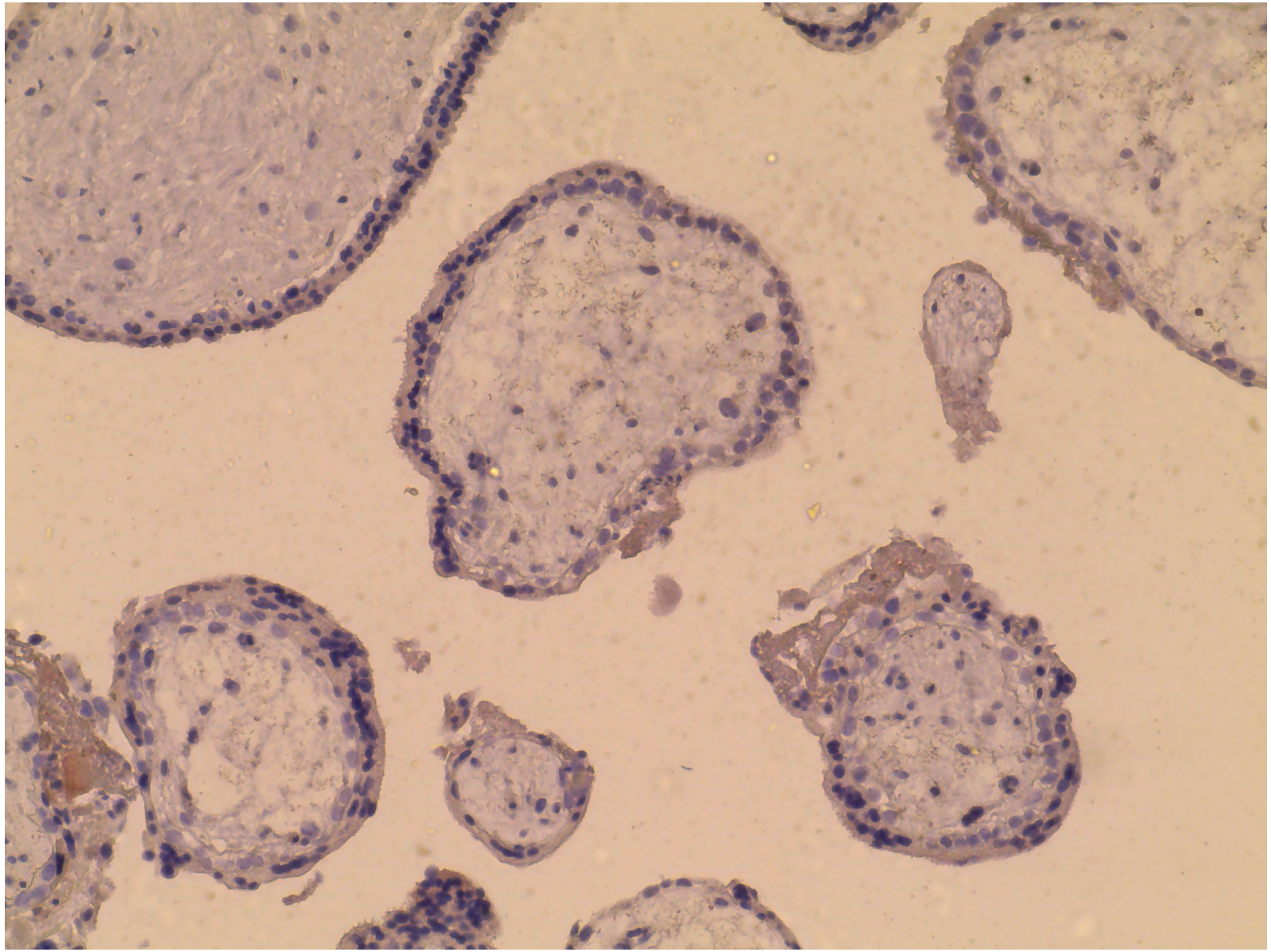
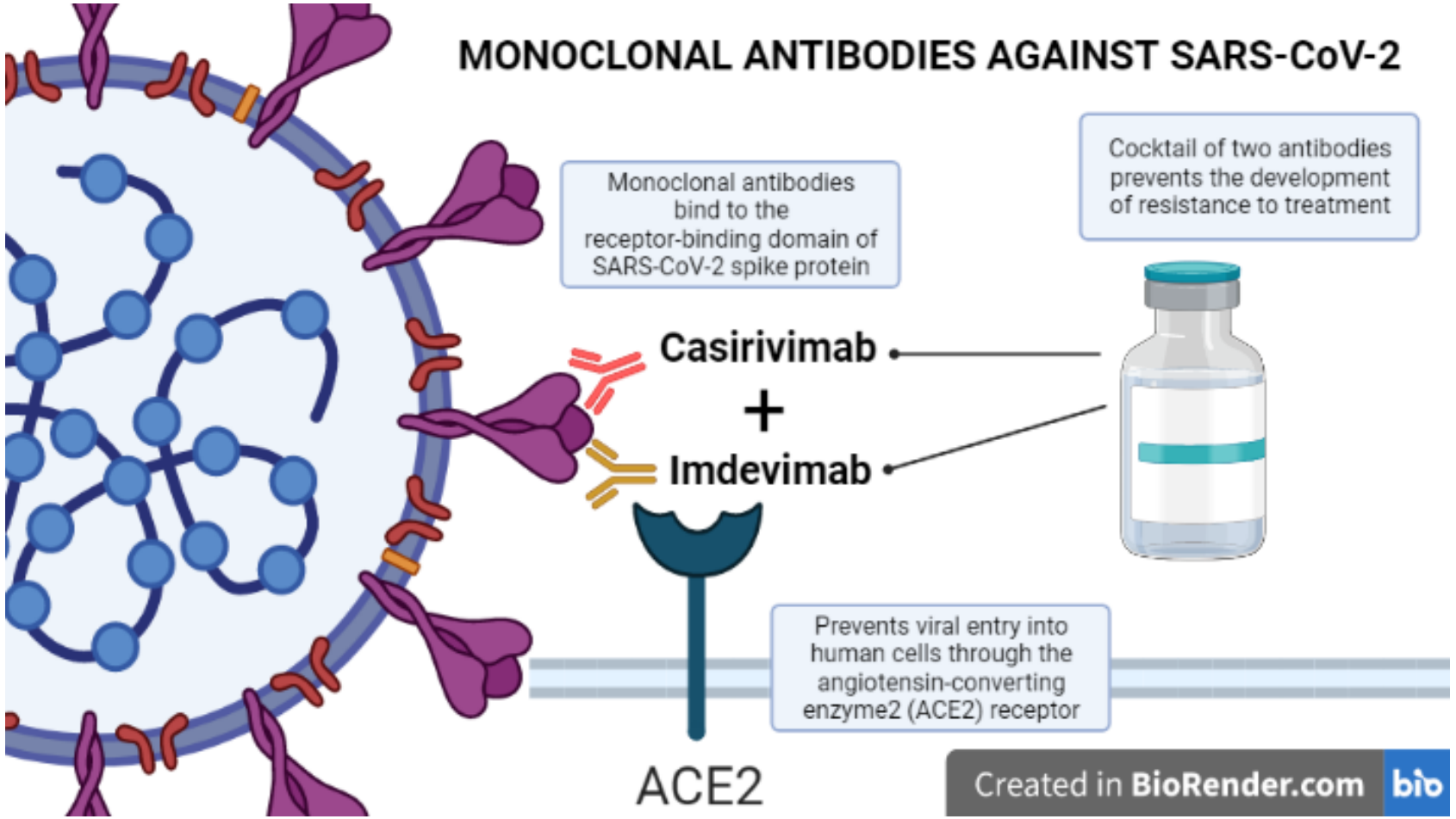
EUROScholars
European Undergraduate Research Opportunities

