Research in Biomedical Engineering

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ABSTRACT - The research areas of Biomedical Engineering have changed dramatically in the past three decades, from physiological instrumentation, data acquisition and analysis, and artificial organs and implantable devices in past years, now to areas of true biological investigation. Physicists and engineers have redefined medical imaging, going from methods of displaying anatomic structures until now portraying functionality of cells and tissues, regional densities of receptors, local intraorgan rates of metabolism, or the progress of pathological processes such as cancer growth. Building upon the information provided by the genomics, proteomics, and molecular biology, bioengineers with training in both engineering and biology now are taking the lead in several disciplines: medical imaging, systems analysis of disease processes, pharmacodynamics and predictive drug targeting, computer-aided diagnosis and therapy, and in the engineering of artificial tissues for implantation. Tissue engineering involves the whole spectrum of science from intervention at the gene level, through gene regulatory control, to the physiological and biomechanical functioning of the tissue. Training in depth in all areas of bioengineering is probably impossible, but the identification of the fundamental fields is becoming clear, with the result that programs built upon the essential core disciplines now advance into distinct subdisciplines, each with its sets of engineering and biological strengths.

KEY WORDS - physiological systems analysis, drug delivery systems and pharmacodynamics, tissue engineering