids (Ms) by the blood-placental barrier. The solid lines denote fetal blood vessels, and the dotted lines show maternal blood sinusoids. Mononuclear trophoblast cells (layer I) are evident (mn). The double layer of the syncytiotrophoblast (layers II and III), indicated with arrowheads, is present between the solid and dotted lines.

Fig. 2 Slc2a1 immunohistochemistry of the mouse placenta at E18.5 embryonic day. (A) A low-magnification view of Slc2a1 labeling in a section of the mouse placenta with conventional fluorescence microscopy. Slc2a1 (green) is highly expressed in the labyrinth and junctional zones. (B-E) Double-immunolabeling of Slc2a1 and Gjb2 in the labyrinth zone as visualized with confocal laser scanning microscopy. (B) Slc2a1 (green) image of the labyrinth zone. (C) Gjb2 (red) image of the same section shown in B. (D) DAPI (blue) image of the same section shown in B. (E) Merger of the green Slc2a1 signal (B) with the red Gjb2 signal (C). Arrows indicate the nuclei of mononuclear trophoblast cells (mn). The solid lines denote fetal blood vessels (Fv), and the dotted lines show maternal blood sinusoids (Ms). The double layer of the syncytiotrophoblast (layers II and III), indicated with arrowheads, is present between the solid and dotted lines. The images in B-E are all at the same magnification.

References

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