Studying the interactions of COVID Treatment with the Developing Fetus

James VanAntwerp in the Cohen lab,
University of Geneva Hospital

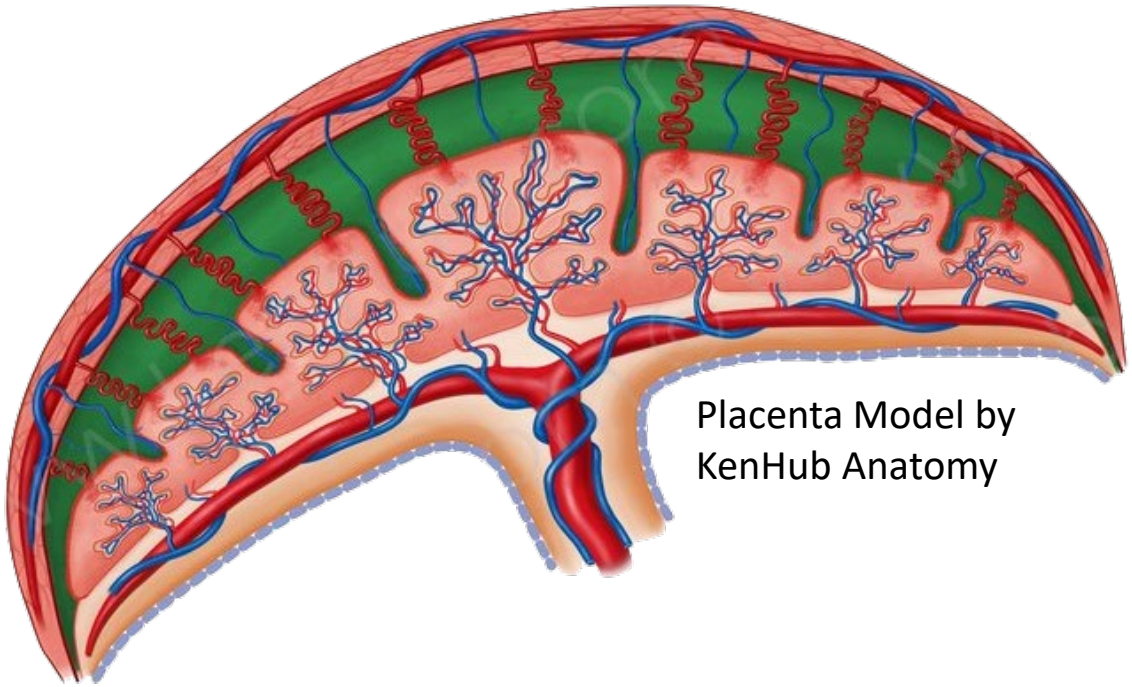


A cross-section of developing placenta stained with Haematoxylin

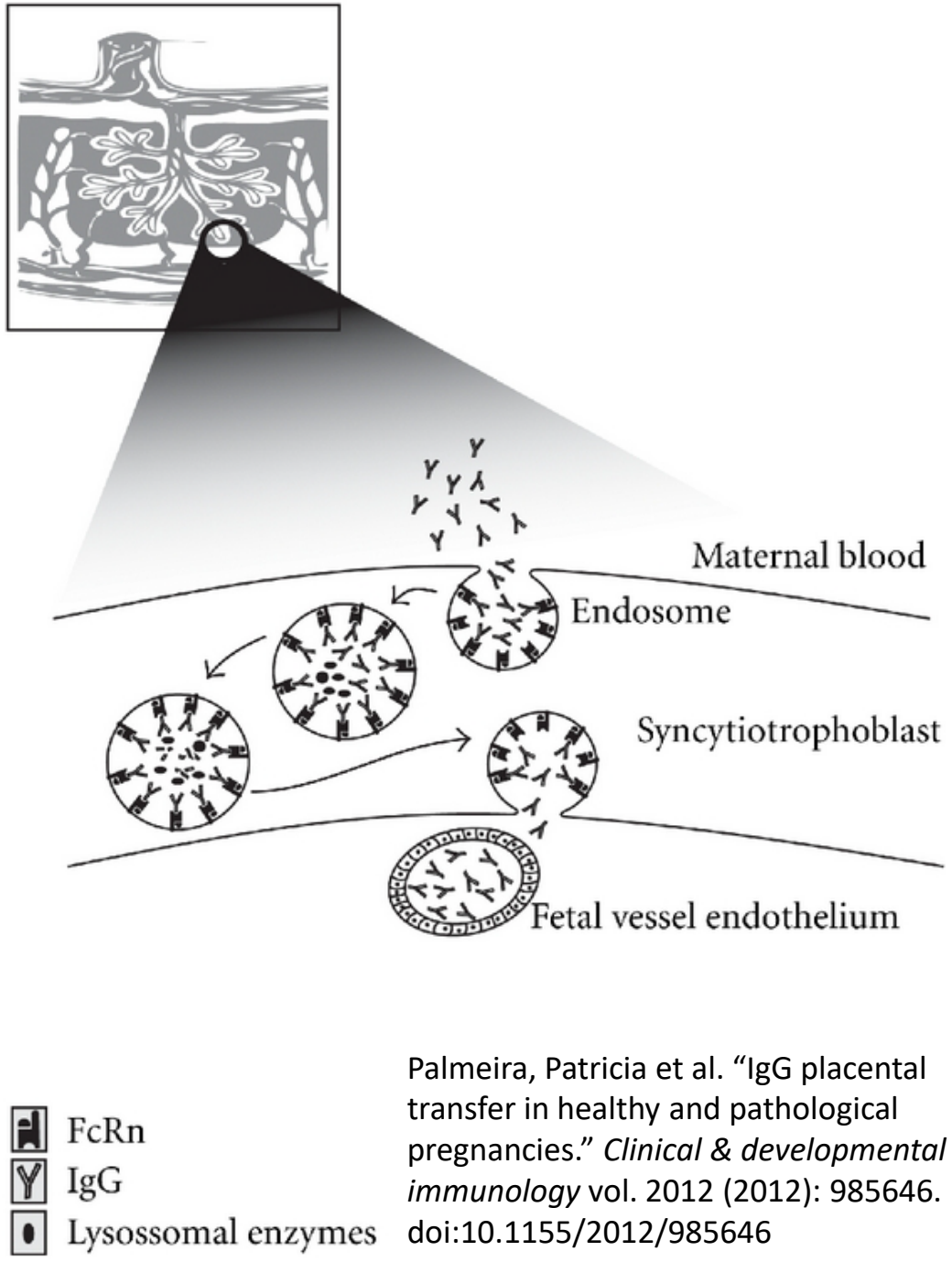


Many antibody treatments are approved under emergency use authorization, but their safety in pregnant women is not well understood. How do these therapeutics affect the developing fetus?

