Materials Science in Dentistry, Medicine, and Pharmacy

It is essentially a 20th-century phenomenon that medicine, dentistry, and pharmacy have come to rely heavily on synthetic materials for scientific and professional needs. This symposium, 28–29 December, arranged by John Autian, University of Texas College of Pharmacy, and Peter M. Margetis, U.S. Army Medical Biomechanical Research Laboratory, Walter Reed Army Medical Center, will focus on the theoretical and practical applications of metals and plastics in restorative and reconstructive procedures.

Restorative materials used in dentistry are subject to stresses peculiar to the oral cavity—pressures up to 30,000 pounds per square inch, rapidly fluctuating temperatures and *p*H, and a corrosion-inducing environment. Materials that can withstand these conditions must also possess another unique property—they must be truly adherent to tooth structures that are made up of such chemically, physically, and physiologically disparate substances as hydroxyapatite and collagen. Ralph Phillips, School of Dentistry, Indiana University, will discuss the use of certain composite plastic materials that have been custom made to meet these and other specifications demanded by true dental restoration.

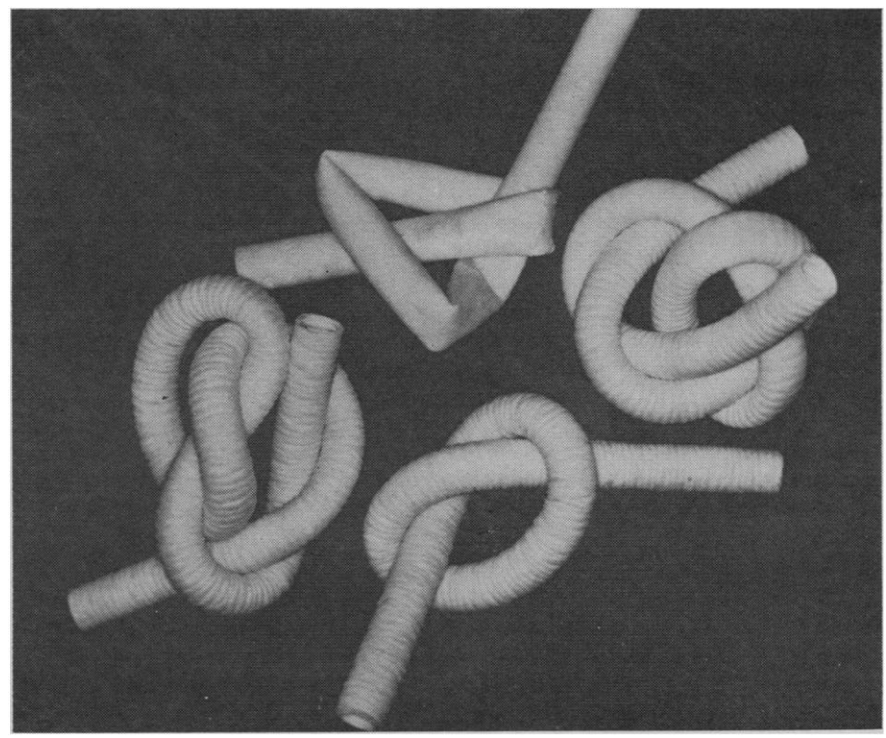
Medical aspects of advancements in metallurgy as applied to surgical implants will be presented by Patrick G. Laing of the Orthopedic Research Laboratory, University of Pittsburgh. He will discuss the critical questions of corrosion of stainless steel, cobalt-chromium-molybdenum, and aluminum-vanadium alloys in body fluids, and the importance of implant design.

Recent advances in medicine and dentistry have enhanced the need for polymeric materials in replacing or repairing tissues and organs damaged or destroyed by trauma and disease. Fred Leonard of the U.S. Army Medical Biomechanical Research Laboratory will stress two main points in his talk on advances in the use of plastic materials for implants: (i) a review of what is known about synthetic polymers used in surgical repair and in implants and (ii) recent research findings on the use of homologous series of α-cyanoacrylates, from methyl to decyl, as tissue adhesives and as hemostatic agents. During the past 5 years methyl α-cyanoacrylate has been widely studied as a nonsuture closure for wounds in the liver, pancreas, bone, bowel, and blood vessels. While the adhesive monomer of this substance can adhere to a variety of tissues, both the monomer and polymer are histotoxic and elicit acute inflammatory responses. The recent work at Walter Reed has been devoted to an attempt to develop other cyanoacrylates that have significant adhesive properties and are less histotoxic than the methyl α-cyanoacrylates.

John Autian, University of Texas College of Pharmacy, will discuss the development of standards for plastics that are to be used in pharmacy and medicine.

Ralph Leininger of Battelle Memorial Institute will review the present status of the use of plastics in dentistry, medicine, and pharmacy, and will highlight major unsolved problems in the use of plastics; among these is the development of plastics for prosthetic use that are completely compatible with body tissues and fluids.

As new products and devices made of synthetic materials come into medical, dental, and pharmaceutical use, practitioners and the public must have confidence that these materials have been properly manufactured, that they have been properly tested, that they have been truthfully promoted, and that the drugs and devices are safe for their intended uses. Earl Meyers, chief of the Manufacturing Controls Branch in the Division of New Drugs, Food and Drug Administration, will talk about regulations and laws that govern experimental and therapeutic use of plastic prosthetic devices and drugs.



Arterial grafts (about × 3). Prosthetic device at top is earlier version; it tended to kink after implantation [*U. S. Army Medical Biomechanical Research Laboratory*]