

Meet...

Julie Soukup nucleic acid biochemist, Omaha, Nebraska

What She's Doing

They say that one man's trash is another man's treasure. But most scientists used to relegate non-coding RNA, transcripts that carry DNA's genetic information but don't code for proteins, to the junk pile. Now these same scientists are finding that non-coding RNA has important and exciting functions—it might actually be more like treasure.

Julie Soukup is working to figure out if parts of non-coding RNA called riboswitches, found in virtually all bacteria, can be targets in the development of new antibiotics for dangerous infections. When small molecules called ligands bind to riboswitch RNAs, they induce a structural change that "switches" a gene's activity up or down. By investigating exactly how bacterial riboswitches act, Soukup can design ligands that bind and upset their normal function.

"Lots of riboswitches control the metabolism of bacteria, which is essential for them to keep growing," Soukup explains. "So if we somehow interfere with that, we might have a new type of antibiotic that can treat bacterial infections." She has her eye on the deadly skin bacteria methicillin-resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile*, which colonizes the gut and causes severe diarrhea.

"I like educating girls about all the cool stuff and problems that need to be solved, so they might think about being a scientist."

Her Findings

Soukup has already designed some of these interfering molecules. The trick is to make each ligand similar enough to its natural counterpart that the riboswitch will recognize and bind to the stand-in. Soukup's team targets one riboswitch that recognizes a specific sugar that bacteria need to build their cell wall, so they designed a ligand that resembles the sugar.

Her team is just beginning to test their ligands on different cultures of MRSA and *C. difficile* in petri plates. "The really exciting part will be putting them into the cultures and seeing if they can actually inhibit growth," she says. If the researchers notice fewer bacteria once their ligand is introduced, the compound could go on to be tested in clinical trials.

Soukup suspects that a combination approach—targeting a few riboswitches at a time with different ligands—will probably be most effective. "You hit the bugs with a couple of different small molecules that target a couple different riboswitches to really get rid of that bug fast," she says.

A decade down the road, Soukup hopes successful ligands can be made into pills that people can take to fight bacterial infections. "We could have a lot of great new antibiotics soon that all target riboswitches," she says.

Meet more interesting chemists at <http://www.nigms.nih.gov/ChemHealthWeb>.



BORN IN
Fort Wayne, Indiana

JOB SITE
Creighton University

OTHER JOB TITLE
Mother of two

FAVORITE BOOK
Wuthering Heights by Emily Brontë

RECENT ACCOMPLISHMENT
Running a half marathon