Image created by Carlo Trinidad, North Shore Medical Complex



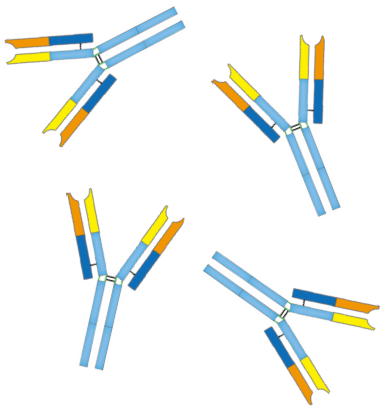
Placenta Model by KenHub Anatomy

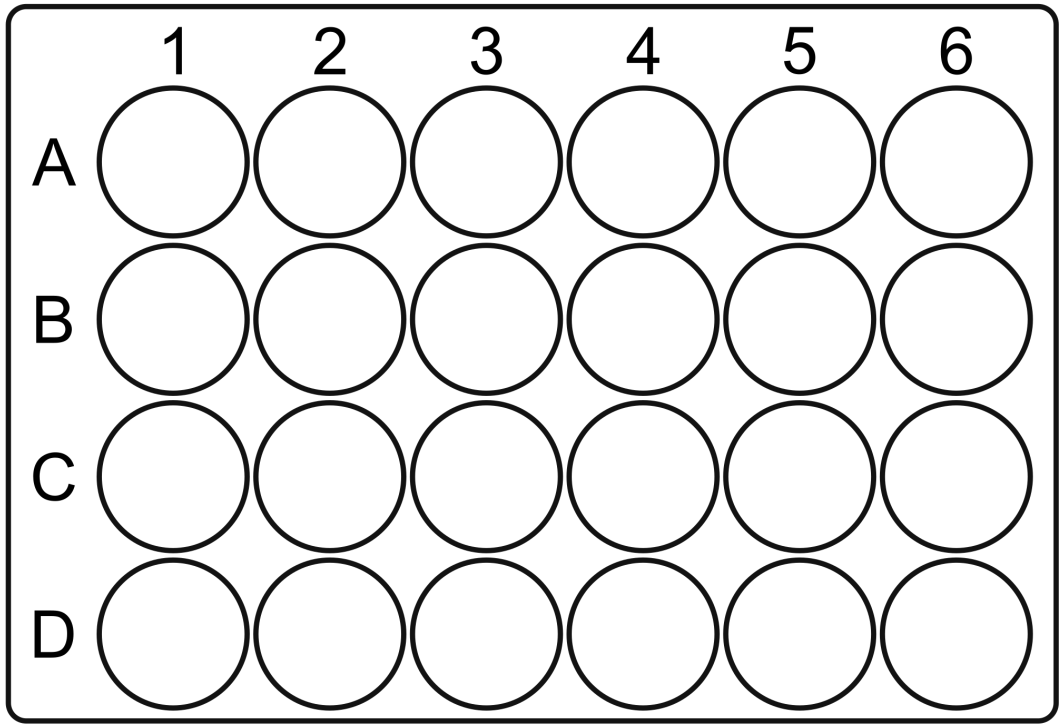


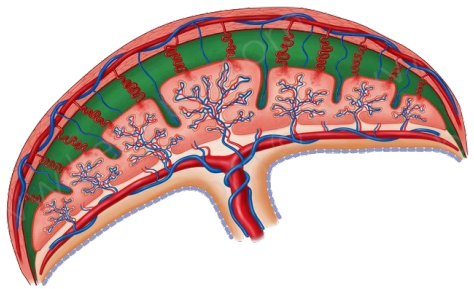
In a healthy placenta, IgG antibodies are transferred from the mother to the developing child. There is evidence that exogenous IgG can cross the placental barrier just as well as endogenous IgG. These effects are dependent on gestational age and IgG concentration in the blood.

Palmeira, Patricia et al. "IgG placental transfer in healthy and pathological pregnancies." *Clinical & developmental immunology* vol. 2012 (2012): 985646. doi:10.1155/2012/985646

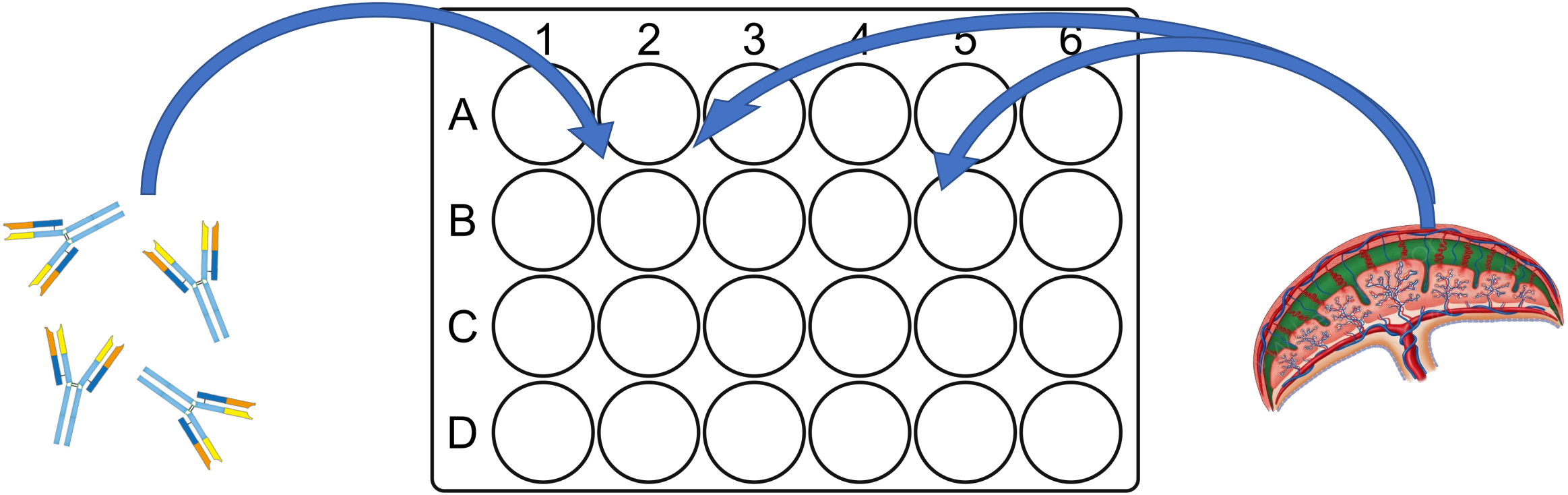
Sections of placental tissue were co-cultured with monoclonal antibody treatments casirivimab and imdevimab for twenty-four hours at 2.4mg/mL to allow the antibodies to cross the syncytiotrophoblast cells



