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News & Comments

New Research Links Dogs' Smell and Vision

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Dogs have a wired sense of smell in their brains. The extent of this wiring has now been revealed by a new map. According to researchers, the dog nose connects to large areas of the brain via powerful nerve connections. First-of-its-kind findings describe how dogs "see" the world through their noses. I think the new brain map is awesome, it's a foundational piece of research. We will be able to understand cognition in dogs much better if we know they have all these same connections as humans.

Twenty mixed-breed dogs and three beagles were scanned using MRIs to create the map. There were no obvious differences between the subjects other than their long noses and medium heads, making them good sniffers. In order to carry signals between brain regions, researchers identified fiber tracts in white matter. In diffusion tensor imaging, water molecules are tracked along tissue to uncover the underlying tracts, which are compared to the "road network" of the brain.

The olfactory bulb, which sits behind the dog's eyes, receives odor information from the nose. The signals weren't clear from there on out. A huge number of pathways were found in the dog MRI data when the team searched for tracts. Team members thought the nose was connected to the brain by information freeways.

Data from the study revealed a major, previously unknown, information highway linking dog's visual and olfactory systems. The team created 3D maps of the dog's nerve tracts based on the data they collected from the dogs.

Consistency was excellent. As far as size is concerned, these tracts appeared dramatically larger than what is described in the olfactory system of the human, more like what you would see in the visual system. Our nose has only 50 million to 60 million olfactory receptors, compared to 220 million in a dog's nose. In addition to forming spatial awareness, reading chemical communications, sensing our moods, and tracking weak heat sources, dogs have the snuffling organ as well. This extra number of connections adds up.

They conclude that the olfactory system is an essential network to consider when studying canine cognition because it features connections to most major processing pathways.

KEYWORDS

Canine, DTI, MRI, occipital, olfactory, white matter, sniff dogs, olfactory receptors, odor, road network.