

EDITORIAL

Relevance of Vascular Sciences Research*Kusal K. Das*

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Last couple of decades several discoveries in the field of vascular sciences have been changing the concept and understanding of the blood vessels and its pathophysiology in diseases. Furchgott and Zawadzki (1980) radically changed our focus of blood vessel research with the discovery of endothelium-derived nitric oxide and its effects on vascular tone. This discovery practically redefined blood vessels as dynamic organs that are capable of regulating vascular microenvironment. The observations on many cardiovascular risk factors which are associated with vascular diseases through nitric oxide mediated homeostasis further make us to believe that blood vessels must be considered as complex organs rather than inert tubes [1, 2].

Current research focuses around understanding how blood vessels function and interact with platelets in health and diseases. Research further elaborates how vasoactive hormones normally released by the vascular endothelium like nitric oxide, prostacyclin and endothelin-1 and of how inflammatory processes may influence their release under different conditions. The vascular science research provides concepts of Toll like receptors (TLRs) and downstream cytokine and oxidant signaling pathways in complex in vivo system [3].

Vascular system is delicately synchronized throughout life to match blood flow against demand so that all tissues receive adequate

perfusion with maximal efficiency under widely varying conditions.

In the decades to follow, research in vascular science will confine to three aspects of vascular function: i) vasomotor tone, ii) inflammation, and iii) the balance between thrombosis and thrombolysis. The reason behind that is due to atherosclerotic cardiovascular disease which takes maximum tolls on health. Atherothrombosis was found to feature disturbances in these functions that preceded visible pathology and clinical manifestations of the disease.

Furthermore, modification of responsible causal factors reversed impaired vascular function (eg, lowering levels of low-density lipoproteins in atherosclerosis), and clinical studies began to validate the importance of preclinical vascular biology research in the treatment of hypertension, atherosclerosis, pulmonary vascular disease, erectile dysfunction, Reynaud phenomenon, and neo-intimal proliferation after mechanical vascular intervention [4].

Discovery of *piezo1* gene by David Beech and his group at University of Leeds provides new concept on vascular biology. *Piezo 1* was found to be important for normal shear stress-evoked Ca^{2+} signaling and non-selective cationic channel activity in endothelial cells. Endothelial *Piezo1* provides important opportunities for achieving better understanding of the processes underlying maturation of arteries during vascular development

and for revealing relationships between physiological functional forces and the architecture and function of the vasculature [5].

Hence it is clear that vascular physiology and medicine must be linked to vascular molecular biology and provide the real shape of vascular sciences to understand the genetic and environmental influences on initiation and progression of vascular diseases and the potential for its prevention. The research on vascular sciences must extend to develop gene therapy as a potential strategy for the treatment of cardiovascular

diseases, such as re-stenosis after angioplasty, vascular bypass graft occlusion and transplant coronary vasculopathy, for which no known effective therapy exists. Genetically modified vein grafts transfected with a decoy against E2F, an essential transcription factor in cell cycle progression, revealed apparent long-term potency in human patients [6].

The outcome of vascular science research will definitely make all of us to accept vascular medicine as a separate new discipline under the broad headline of cardiology or radiology!

References

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