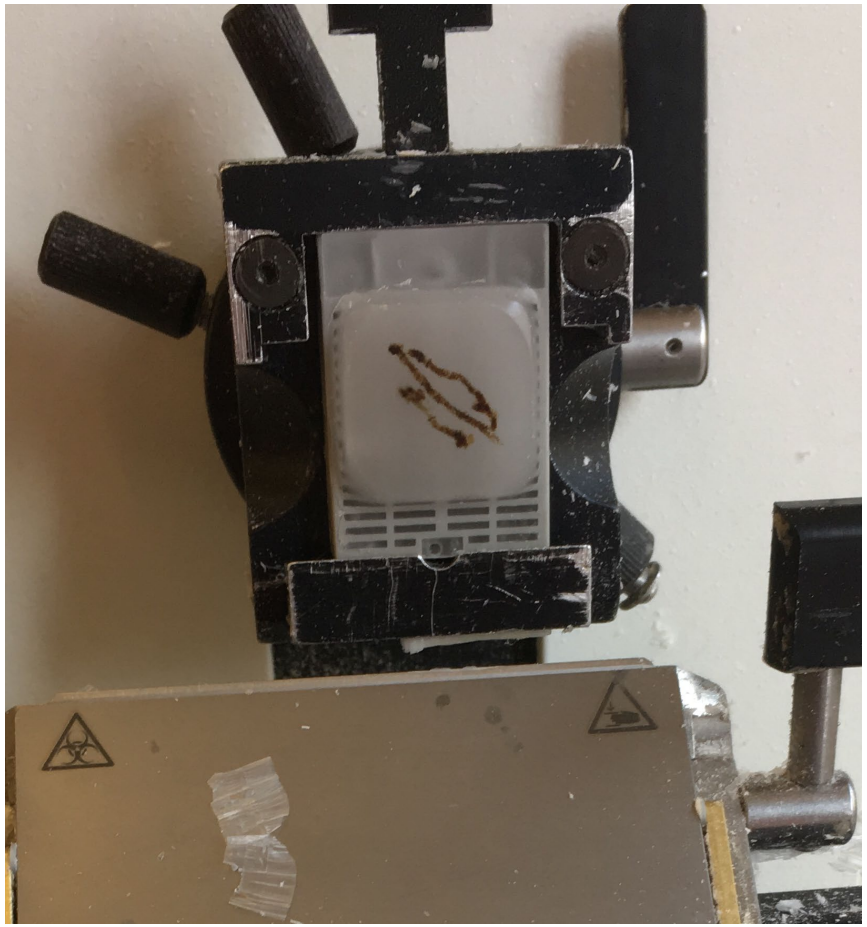




Sections of placental tissue were co-cultured with monoclonal antibody treatments casirivimab and imdevimab for twenty-four hours at 2.4mg/mL to allow the antibodies to cross the syncytiotrophoblast cells



The incubated placental tissue was fixed with formyl and embedded in paraffin. Then 3 micrometer cross-sections were cut on a microtome (left) and mounted on slides for staining using immunohistochemistry (right).



For our immunohistochemistry protocol, the primary antibodies are casirivimab and imdevimab, added before the tissue is fixed. The secondary antibody we use is a polyclonal rabbit anti-human conjugated to a peroxidase. This should produce a brown stain on the slides anywhere that the casirivimab and imdevimab have penetrated or attached to the tissue. Additionally, we add a haematoxylin stain to show cellular structures such as syncytiotrophoblasts and cytotrophoblasts

