

# A System Approach to Translational Research and Population Genomics in Complex Human Diseases

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“**Translational research**” is a buzzword sparked by the National Institutes Of Health (NIH) with the gradual replacement of General Clinical Research Centers (GCRC) by Center for Clinical and Translational Sciences (CCTS), thus making translational research an integral part of biomedical research. Translational research includes two areas of translation. One is the process of applying discoveries generated during research in the laboratory, and in preclinical studies, to the development of trials and studies in humans. The second area of translation concerns research aimed at enhancing the adoption of best practices in the community. For the last two decades, we have combined translational research and interdisciplinary collaborations into “A System approach” using an academic platform to create academic-academic /academic-private consortiums to integrate: interdisciplinary science, medicine, public health, basic scientists, and physicians, surgeons, and bioinformatics experts. This presentation shows the use of MOLECULAR INFLAMMATION as the center piece of all our projects in human arthritis and autoimmunity, diabetes and obesity, vaccine development and infectious diseases. This includes discovery and/ or development of (a) portable, HIPPA approved-high-quality tissue banks and / or infectious agents from human tissues (b) Cancer vaccines in preclinical studies and clinical trial (c) New biomarkers and therapeutic targets which are protected by 22 international patents (d) The presentation will illustrate the discovery and molecular mechanism of targets, development of small molecules and humanized antibodies. This includes the discovery, preclinical validation, licensing, and development of clinical trials of a “tetracycline –based”-nitric oxide synthase inhibitor (ORACEA™) which is presently in the clinic for treatment of Rosacea and skin inflammation. Other IL-1 and TNF antagonists which were characterized and are in development will be introduced. Proteomic screens and functional genomic analysis of virulent bacterial cultures from lungs of a *Pseudomonas*-infected human cystic fibrosis-infant identified a unique virulent anti-inflammatory protein (RahU). RahU is involved in neutralizing the host’s response at the cellular and genomic level. Its potential as a therapeutic agent is under investigation.