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Post-genomic integrative approaches to understand psychological stress

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Post genomic development in biology has revolutionized how we approach to understand complex biological problems. Modern approaches are more integrative and are able to handle larger sample size to infer conclusion with more confidence. Understanding etiology of a disease and establish intervention are also more challenging nowadays than before, simply because the environment is more complex. This complex environment leads to more stress in the life of an individual. It is, therefore, important to develop means to understand the correlation between stress and disease as well as to be able to predict stress dependent disease susceptibility. We began our journey by attempting to understand bovine respiratory disease (BRD) in cattle model. We established integrative systems biology approach to understand and quantify psychological stress and its relation to BRD. Fatal BRD is frequently the result of a primary viral and a secondary bacterial respiratory infection. In cattle, BRD causes more than half of feedlot deaths and has a major impact on financial losses in the cattle industry in North America. It is, therefore, very important to understand the mechanism of this complex disease process as well to predict and identify BRD susceptible cattle to enhance treatment efficacy. We established the value of using combinatorial omics approaches to identify candidate biomarkers associated with stress responses, a factor that can increase the severity of BRD. Using proteomic, metabonomic and elemental analyses of serum samples we also established that multi-method analysis could discriminate between the complex biological responses to secondary bacterial respiratory infection and predict disease outcome. We have further correlated stress with major physiological processes in humans and other animals to understand the genome-wide association of stress with various diseases. Significance of the results from our studies in terms of future health research will be discussed.

Biography

Palok Aich is a physical biochemist turned molecular and systems biologist. His research interests are stress, gut microbiome and innate mucosal immunity. Following his PhD in Biophysics, he joined Stockholm University and Karolinska Institute, Sweden for his 1st PDF and the second one in University of Saskatchewan, Canada. He then joined a pharmaceutical industry in Canada as a group leader of bio-imaging followed by a position in VIDO, Canada as a Scientist. He joined NISER as Associate Professor (G) in 2009. He was the first Chairperson of School of Biological Sciences and currently as FIC/Dean of International and Estate.

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