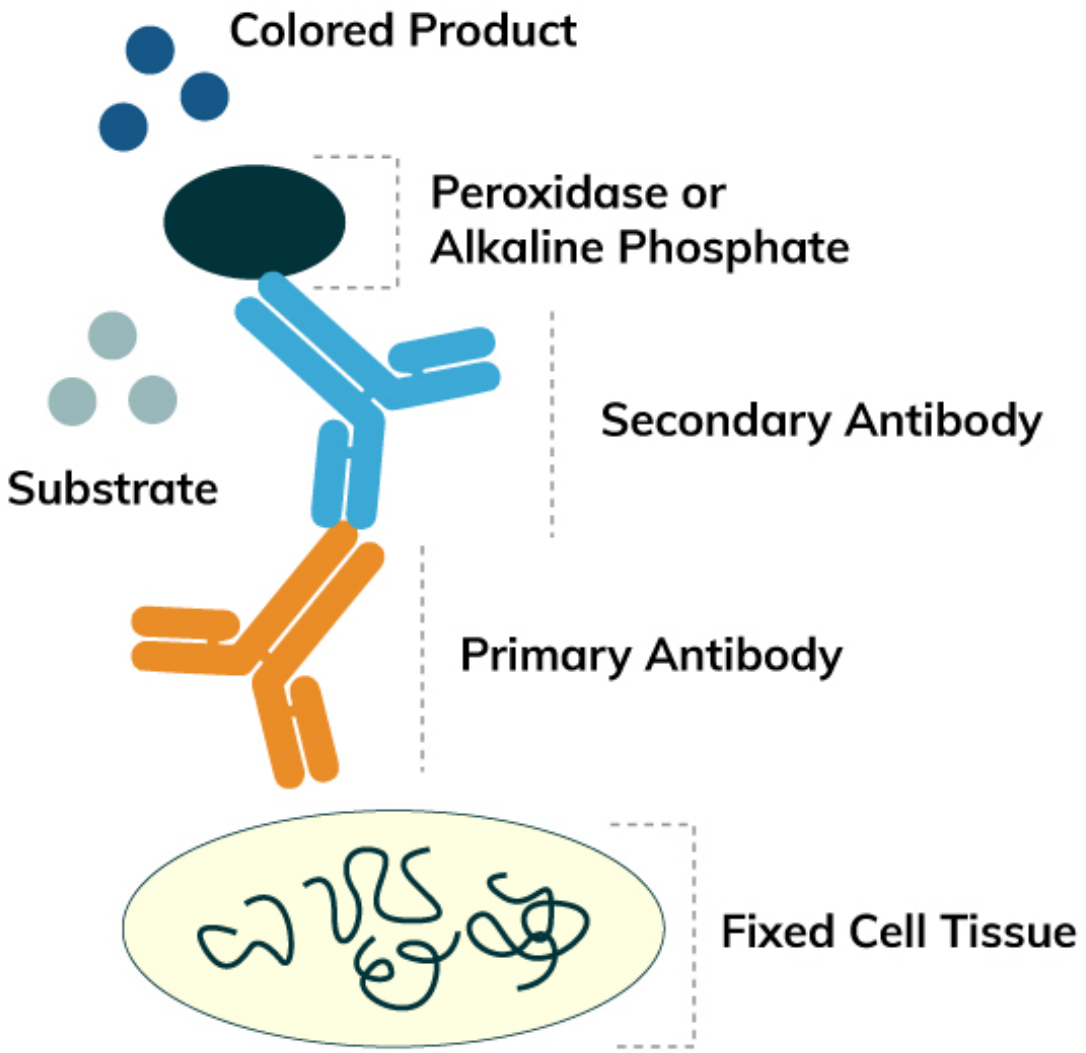
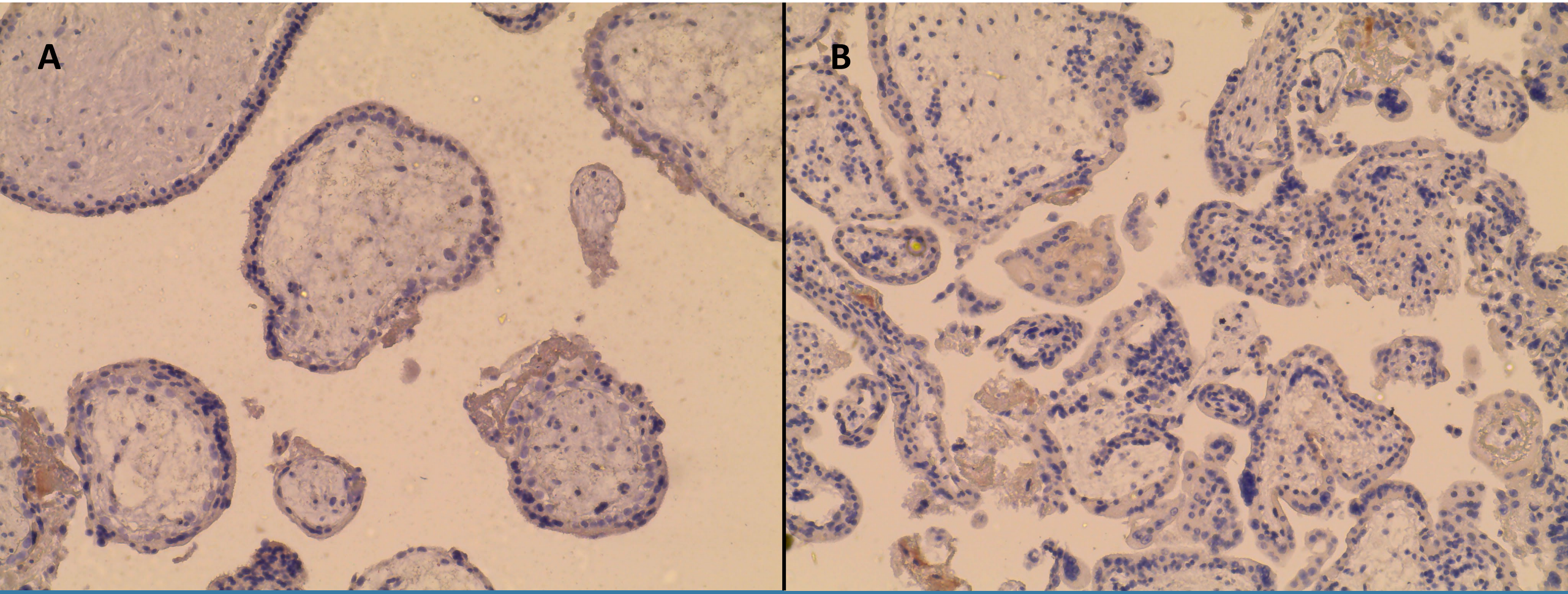


