Immunohistochemical methods combined with Nissl’s staining method were used to study the caudal margin of corpus striatum in albino rats, cats and monkeys. There was a thin layer of fusiform cells. This group of cells were arranged in parallel forming flat plates. The long axis was arranged in a dorsal-ventral direction along caudate margin of corpus striatum. In this area, substance P, encephalin, endorphin and cholecystokinin immunopositive fibers and terminals were seen which were obviously more abundant than other areas in the corpus striatum. Due to the fact that this area is all seen in brains of rats, cats and monkeys therefore we acknowledged that this structure would possibly be present in mammals as a general phenomenon.

Using PHA-L and WGA-HRP as pathway tracers, we had determined the connections of the fusiform cells, both anterogradely and retrogradely, in marginal zones of corpus striatum in rats. It was found that in the marginal zone of rats, most fibers projected to globus pallidus and caudate side of substantia nigra. Fibers projecting to the caudate side of globus pallidus ended at the basal nucleus of Meynert near the caudal side of globus pallidus. In rats, the efferent fibers in the marginal area mostly came from lateral region of dorsal substantia nigra and its neighboring structure, and it is also different from other regions in the corpus striatum.

To understand the function of the marginal area, we microinjected kainic acid using a stereotaxic into the marginal area to destroy neurons in this area. Control cases received microinjection of the drug into the rostral and caudal parts of corpus striatum. The learning & memory functions in the rat, before and after the operation, were determined with Y shape maze. The result showed that in rats with marginal areas destroyed on both sides, both learning and memory functions were diminished. While rats with unilateral marginal area destroyed in a short time after operation memory function diminished but later gradually recovered. In rats with kainate injected into head and tail of corpus striatum, there is no significant loss of learning and memory functions. This experiment proved preliminarily that function of the marginal area was possibly related to the learning and memory activity of rats. Whether it is because the marginal nucleus projects to the Meynert basal nucleus remained for further study.