THE FUTURE OF TRANSLATIONAL BIOMEDICAL RESEARCH AT NAZARBAYEV UNIVERSITY

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The ultimate goal of fundamental biomedical research is to decipher mechanisms underlying the impairment of molecules, cells, tissues, and organs and subsequent dysfunction of the whole human body. Knowledge of these mechanisms helps discover and develop new approaches in the diagnosis, prevention and treatment of various diseases. Translational biomedical research enables the application of basic scientific discoveries to diagnostics, patient care and clinical practice. Thus, translational biomedical research is a link between fundamental research, clinical research and clinical practice. Transfer of discoveries from the bench to the bedside is a very complex and time consuming process that includes pre-clinical studies and several phases of clinical trials, along with the development of clinical guidelines and protocols, and the eventual implementation of best clinical practices.

Recent rapid progress of biomedical research has transformed our understanding of health and disease. The completion of the Human Genome Project triggered new discoveries on the regulation of gene expression, allowing for a better understanding of the processes that characterize healthy conditions as well as the development of various diseases. Discoveries in the area of molecular medicine reveal the molecular mechanisms behind the normal function and dysfunction of cells during disease. Large-scale studies of the products of gene transcription (transcriptomics), protein profile (proteomics) and products of metabolism (metabolomics) indicate that every disease has a unique profile or "fingerprints" of its molecular products. Defining genomic, transcriptomic, proteomic and metabolomic profiles for each particular disease and for each particular patient allows for more precise diagnostics, better prevention and more effective treatment of the disease. Moreover, the necessity to analyze huge amounts of information requires the involvement of biomedical informatics, powerful computing capabilities and computer modeling. Collaboration between the School of Science and Technology, the School of Medicine and National Medical Holding as well as multidisciplinary, integrative and teamwork approaches will allow for the efficient transfer of discoveries in the area of fundamental biomedical research into clinical practice. As a result, medicine will become more personalized, preventive and proactive. The implementation of these approaches will improve the healthcare of the people of Kazakhstan and beyond.