Image by Boster Bio

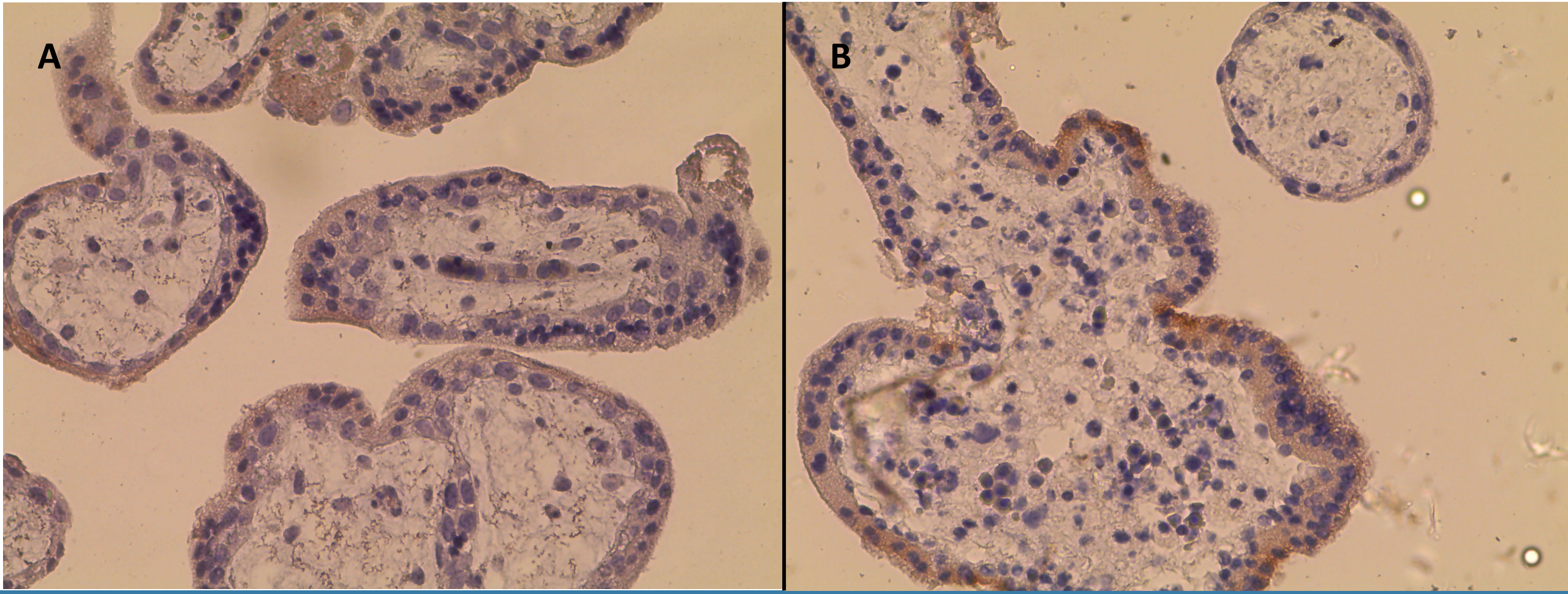
20x Magnification

Results -- Control Tissue



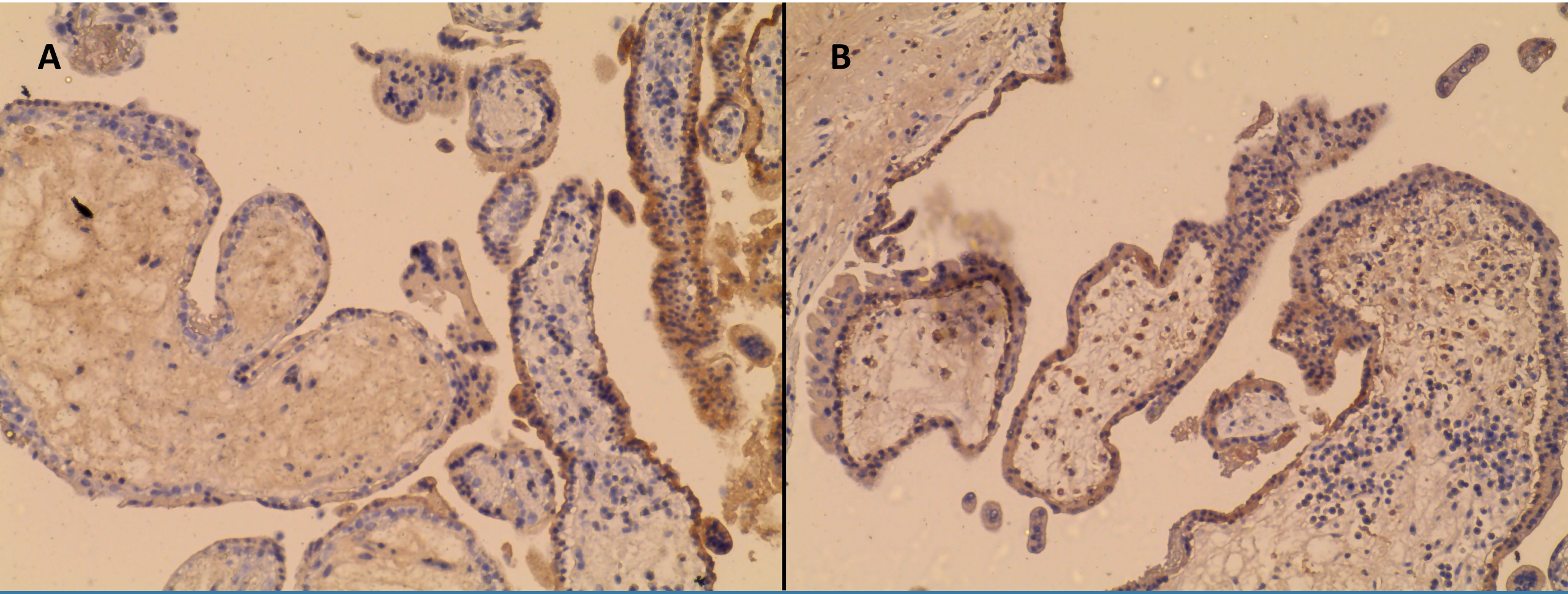
40x Magnification

Results -- Control Tissue



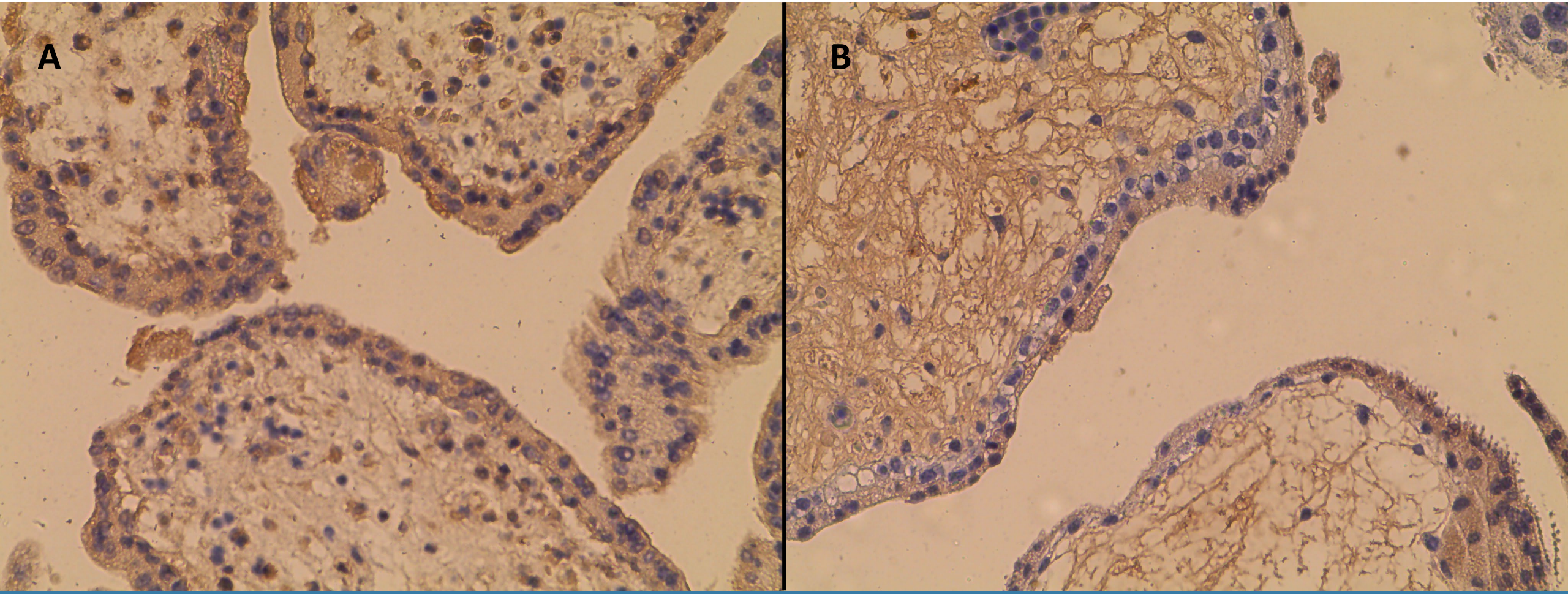
20x Magnification

Results -- Antibody Tissue



40x Magnification

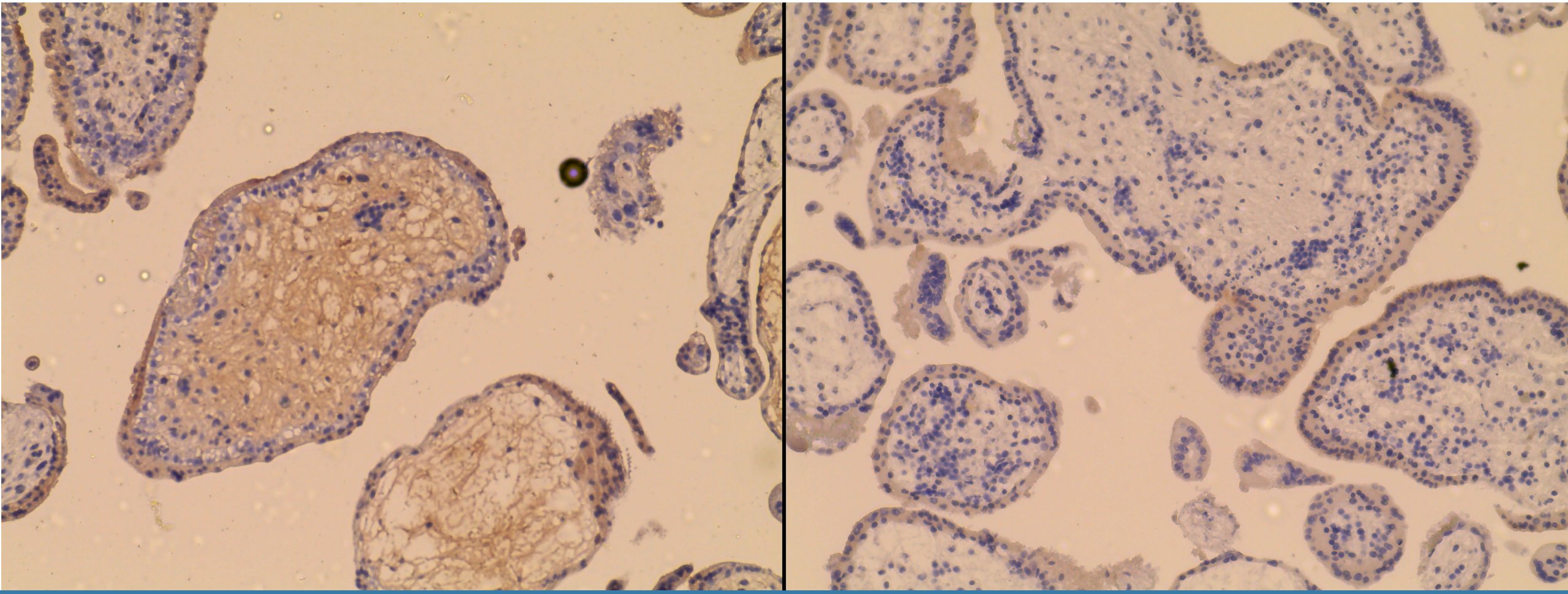
Results -- Antibody Tissue



20x Magnification

