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Courtney L Davis* (courtney.davis2@pepperdine.edu), Pepperdine University, NASC 4321, 24255 Pacific Coast Highway, Malibu, CA 90263. *Identifying Dysentery Vaccine Targets with a Clinically Parameterized Mathematical Model of Shigella Immunity*. Preliminary report.

We clinically parameterize a mathematical model of the immune response against Shigella, a dysentery-causing bacteria that kills 600,000 people worldwide each year. Using Latin hypercube sampling and Monte Carlo parameter estimation, we fit our model to human immune data from two Shigella vaccine trials and a rechallenge study in which antibody and B-cell responses against Shigella's membrane proteins were recorded. The clinically grounded model is used to mathematically investigate which key immune mechanisms and bacterial targets confer immunity against Shigella and to predict which immune components should be elicited to create a protective vaccine against Shigella. The model shows that, on average, humans would be highly symptomatic following a humoral immune response against only Shigella's membrane proteins due to an uncontrolled infection of gut epithelial cells that is present across all best-fit model parameterizations. Thus, our modeling results predict that a vaccine targeting only displayed membrane proteins will not be protective against Shigella. Using sensitivity analysis, we explore which model parameter values must be altered to prevent the destructive epithelial invasion by Shigella bacteria and identify key parameter groups as potential vaccine targets. (Received September 17, 2015)