Title: Site of entry of the Rabies virus from the nose and oral cavity; and new methods of treatment of Rabies using olfactory mucosa and by breaking BBB.

By

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Objective: The object of this presentation is to show the perineural epithelium (PE) of the olfactory mucosa, nerves, bulb; and taste buds nerves; and their role in transfer of rabies virus to the CNS (1). We want to discuss possible new approach in the treatment of rabies patients based on our findings.

Material and Methods: Studies were made on the Rhesus-squirrel monkey, rat and rabbits olfactory mucosa, olfactory nerve and bulb, taste buds. They were sectioned and stained with various histochemical methods. They were dissected under high power dissection microscope to delineate various coverings of the nerve supply and the origin of their coverings in relation to pia-arachnoid membrane and subarachnoid space.

Results: Our studies showed that the olfactory nerves and the taste buds nerve supply are covered completely by PE, which are directly continuous with the pia - arachnoid mater of the CNS. The subarachnoid space with CSF surrounding the olfactory bulb is continuous with the space surrounding the olfactory nerves as they emerge from the olfactory bipolar cells of olfactory mucosa.

Discussion: Based on these histological findings, it is clear that any bacteria and virus such as rabies virus can get easily attached to the sticky mucus coatings, olfactory cilia and microvilli of these sensory end organs (figs. 1, 2, 3). They can reach the central nervous system and subarachnoid space without any hindrance using these anatomical routes within the axons (3) to reach the CNS resulting in rabies encephalopathy. Based on our experience of breaking the blood brain barrier (BBB), we believe that the anti rabies antibodies (5) and antiviral agents (4)can be delivered to the brain through the nasal olfactory mucosa and intra arterial and / or intravenous methods after breaking the BBB for the treatment of rabies. With intensive care and directly attacking the rabies virus in the brain; the virus can cleared and the damage to the brain is minimized with possibility of full recovery of the patients with least neurological deficit.

Conclusions: The most elusive route debated is inhalation route of rabies virus transfer (2, 3). We have shown how easy it is for rabies virus (and other microbes) to reach the CNS from inhalation and oral routes. By using the same histological routes, anti rabies antibodies (MAB) and antiviral agents can be directly delivered to the CNS in the treatment of rabies along with other intensive care with life support interventions.

References:

