Blocking Tick-Borne Infection with Nanobodies

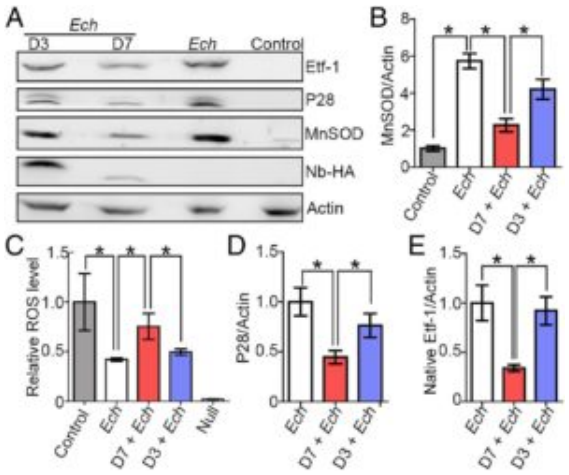

Fig. 8. D7, but not D3, abrogates E. chaffeensis-induced increase in MnSOD and reduction in ROS and inhibits infection. (A) HEK293 cells were transfected with HA-tagged Nbs and infected with E. chaffeensis (Ech) at 1 dpt. Native E. chaffeensis Etf-1, E. chaffeensis outer membrane proteins P28/OMP-1F, Nbs, MnSOD, and human actin were detected at 2 dpi by Western blotting using their respective antibodies. (B, D, and E) Quantification of relative densities of MnSOD (B), P28 (D), and Etf-1 (E) normalized against actin. (C) ROS production at 2 dpi was analyzed by the

fluorescent indicator H2DCFDA. Null, buffer control without H2DCFDA. (B–E) Data are presented as the mean ± SD from three independent experiments with triplicates per sample. *P < 0.05, by one-way ANOVA.

Ohio State University researchers have just published an article on their creation of nanobodies which target the protein that causes *E. chaffeensis* bacteria to be extremely infectious. Nanobodies are small molecules that can be designed to mimic the function and structure of antibodies and may be the solution to inhibit tick-borne bacterial infections that remain inaccessible by most current antibiotics due to the fact that they reside and replicate inside human immune cells.

Researchers conducted a number of experiments in both mice and cell cultures which identified one specific nanobody that could suppress *E. chaffeensis* infection by blocking three ways the protein enables the bacteria to commandeer immune cells. It is thought that these nanobodies can be developed as a new or complementary therapy for human monocytic ehrlichiosis as well as other tick-borne diseases that are caused by intracellular infections, infections that can be fatal if left untreated or undertreated.

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