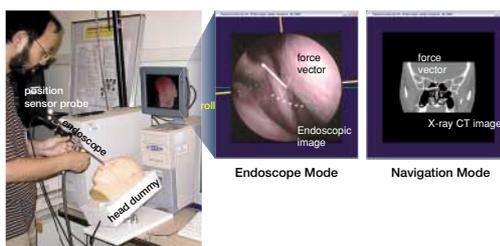


Endoscopic Sinus Surgery Training System

Recent surgical technology provides less invasiveness for patients, but requires surgeon's higher surgical skills and experience than conventional means. We are developing an endoscopic sinus surgery training system for surgical skill evaluation. It consists of a realistic head dummy, force sensor, position sensor and computer. While a trainee doctor performs surgical procedures inside the dummy, the force vector is overlaid on an endoscopic image, to alert to excessive collision between the surgical tools and the dummy. The orientation of the endoscope is also shown to avoid its unnecessary rolling. The position of the surgical tools is displayed as a sliced X-ray CT image at the tip of the tool.



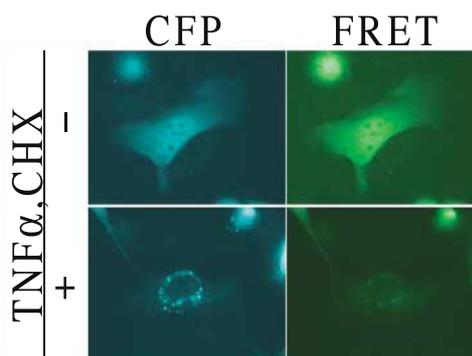
Endoscopic sinus surgery training system with force and position sensors.

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Apoptotic Pathways in Alzheimer's Disease

Alzheimer's disease, a progressive neurodegenerative disorder, is characterized by deposition of A β , accumulation of intercellular neurofibrillary tangles, and neuronal cell loss. Recently, it was reported that the activation of caspase 8 was observed in A β -induced neuronal apoptosis. In general, when cells are exposed to death-inducing molecules such as TNF- α or Fas, caspase 8 is activated and cleaves an apoptotic facilitator Bid that is a member of the Bcl-2 family. After additional modification, the carboxy-terminal moiety of Bid is translocated to the mitochondria and induces the release of cytochrome c into the cytoplasm. In an attempt to directly observe the cleavage of Bid and the following events in living cells, we constructed a vector that encoded Bid fused with YFP and CFP (YFP-Bid-CFP). Upon expression of YFP-Bid-CFP in mammalian cells, we were able to observe the efficient transfer of energy from excited CFP to YFP within the YFP-Bid-CFP molecule, and, importantly, the fusion protein YFP-Bid-CFP was fully functional in cells. When YFP-Bid-CFP was cleaved by caspase 8, upon activation by anti-Fas antibodies

but not by A β or tunicamycin, no such transfer of energy was detected. This data suggests that other apoptotic pathways are more important in A β -induced apoptosis.



Activation of caspase 8 was detected in single cells by disappearance of Fluorescence energy resonance transfer (FRET). CFP-Bid-YFP-expressed COS 7 cells were incubated with TNF α and cycloheximide (CHX) to induce cell death. In general, caspase 8 is activated by TNF- α and CHX.

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