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Structural Elucidation of Supramolecular Complexes in Immunity

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My laboratory has been interested in using structural biology to address fundamental questions in immunological processes. In innate immunity, which offers the first line of defense against infections and other types of danger, recent studies from my lab and other labs have established a new paradigm that involves large oligomeric intracellular signaling complexes, or "signalosomes". I will elaborate on our cryo-EM studies on cytosolic caspase-1 activating complexes known as inflammasomes, which assemble into filamentous structures and disk-like structures. I will discuss their prion-like assembly and amplification mechanisms. In adaptive immunity, which elicits specific antibody and cellular protection, generation of the diverse repertoire of antigen-receptor genes is mediated by the RAG recombinase. I will present our cryo-EM studies on the (RAG1-RAG2) recombinase dimer synapsed with recombination signal sequences, and address the molecular basis of DNA recognition, catalysis and the so-called 12/23 rule of combination.

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