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Mental models of virology in experts and novices

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Abstract: Viruses are invisible and their effects, though often experienced, arise through mechanisms that may be poorly understood by many people. The present work examined what people with different levels of virology expertise think and believe about viruses. We conducted detailed, semi-structured interviews about virus infection, replication, transmission, and other topics with a group of middle-school students, science teachers, and expert virologists. Participants' responses were coded for content and used to establish their mental models for several key topics (cf. Hmelo-Silver & Pfeffer, 2004). Analyses revealed that the experts' mental models were greatest in depth and breadth. Many of the students—and several teachers—possessed scientific inaccuracies and inconsistencies in their mental models. By capitalizing on experts' knowledge organizations and by targeting common misconceptions about viruses found in students and teachers, it will be possible to develop materials and tools for increasing people's understanding of viruses and the microbiological world.