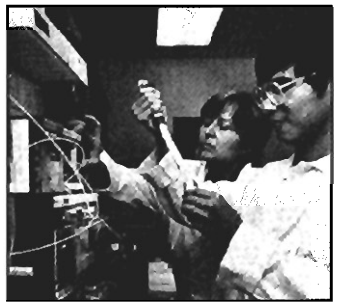
Center for Controlled Chemical Delivery

Mission

The Center for Controlled Chemical Delivery is devoted to active research in chemical delivery systems.

The Center

The Center for Controlled Chemical Delivery (CCCD) was established at the University of Utah in 1986, consisting of faculty from the Department of Pharmaceutics and Pharmaceutical Science. As an extension of these departments, the CCCD maintains a strong graduate training program and has attained a leading position in worldwide pharmaceutical, polymer, and biomedical research. Ongoing research projects at CCCD include:



CCCD Laboratories.

POLYMERIC MATERIALS

A central theme of the research being pursued within CCCD is the development and application of new and useful polymeric materials. Biodegradable polymers are coupled with drugs through enzymatically and hydrolytically labile bonds and fabricated for long term delivery as implantable devices. The chemical composition of the polymer backbone is designed to degrade into common body metabolics after all the drug have been released. Antihyperintensive drugs for the development of a long term delivery system and bioadhesive polymers used to increase the residency time of oral protein-polymeric carrier delivery systems are also being explored at the Center. Additionally, novel hydrogels, such as temperature, pH, electrical, and ultraviolet radiation, are being synthesized and characterized. These new and exciting hydrogels are currently being evaluated for oral drug delivery and as implantable systems.

NONTHROMBOGENIC SURFACES

The design of nonthrombogenic surfaces entails the modification of new and existing blood-contacting polymers used for small diameter vascular grafts, left ventricular assist devices, artificial hearts, vascular stents, and implantable sensor systems. Blood compatible surfaces are archived by grafting hydrophilic groups and the coupling of antithrombotic drugs directly onto the polymer surface. These modified surfaces demonstrated suppression of clot formation and extended the usefulness of blood contacting devices.

SELF-REGULATED INSULIN DELIVERY SYSTEMS

This insulin delivery device demonstrates a unique concept in controlled drug delivery technology. Insulin is chemically modified through the attachment of saccharide groups. These saccharides provide a binding site for the glycosylated insulin (G-Ins) with a lectin (Concanavalin A-Con A). The self-regulating aspect of this device centers around the fact that blood glucose will also bind to the saccharide binding site on Con-A. This device, a polymer membrane pouch filled with G-Ins bound to Con-A, will react to glucose molecules by releasing G-Ins. As the blood glucose concentration increases, more G-Ins are released; minimal G-Ins releases occur at low glucose levels.

TARGETABLE DRUG DELIVERY is being developed for anticancer therapy. An anticancer drug and a specific targetable antibody are chemically coupled to a polymer backbone. The targeting antibody allows the system to be aimed directly at a cancer cell. Once inside the cell, the drug is cleaved from the polymer by lysosomal enzymes to destroy the cell. The mechanism of action of the targetable polymeric drug is being studied at both a cellular and sub cellular level.

New Biomedical Polymers Research Facility, University of Utah Health Sciences Center, due for completion in 1994.

ORAL DELIVERY

The oral delivery of peptide drugs is hampered by rapid degradation in the acidic environment of the stomach and by specific enzymes in the small intestines. The large molecular weight and surface charge of peptides also limits their internal absorption. The use of low molecular weight stabilizing compounds and carrier polymers may increase the stability and absorption of peptides. Peptide drugs, especially insulin, could then be taken orally, much to the benefit of the patient. In addition, CCCD is investigating colonic delivery of peptides.

For more information, please contact:

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