Incubated with Antibodies

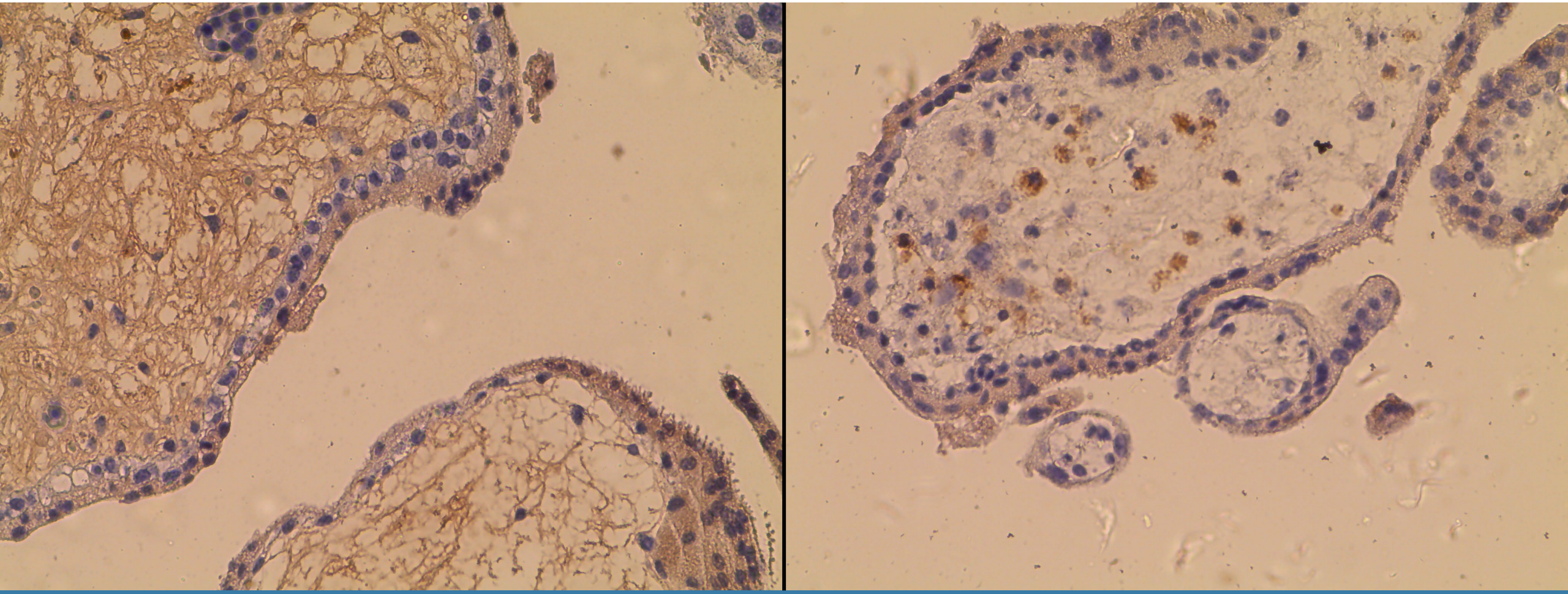
Control



40x Magnification

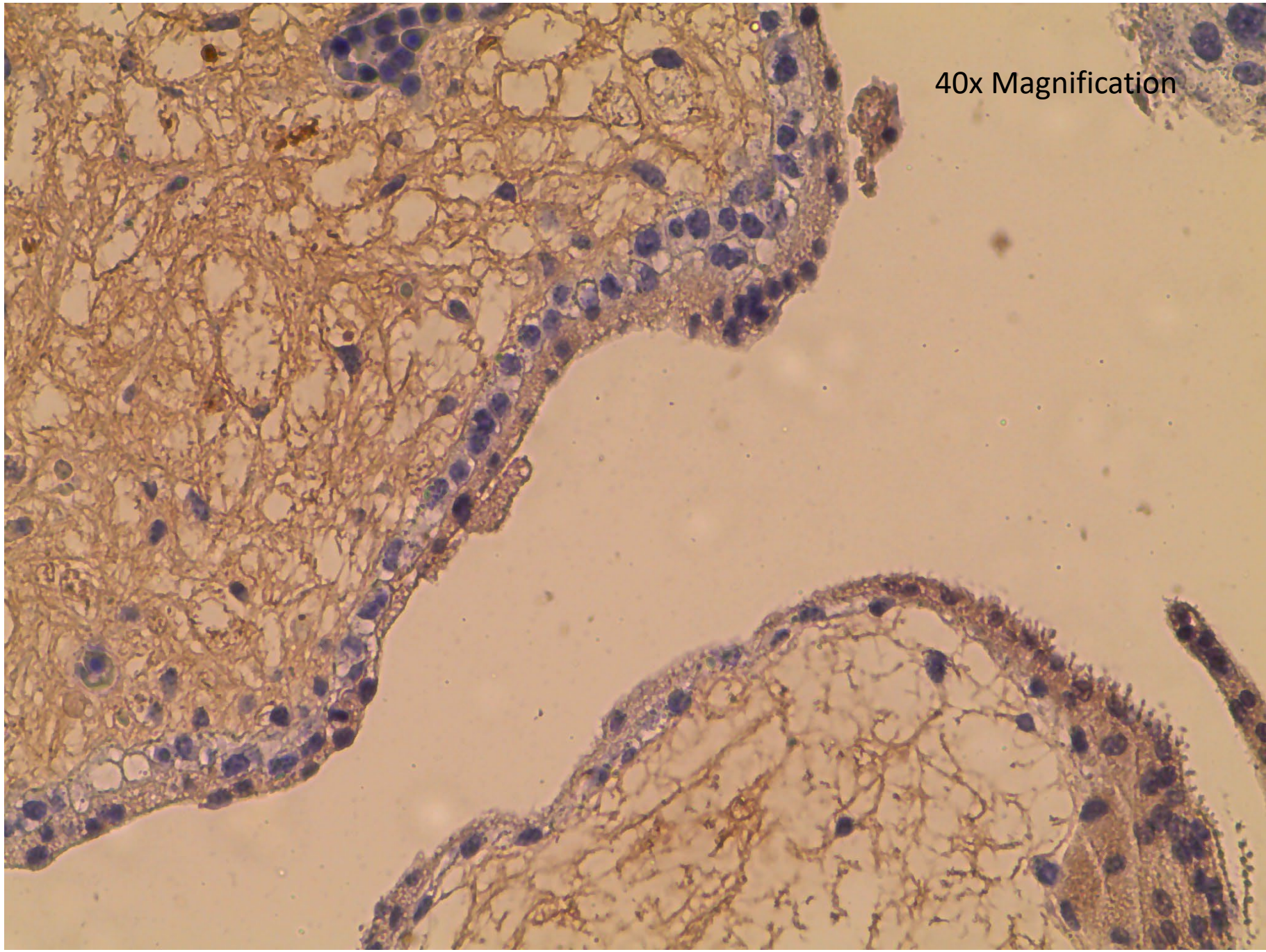
Incubated with Antibodies

Control



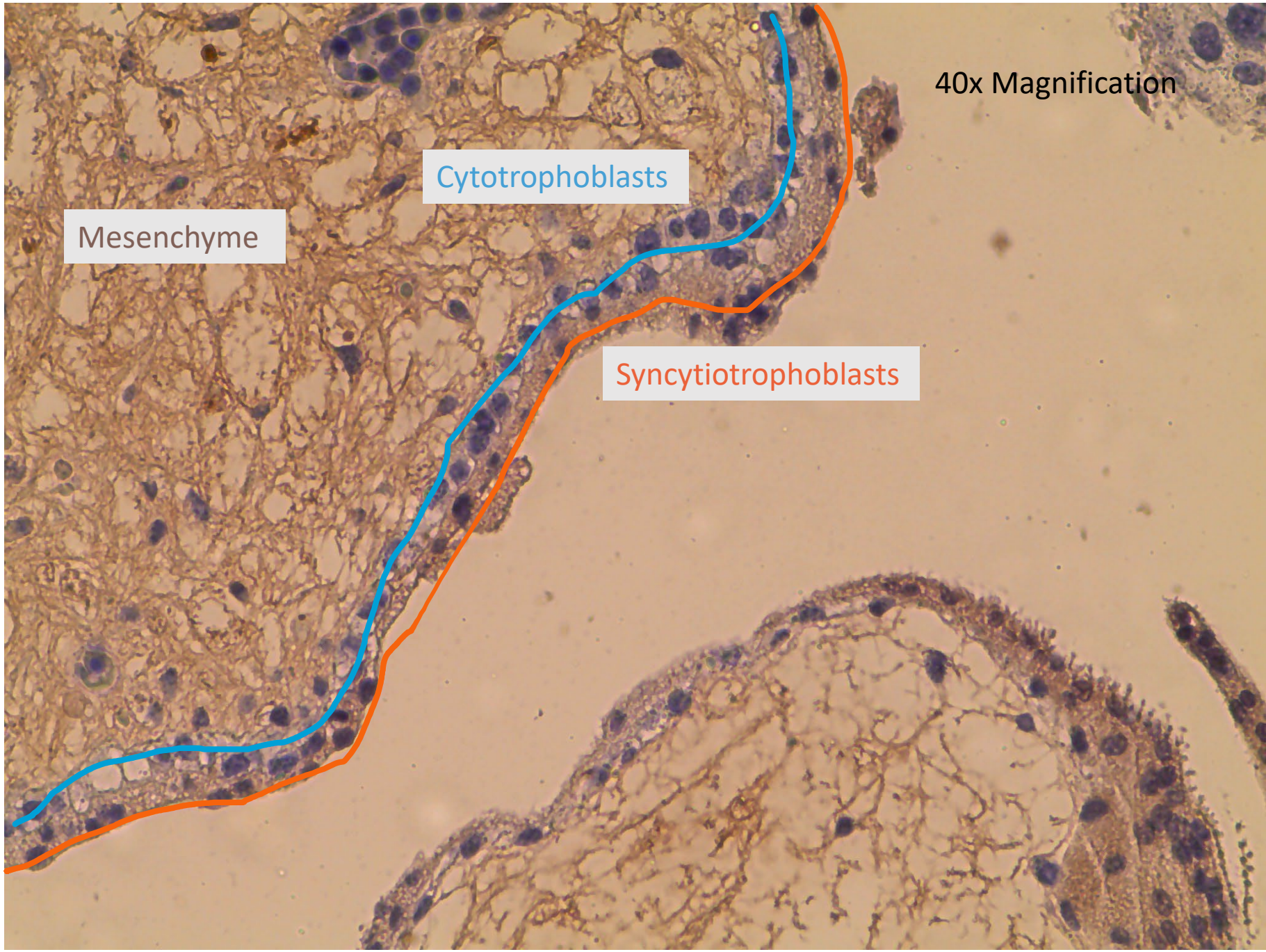
EUROScholars
European Undergraduate Research Opportunities

Notice the different cell types and how they interact with the monoclonal IgG differently – the Cytotrophoblasts, Syncytiotrophoblasts, and the Mesenchyme.



EUROScholars
European Undergraduate Research Opportunities

Cytotrophoblasts do not appear to be permeable to antibodies, which is confusing because both Syncytiotrophoblasts and the Mesenchyme have antibodies present.



Many thanks to Dr. Marie Cohen, Christine Wuillemin-Rambosson, Serena Ricci, Valentine Pieteraerens, and Ana Ferreira da Costa!

Are there any questions?