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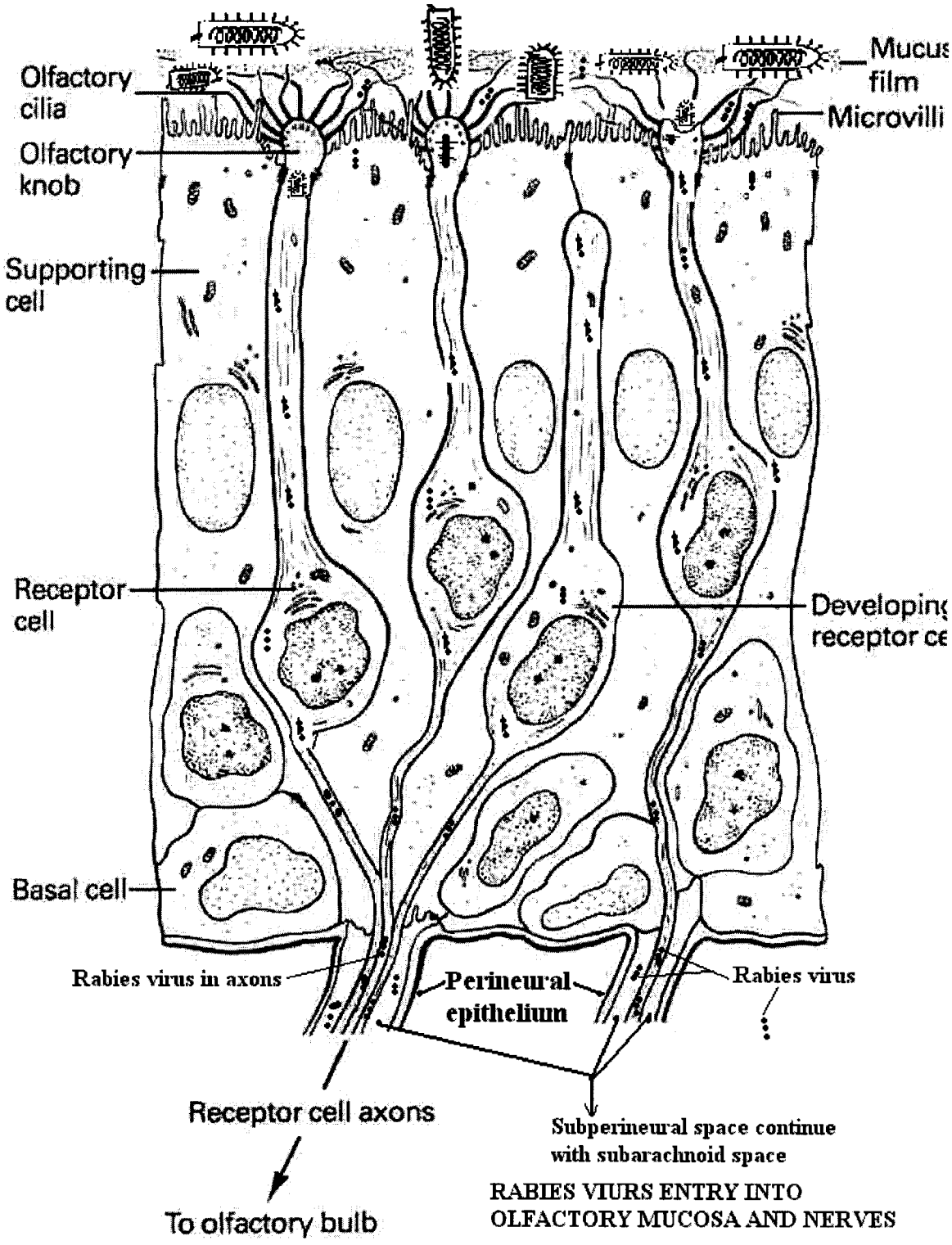
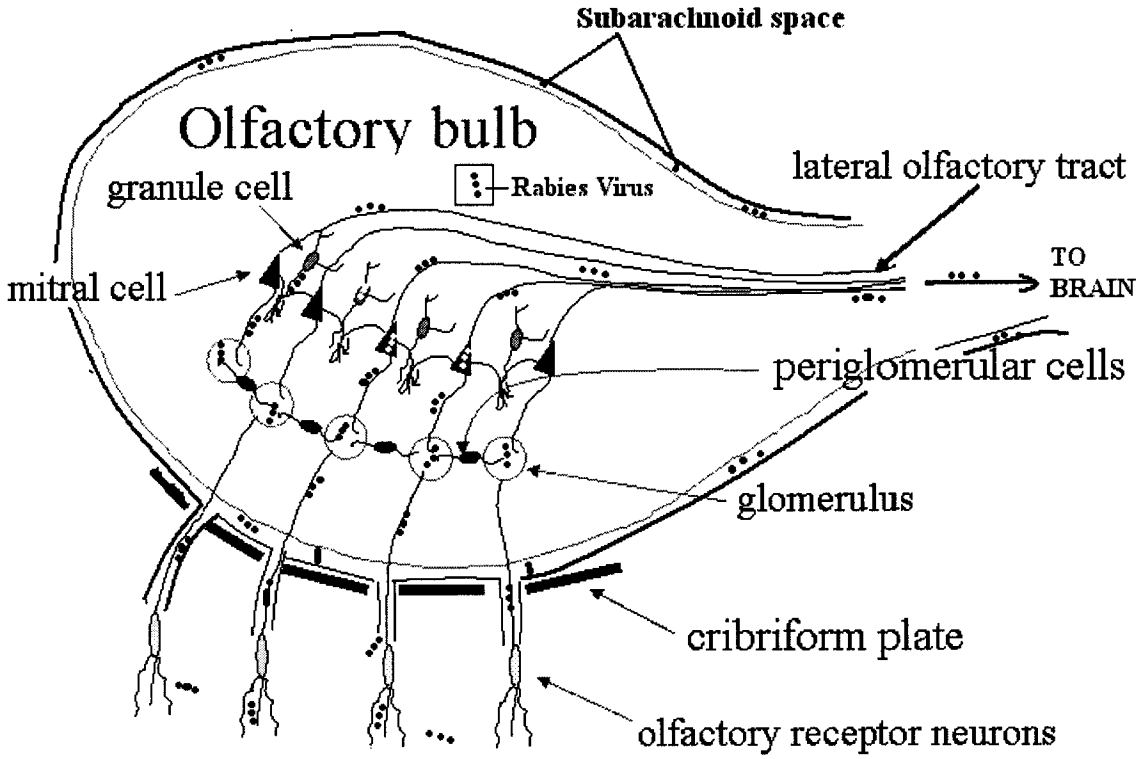


Figure 1. Showing the olfactory mucosa as the portal of entry of rabies virus from the virus containing air inhalation. Note the perineural epithelial covering of the olfactory nerve fasciculi.



