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Direct projection from the visual associative cortex to the caudate nucleus in the feline brain

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Recent morphological and physiological studies support the suggestion that the extrageniculate ascending tectofugal pathways send visual projection to the caudate nucleus (CN) in amniotes. In the present study we investigated the anatomic connection between the visual associative cortex along the anterior ectosylvian sulcus (AES) and the CN in adult domestic cats. An anterograde tracer – fluoro-dextrane-amine - was injected in the AES cortex. The distribution of labeled axons was not uniform in the CN. Large number of labeled axons and terminal like punkta were found only a limited area in the dorsal part of the CN between the coordinates anterior 12-15. Furthermore, a retrograde tracer -cholaratoxin-B- was inserted in the dorsal part of the CN between anterior 12 and 13. We detected large number of labeled neurons in the fundus and the dorsal part of the AES between the coordinates anterior 12-14. Based upon our recent results we argue that there is a direct monosynaptic connection between the visual associative cortex along the AES and the CN. Beside the posterior thalamus the AES cortex should also participate in the transmission of the tectal visual information to the CN. This pathway is likely to convey complex information containing both sensory and motor components toward the basal ganglia, supporting their integrative function in visuomotor actions such as motion and novelty detection and saccade generation.