Notes from the lab

February 9, 1994

A NEW MATERIAL FOR TISSUE ENGINEERING?

About a year ago, research scientist Shuguang Zhang of biology, and graduate student Curtis Lockshin of biology and Todd Holmes of brain and cognitive sciences discovered an oligopeptide, or very small part of a protein, that spontaneously assembles into a stable membrane when exposed to salt (see MIT Tech Talk, April 28, 1993).

At the time, Dr. Zhang and Professor Alexander Rich of biology (in whose lab the discovery was made) envisioned a variety of possible applications for the membrane. Now one of those applications – using the membrane as a kind of biodegradable scaffold in tissue engineering – appears to be a step closer to reality. In preliminary studies, the scientists have found that several kinds of tissue cells (including human bone cells) can attach themselves to the membrane and grow well for up to 14 days (the longest time that the researchers have kept them). Further, when a solution of the oligopeptide was injected into rabbits it did not trigger an appreciable immune response.

Consequently, the scientists are hopeful that the oligopeptide membrane might one day be useful as a matrix upon which cells could be grown. The matrix with its cells could then be transplanted into the body, where the cells would multiply to help replace diseased or damaged tissue while the matrix would degrade into amino acids that could be reused by the body. Michael DiPersio, a postdoctoral fellow in Professor Richard Hynes' lab in the Center for Cancer Research, is also involved in this research, which is sponsored by the NIH. Dr. Holmes received his PhD in 1993.

DESIGNING AND MANAGING SHIP CHANNELS

Most seaports require the construction and maintenance of channels to permit navigation. Yet because the use of channels is difficult and their upkeep demands constant attention, channels are the major cause of ship collisions and groundings.

In a project led by Professor Ernst Frankel of the Department of Ocean Engineering, MIT researchers are developing a method for more effectively designing, constructing, aligning and marking navigational channels, and for managing channel traffic. Results of actual transits as well as ship simulator studies are being used to draw effective channel cross-sections, curvatures, and ship sequence and traffic controls for safe, efficient channel design and management.

Over the last two years, this work has been expanded to include evaluation and development of technologies for effective control of ship movements through channels by such means as wire-guided controls, actual physical towing with cables, or ship guidance systems. These technologies are expected to reduce vessel collisions and groundings in navigational channels, as well as the cost of channel dredging and maintenance by allowing channel width to be reduced. The work is sponsored by the International Maritime Organization. (Source: RESEARCH, Department of Ocean Engineering)

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