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How a host organism responds to various microbial infections and vaccinations?

With the ever-increasing volume of publications in host-pathogen interactions, it is very challenging to integrate and analyze published big data and knowledge. Our studies have first identified a caspase-2-mediated proinflammatory cell death, which exists in macrophages and dendritic cells infected with a live attenuated vaccine *Brucella* strain RB51. This type of cell death is different from non-proinflammatory apoptosis or caspase-1-mediated proinflammatory pyroptosis, and so we named the cell death "caspase-2-mediated pyroptosis". Interestingly, virulent *Brucella* inhibits such cell death in infected macrophages but not in dendritic cells. Our current confusions are how to understand more about the pathway and how to integrate this pathway with other cell death pathways modulated by various infections and vaccinations. To support knowledge integration and advanced data analysis, the presenter proposes an integrative One Network ('OneNet') Theory of Life, which treats the whole process of a life of an organism as a single integrative, complex, and dynamic network (called "OneNet"). Based on this theory, one host organism will utilize a single complex interaction network to respond to different pathogen infections or vaccinations. The OneNet interaction networks of one organism can be better represented and studied using biological ontologies. An ontology is a human- and computer-interpretable set of terms and relations that represent entities in a specific domain and how these terms relate to each other. Like the Periodic Table of Chemical Elements that represents the information of various chemical elements, ontologies can be used to systematically represent and analyze host responses to infections and vaccinations.

Biography

Yongqun Oliver He is an associate professor in the University of Michigan Medical School, Ann Arbor, MI, USA. Dr. He has strong backgrounds in microbiology, immunology, veterinary medicine, and bioinformatics. He practiced as a veterinarian for two years, earned his PhD in immunology, and obtained his MS in computer science. He has done intensive research in the areas of host-pathogen interactions and vaccine research. Dr. He is also experienced in developing and applying bioinformatics technologies in immunology studies. Dr. He has published over 90 peer-reviewed papers and book chapters, and served as an editorial member for many journals and a grant reviewer for different funding agents.

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