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Filamentous phage as platform for vaccine design and delivery

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Bacteriophages (phages) are viruses that infect and impact bacteria, but are not harmful for animals. Filamentous phages are long (~1 μm) and thin (~7 nm) particles that are characterized by well-defined geometry and uniformity. The core of a phage particle is a DNA molecule, which is surrounded by several different phage coat proteins. Phage particles can be modified to display fusion (non-phage) peptides as a part of the coat proteins. More often, the modifications are accomplished via genetic manipulations with phage DNA, while other types of alterations, for example, chemical conjugation of synthetic peptides to the phage surface proteins are possible. Fusion peptides displayed on filamentous phages were demonstrated to induce humoral and cell-mediated immune responses, making phage particles an attractive antigen delivery system for development of new vaccines. Recombinant phage particles displaying antigenic peptides were used as vaccines for treatment of melanoma, HIV, Alzheimer's disease, candidiasis, rabies, etc. The focus of our research group is on development of phage-based vaccines against various reproductive targets for contraception of wild and feral animals. For example, we have developed phage-peptide constructs that stimulate production of neutralizing antibodies against gonadotropin releasing hormone (GnRH), a major player in hypothalamus-pituitary-gonadal cascade of reproductive events. Multiple phage-GnRH constructs were generated and tested alone or in combination with adjuvants in mice. They were shown to stimulate production of neutralizing anti-GnRH antibodies that suppress testosterone, demonstrating their potential for immunocontraception or for treatment of hormone-dependent reproductive cancers.

Biography

Tatiana Samoylova has received her MS degree in Botany and Zoology from Kiev National University, Ukraine in 1982 and PhD in Biochemistry from the Institute of Experimental Botany (Minsk) in 1991. She was a Post-doctoral Research Associate at the Institute of Plant Genetics & Crop Plant Research, Germany. In 1996, she has joined the Scott-Ritchey Research Center (SRRC) Auburn University College of Veterinary Medicine (AUCVM) as a Post-doctoral Fellow. Currently, she holds joint appointment as a Research Professor at SRRC and the Department of Pathobiology (AUCVM).

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