Rabies virus entry to olfactroy mucosa, nerves, bulb, CSF and brain

Figure 2. Showing the histological route of rabies virus to brain from olfactory mucosa

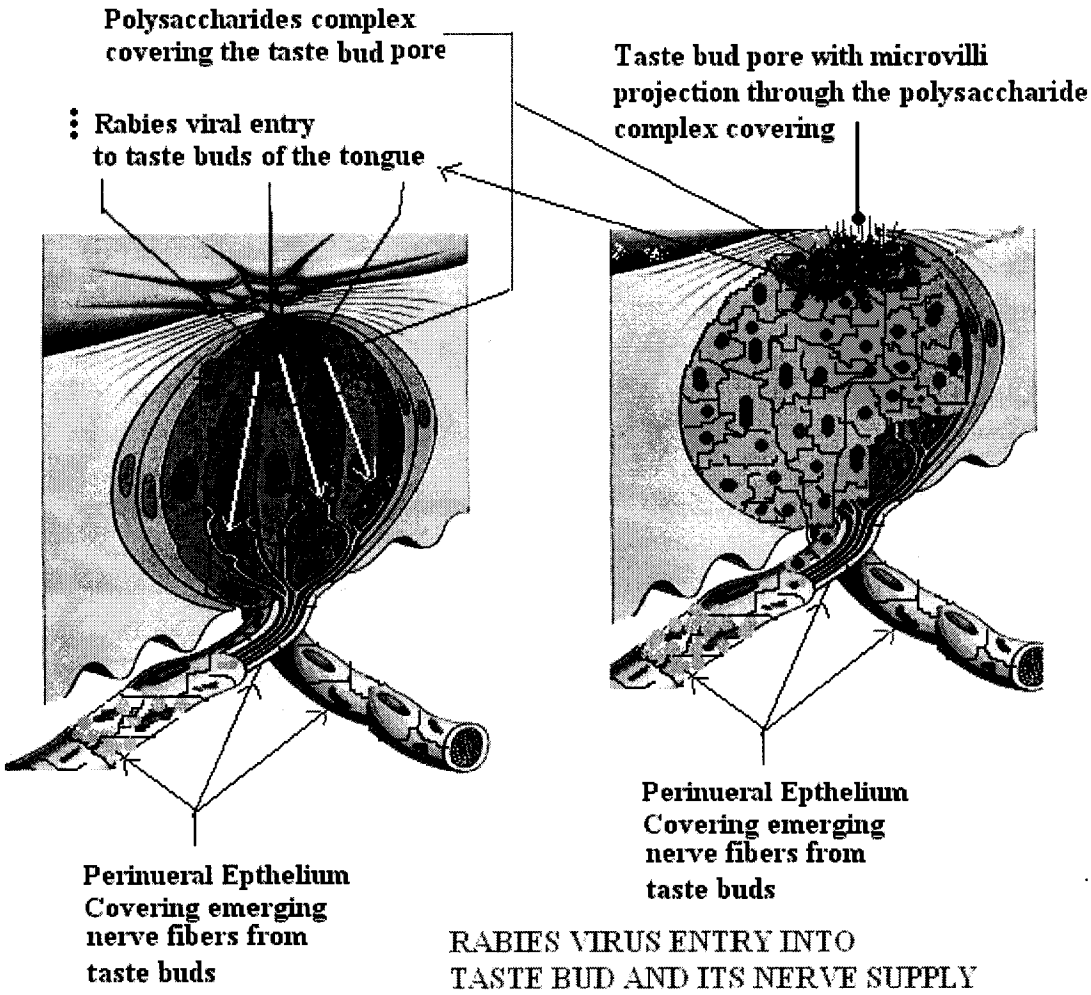


Figure 3. Showing the taste bud pore as the portal of entry of rabies virus when exposed orally with direct contact with the tongue. Note the perineural epithelial covering of the taste bud nerves.