



The DNA inside a cell contains instructions to make proteins. To create a protein, first the DNA is transcribed into messenger RNA (mRNA). Then the mRNA undergoes translation, during which a ribosome reads the mRNA sequence and assembles amino acids into a protein. Cells use various mechanisms to control the steps in this process and guide which proteins are made, when and in what amounts. Mechanisms that act after the DNA is transcribed fall into a category known as posttranscriptional regulation. Gottesman's work has focused on two mechanisms in bacterial cells— controlled proteolysis and small RNAs—and particularly on how those mechanisms affect bacteria's response to stress. Proteolysis is the breakdown of proteins into simpler molecules. Gottesman uncovered the critical role that controlled proteolysis plays in bacterial cells, linking the mechanism to protein folding and misfolding as well as the cell's stress response. She and her collaborators identified a family of energy-dependent proteases (enzymes that perform proteolysis) that act as the bacterial equivalent of the proteasome protein complexes found in the cells of higher-order organisms. Gottesman's lab then expanded its focus to the role that small RNAs play in regulation in *E. coli* and other bacteria. Small RNAs do not contain coding for proteins; instead, they interact with mRNAs or proteins to control gene expression in a cell. Gottesman and her colleagues uncovered a collection of small RNAs and established their unique role in bacterial cell regulation, which has had a significant impact in the understanding of regulatory networks within these organisms.