Linda G. Griffith

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Research Interests
Our research is in the field of tissue engineering. Broadly defined, tissue engineering is the process of creating living, physiological, 3D tissues and organs. The process starts with a source of cells derived from a patient or from a donor. The cells may be immature cells, in the stem cell stage, or cells that are already capable of carrying out tissue functions; often, a mixture of cell types (e.g., liver cells and blood vessel cells) and cell maturity levels are needed. Coaxing cells to form tissue is inherently an engineering process, as they need physical support (typically in the form of some sort of 3D scaffold) as well as chemical and mechanical signals provided at appropriate times and places to form the intricate hierarchical structures that characterize native tissue.

The process of forming tissues from cells is a highly orchestrated set of events that occur over time scales ranging from seconds to weeks and dimensions ranging from 0.0001 cm ? 10 cm. Research projects in the lab address problems across this spectrum. At one end, we study basic biological and biophysical processes at the molecular and cellular level. This helps us understand what processes the cells need help with, and what events they can accomplish themselves. Our work at this end of the spectrum has led to the development of new tools for biologists to use in fundamental studies of cell behavior. At the other end of the spectrum, we develop new materials and devices that are needed to direct the process of tissue formation, under the classical engineering constraints of cost, reliability, government regulation, and societal acceptance. We are also developing new integrated micro-bioreactor systems to grow 3D tissues for use in drug discovery and development, and as physiological models of human diseases such as hepatitis. Research and development in this area includes integration of materials and scaffold engineering with computation models of fluid flow and nutrient metabolism. For a more detailed perspective, see 67. Griffith, L.G. and Naughton, G., "Tissue Engineering: Current Challenges and Expanding Opportunities" Science, 295, 1009-1014 (2002).

Teaching Interests
Teaching interests are at the interface of engineering and biology

Recent subjects taught:
Molecular & Engineering Aspects of Biotechnology (7.37/BE.361)
Statistical Thermodynamics of Biomolecular Systems (2.772/BE.011)

Cell & Tissue Engineering (BE.360/10.449)
Heat & Mass Transfer (10.302)
Chemical Engineering Reactor Design (10.37)

Education
B.ChE. Georgia Tech, 1982
Ph.D. U.C Berkeley, 1988, Chemical Engineering

Honors and Awards
1984 Outstanding Teaching Assistant, U.C. Berkeley
1991 NSF Presidential Young Investigator Award
1996 Georgia Tech Council of Outstanding Young Engineers
1997 Ballou Memorial Lecture, Northshore Hospital, Salem, MA
1998 Fellow, American Institute of Medical and Biological Engineers
1998 Whitaker Lecture, American Society for Artificial Internal Organs Annual Meeting
1999 MIT Class of 1960 Innovation in Education Award
2000 International Fellow, Biomaterials Science and Engineering, International Union of Societies for Biomaterials Science and Engineering
2002 Popular Science Brilliant 10
2003 UC. Berkeley Bayer Lecture

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