OPINION

MEDICAL MOLECULAR SURGERY

In an article which was recently published in the Journal of the American College of Surgery, entitled "Is surgical Science dead? The Excelsior Society Lecture" wrote by Barker and Kaiser, the surgical science and surgery has an interesting historical pathway. From dedicating the knowledge in surgery ("chirurgia" means "work by hand") since the beginning of mankind and human history to nowadays' need of medicine in the treatment of genetic diseases and gene therapy as well as the treatment of cancer and other malignant diseases. Mechanical trauma still needs treatment by surgery. Surgery and surgical science still exist and not dead. Surgeons, on the other perspective, have more obligations and challenges to face the trend of the new diseases and treatment modalities which might need the knowledge of surgical science.

The current focus of medicine on molecular genetics ignores the physical basis of diseases even though many of the problems that lead to pain and morbidity, and bring patients to the doctor's office, result from changes in tissue structure or mechanics. Edema, tissue contusion, hematoma, as result of trauma or surgery or surgical interventions, are part of routine events in daily medicine. Vascular endothelial science and the knowledge of the prevention of intimal hyperplasia which lead to vascular occlusion, has been coped by gene therapy by means of gene delivery using adenoviral vectors. To identify genes that are differentially expressed in tissues with manifest vascular damage has the ultimate goal of intervening the process to block the progressive development of tissue injury.

Endocrine diseases such as thyroid hormone dysfunction, causes certain molecular pathways in the heart and vasculature which relevant to cardiovascular derangements. These are all good examples of combination between medical and surgical science in molecular level.

Trauma, which is part in human life, is caused by mechanical events that always face us in everyday's life. Fluid and electrolyte treatment in medical, as well as in surgical patients, should be supported by thromboelastographics values to indicate the possibility of hemostatic changes during the treatment modality. Mechanobiology and disease of mechanotransduction should therefore integrate mechanics into the understanding of molecular basis of disease. Extracellular matrix and cell structure play the key roles in the maintenance of tissue form and function. Cellular mechanotransduction, the molecular mechanism by which cells sense and respond to mechanical stress is the major key issue on these premises. A re-evaluation of human pathophysiology explains that a wide range of diseases included within virtually all fields of medicine and surgery share a common feature: their etiology or clinical presentation results from abnormal mechanotransduction. The end result of insights into mechanical basis of tissue regulation may lead to development of improved medical devices, engineered tissue, and biologically-inspired materials for tissue repair and reconstruction. Thus, surgeons, surgery and the science of surgery are again in the beginning era of the new frontier of "medical molecular surgery".

Oncology and cancer science has shown that cell-free circulating DNA in plasma or serum of cancer patients share similar genetic alterations to those described in the corresponding tumor. This has lead to new roads for translational research and new strategies for molecular diagnostics, which is again, part of "medical molecular surgery".

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