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Progress towards a universal, preventative cancer vaccine

An ideal approach to eradicating cancer would be to develop a preventative vaccine. An especially attractive aspect of this approach would be that it would be inexpensive, addressing the issue of providing for the 70% of cancer that occurs in the non-developed world. However, the prevailing view in the community is that classic experiments in mouse models and the cancer genome sequencing effort demonstrate that cancer mutations are personal, indicating a universal vaccine is not feasible. We have detected a logical flaw in the interpretation of these mouse experiments and in where the sequencing efforts have searched for common mutations. Based on this analysis we have been working on creating a universal, prophylactic cancer vaccine. We have found that tumors frequently create frame shift neo-antigens at the RNA level through mis-splicing and indels in microsatellites. Many of these neo-antigens are recurrent across tumors of different types. We also have show that people with tumors have humoral immune responses against these neo-antigens. We have found the same is true in a survey of dog cancers. Based on these findings we created and produced a dog vaccine with 21 neo-antigens. This vaccine was tested in a dog safety trial and was found to be immunogenic and safe. The logic and design of a dog efficacy trial will be discussed. The dog vaccine is essentially the same as would be used in people.

Biography

Stephen Albert Johnston is currently the Director for the Center for Innovations in Medicine (CIM), a Professor in the School of Life Sciences and Director of the Biological Design Graduate Program at The Biodesign Institute at Arizona State University. His current work focuses on innovative solutions to fundamental problems in biomedicine. He has experience in basic science, notably first cloning the Gal4 gene, showing that proteins have separable functional domains and discovering the AAA proteins and their role in transcription. His current focus is in translational sciences and technology development. He was Co-Inventor/Innovator of pathogen derived resistance, organelle transformation, the gene gun, genetic immunization, TEV protease system, expression library immunization, linear expression elements, synbodies and immunosignaturing. He is the author of over 150 journal articles with over 20 patents and has garnered approximately $85M in grant support including large programs from DARPA, NIAID and NHLBI.

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