LIZ NOLAN: I like to solve problems. And I think I have a fascination with the natural world. And those merge well in the context of science. Not all bacteria are harmful. And in fact, if you consider a person on a cell-per-cell basis, there are more bacterial cells in us or on us than are eukaryotic or human cells.

Many bacteria help us out, maybe with the digestion of food. But other types of bacteria have the propensity to invade tissues or produce toxins. And so if their populations get out of check, they make us sick. Just like humans or any animal, bacteria need food.

In my lab, we're particularly interested in metal ions. And you might not think of metal ions as being food, but they are essential nutrients for all organisms. Bacteria seeking to colonize or survive within the host environment need methods to acquire certain metals. We respond first by using our innate immune response.

MEGAN BROPHY: So it's kind of gross, but you can see some protein. And then you have fat on top where it's shiny. I work with a human protein called calprotectin. And it's secreted in response to bacterial infection. And when it encounters these bacteria, it chelates, so it grabs onto zinc and manganese in the environment and starves the bacteria.

LIZ NOLAN: So zinc is an essential nutrient. And the general idea is that calprotectin is somehow acting as a sponge. In my lab, we over-express and purify calprotectin or [? mutants ?] where we have systematically changed an amino acid we think is important for calprotectin's mechanism and then utilize this purified protein in a suite of studies.

We can come to conclusions about where the metal binds and how. We can also do experiments called titrations that allow us to determine how tightly the metal binds to a particular site and also what the selectivity is-- so does calprotectin have a preference? Does it prefer to bind zinc over manganese, over some other metal ion or not?

In high school, I didn't like my chemistry class very much. And that motivated me to take chemistry first thing in college. And I loved it. I liked that it was quantitative. And I felt it overlapped well with courses I took in biology and geology. And when I ultimately decided on a major, I found chemistry the most appealing because of its broad applicability and ability to bring a molecular-level understanding to very complex questions.

[MUSIC PLAYING]