Neurobiology

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Microvasculature of the domestic ruminant brain: vascular corrosion casts and immunocytochemical study

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Blood vessels of the brain in domestic ruminants (buffalo, cattle and sheep) were studied by vascular corrosion cast and immunocytochemical techniques at scanning electron microscopy (SEM).

Microvascular corrosion cast SEM

Nine heads (three of buffalo, three of cattle and three of sheep) were each perfused the maxillary artery with a physiological solution to wash the blood vessels.

Every cerebral hemisphere was supplied by terminal portion of the internal carotis (A. carotis interna), originated in a rete mirabile epidurale rostrale. From internal carotis originate:

A. cerebri rostralis, directs rostro-medially, reached the cerebral longitudinal fissure, and supplies the hemisphere's medial face. By the rostral communicant artery communicates with the contralateral artery in correspondence with optic chiasma.

A. cerebri media, supplies the hemisphere's lateral face by temporal, parietal and frontal branches.

A. communicans caudalis, goes caudally, anastomoses with contralateral artery and A. basilaris, and gave off the A. cerebri caudalis.

From final branches of the cerebral arteries (A. cerebri rostralis, A. cerebri media, and A. cerebri cauallis) originate arterioles that penetrate in perpendicular sense into the cerebral cortex. These arterioles are two types: shorts (capillaries of the gray matter) that supply the cerebral cortex, and longs, that supply the white matter. Capillaries of the gray matter form a thick network with some morpho-structural details (annular and ovoid formations).

Immunogold-Labeling SEM Analysis

For the immunogold-labeling SEM analysis, the brains were cut into small fragments (rostral pole, caudal pole, and dorsal pars). Samples were immersed in PBS for 1hr, incubated for 1hr with a solution containing normal goat serum diluted 1:10 in PBS, and next with a primary polyclonal antibody directed toward CD133, p53 family, and MDM2, diluted 1:1,500 in PBS, overnight at 4°C. After washing in PBS, the samples were incubated with gold-conjugated goat anti-rabbit IgG, diluted 1:200 in PBS for 1hr at room temperature. After washing on PBS, samples were fixed by 2.5% glutaraldehyde, and subjected to silver enhancement. Next samples were dehydrated, mounted on stubs, and examined under a LEO 435 VP at variable pressure in backscattered mode. Samples had not been coated by gold-palladium, so that the only conjugated gold deriving from the immunocytochemical reaction.

Samples show the intense immunoreactivity on the external surface of the blood capillaries, located in the cerebral cortex. No immunoreactivity was observed in the cerebral cortex treated with PBS substituting the primary antibodies (negative control). These results display the presence the angiogenesis phenomena in the cerebral cortex of the domestic ruminant brain.

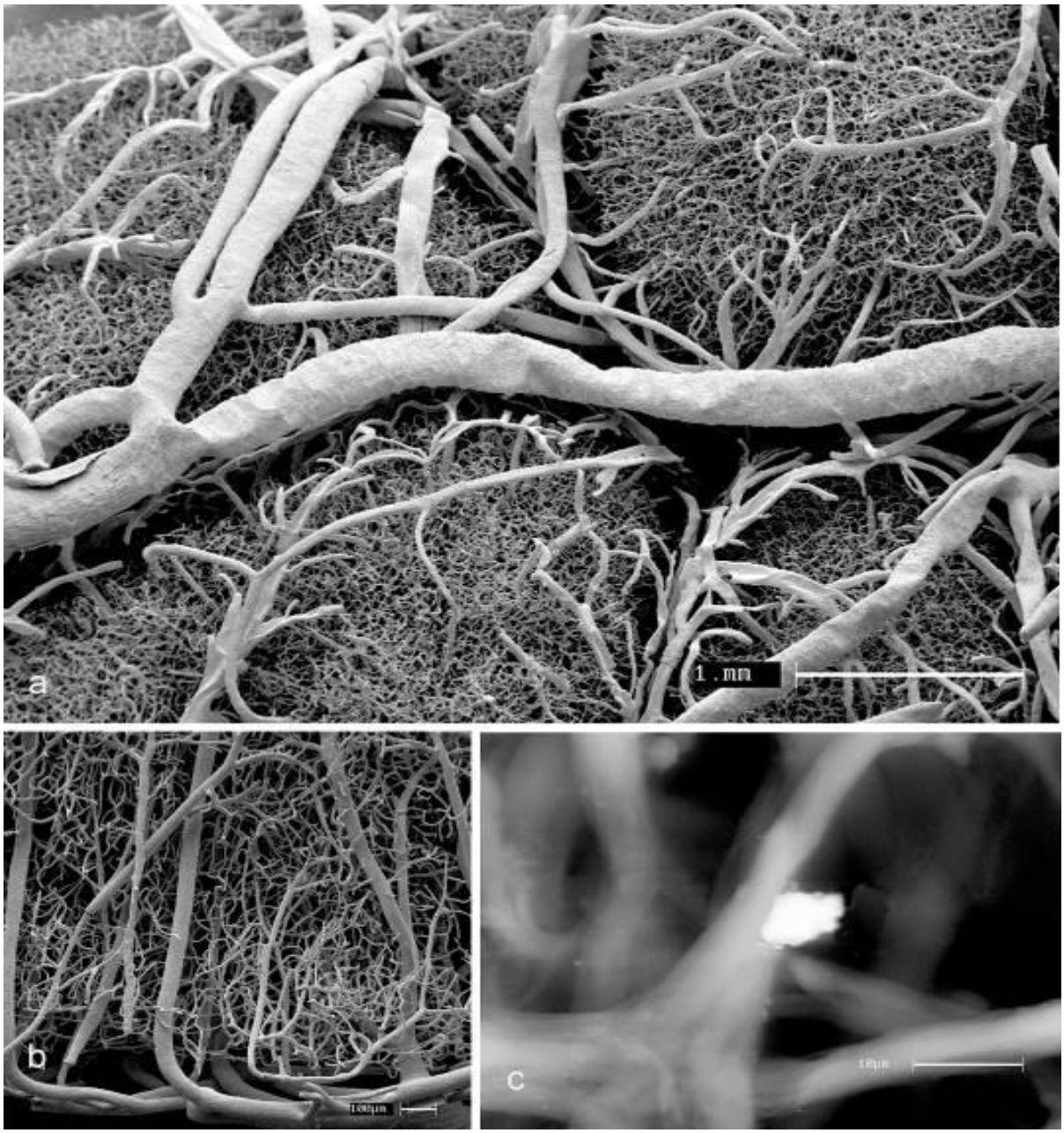

Figure 1