



Robert Langer

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Massachusetts Institute of Technology
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Novel biomaterials

Advanced drug delivery systems are having an enormous impact on human health. We start by discussing our early research on developing the first controlled release systems for macromolecules and the isolation of angiogenesis inhibitors and how these led to numerous new therapies. For example, new drug delivery technologies including nanoparticles and nanotechnology are now being studied for use treating cancer and other illnesses. We then discuss new ways of using nanotechnology to deliver DNA and siRNA and novel microchips for drug delivery. Approaches for creating new biomaterials are then evaluated and examples where such materials are used in brain cancer and shape memory applications are discussed. Finally, by combining mammalian cells, including stem cells, with synthetic polymers, new approaches for engineering tissues are being developed that may someday help in various disease. Examples in the areas of cartilage, skin and spinal cord repair are discussed.

BIO

Robert Langer was born in Albany, New York (USA). He received his BSc from Cornell University in 1970 and his ScD from the Massachusetts Institute of Technology (MIT) in 1974, both in Chemical Engineering. He is now David H. Koch Institute Professor at MIT. He served as a member of the United States Food and Drug Administration's SCIENCE Board, the FDA's highest advisory board, from 1995–2002 and as its Chairman from 1999–2002. Prof. Langer is considered as the father of smart drug release, following his development of innovative biomimetic materials, such as polymers, nanoparticles or chips, which enable a controlled distribution of drugs in the human body. His research has allowed for the successful treatment of various types of cancer, such as prostate and brain. He is also one of the pioneers of tissue engineering, leading to controlled reconstruction and growth of tissues and organs by means of new biodegradable materials used as scaffolds. Langer has received over 170 major awards including the 2006 United States National Medal of Science; the Charles Stark Draper Prize, considered the equivalent of the Nobel Prize for engineers and the 2008 Millennium Prize, the world's largest technology prize. Among numerous other awards Langer has received are the Dickson Prize for Science (2002), the Max Planck Research Award (2008) and the Prince of Asturias Award for Technical and Scientific Research (2008).