

Alan Levine, PhD

Director Position

North Central Region

Dr. Alan Levine received a combined Bachelors of Science / Bachelors of Arts degree in physics, mathematics, and French from Union College in Schenectady, NY in 1971. He then completed a Masters of Philosophy degree at Yale University, New Haven, CT, in physics in 1973. While the lure of completing his doctoral studies in characterizing the collision of protons and antiprotons that generates mesons, hadronic subatomic particles composed of an equal number of quarks and antiquarks, in Los Alamos National Laboratory was strong, Dr. Levine became enamored with the application of basic physical principles to biology, and therefore transferred to the Molecular Biophysics and Biochemistry department at Yale. Dr. Levine was awarded his Ph.D. in 1978 for his dissertation with Dr. W. Dean Rupp in which he was the first to identify a small RNA product that controls DNA replication in bacteria, which acts as a primer for the synthesis Okazaki fragments. After a brief postdoctoral fellowship at Yale to expand this project, Dr. Levine was awarded an NIH postdoctoral fellowship to study with Dr. Roger Kornberg in the Department of Cell Biology at Stanford University, Palo Alto, CA. During his fellowship, he characterized the mammalian ribonucleoprotein complex, which regulates the splicing of nuclear RNA to messenger RNA and its transport from the nucleus to the cytoplasm.

In 1983 the entire world was enamored with biotechnology, and not to fall behind, Monsanto in St. Louis, MO established a Molecular Biology basic science program to pursue plant biology, animal nutrition, and human health topics. Dr. Levine was recruited to establish a molecular immunology laboratory and spearhead the effort to identify new proteins that modulate aberrant host responses during allergic and asthmatic attacks and autoimmune diseases such as rheumatoid arthritis, diabetes, and inflammatory bowel disease. These efforts were pursued in collaboration with scientists at Washington University in St. Louis and Duke University. While at Monsanto, Dr. Levine developed an international reputation as an expert on interleukin 4 (IL-4), a protein that modulates leukocyte function. Using cellular, biochemical, and molecular techniques and mouse models of disease, Dr. Levine helped to define the role for IL-4 in health and disease. His team cloned the human gene coding for IL-4, the human gene coding for the IL-4 receptor, defined the crystal structure of the ligand-receptor complex, and identified and patented an inhibitor of IL-4 induced IgE production by B cells.

Longing to train graduate students and postdoctoral fellows after 11 years at Monsanto, Dr. Levine joined the faculty of the Department of Medicine, Gastroenterology Division, Case Western Reserve University School of Medicine as an Associate Professor in September 1995. Over the years he attained secondary appointments in the Departments of Pathology, Pharmacology, Pediatrics, and the Case Comprehensive Cancer Center at the School of Medicine and Biological Sciences at the School of Dental Medicine. In 2002 he was promoted to full professor with tenure and in 2011 transferred to the Department of Molecular Biology & Microbiology. He served as Chair-elect and Chair of the Case Western Faculty Senate 2009-2011, on the University Budget Committee advising the Provost and CFO, Chief Operating Officer of the Center for AIDS Research, Program Director for the NIH-funded T32 Training Program in HIV Cure, and Graduate Program Director for the Cell Biology, Molecular Virology, and Molecular Biology & Microbiology programs.

His research interests include the mechanism of immune tolerance in the gastrointestinal tract, loss of immune tolerance in inflammatory bowel disease (IBD), cytokine regulation of host mucosal immunity, activation and regulation of T lymphocytes by classical and non-classical pathways, the effects of opioids on T cell biology, the mechanism of HIV transport across the intestinal epithelial barrier, the mechanism of programmed cell death, known as apoptosis, the contribution of the gut luminal microbiome on human health and disease, and, of course nowadays, the mechanism and biology of SARS-CoV-2 infection on the GI epithelium. Since his arrival in Cleveland, Dr. Levine has applied a multifactorial approach to the complexities of the immune response in collaboration with investigators in Italy, France, United Kingdom, Uganda, Germany, Austria, and throughout Case Western and the US.