Andrei Alexenko, Ph. D.

Research Summary

Graduated in 1981 Moscow State University, USSR, Biology Department, Chair of Virology. From 1981 to 1986 Postgraduate Research Assistant in Laboratory of Molecular Immunology, Shemyakin Institute of Bioorganic Chemistry, USSR Academy of Sciences, Moscow, USSR. Study on biochemical properties and biological activity of native rat interleukin2 (IL2). From 1986 to 1989 as Junior Research Fellow and then from 1989 to 1994 as Research Fellow studied human recombinant IFNbeta and several members of human IFNalpha family in the Institute of Selection of Industrial Microorganisms, Moscow, Russia. From 1994 to 2001 Postdoctoral Research Associate in the University of Missouri Columbia, College of Agriculture, Food and Natural Resources, Department of Animal Sciences, Columbia, Missouri. Study on bovine and ovine IFNtau. From 2001 to present time Research Assistant Professor in Division of Animals Sciences. Study on IFNtau, on influence of diet on sex of the offspring in mice and on pig induced pluripotent stem and trophoblast cells (iPS and iPT respectively) and human embryonic stem cells (ES). Part of the time in the Department of Molecular Microbiology and Immunology I was working on generating IL13 receptor 1 alpha knockout mouse. Professional activity also includes collaboration with other laboratories in MU and other Universities, providing protein preparations and genetic constructs to the number of researchers all over the world, supervision and training students.

Research Interest

My research is presently in three areas. First, I have long been interested in the Interferon tau, a family of gene products identified in trophectoderm of pecoran ruminants, such as cattle and sheep, and whose role is in maternal recognition of pregnancy and specifically in preventing the regression of the corpus luteum and the accompanying loss of progesterone support for the uterine endometrium. IFNtau retains the full spectrum of biological activities displayed by other type I IFNs, including IFNalpha. My focus is on structure/function relationships and interaction of IFNtau and other type 1 IFN with the common IFN receptor. I have also been studying why certain structural forms of IFNtau appear to ameliorate experimental allergic encephalomyelitis (EAE), a mouse model, for human multiple sclerosis. My goal is to characterize the most potent forms of IFNtau in terms of their therapeutic potential.

A second interest is in producing and characterization of the pig induced pluripotent stem cells (iPS) and trophoblast stem cells (iPT) and study in human embryonic stem (hES) cells. Recently developed in Roberts lab pig iPS and iPT cells are analyzed for expression of variety of factors on mRNA and protein level as well for their ability to form germ layers in teratomas in mice. The goal is to determine their pluripotency potential and ability for differentiation related to culturing conditions and number of passages. Another project involves generation and characterization of LIF-dependent pluripotent stem cells established from inner cell mass of porcine embryos. Study on hESCs is focused on the roles of bone morphogenetic protein (BMP)4 and oxygen in the differentiation of trophoblast from established hESC lines H1 and H9. Another project on human cells is related to study of preeclampsia conditions in iPSC derived from umbilical cord (UC) cell.

A third interest is on how maternal diet can influence the sex of offspring. Using a mouse model, the Roberts' laboratory has shown that diets high in fat tend to skew the sex ratio of pups towards males, whereas a low fat diet favors female pups. My research is on assessing the minimal time the mother has to be fed the diets to obtain an effect on sex ratio skewing, whether it is the high fat or calorie content of the diet that is important, and whether male diet has any influence on the phenomenon.