

# New study shows cells produce specialised protein factories under stress

October 3 2018

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Escherichia coli. Credit: Rocky Mountain Laboratories, NIAID, NIH

Prevailing dogma in biological research holds that the cell's protein factories, the ribosomes, function the same way in all cells and in all conditions. In an international study with participation from Weill

Cornell Medicine and Uppsala University, published today in the journal *Cell Reports*, the researchers show that this is a truth that seems to not hold true.

Most functions in a cell are controlled by proteins. They are formed inside the cells in special [protein factories](#) called ribosomes. Different cells, i.e. in different tissues, need different sets of proteins and there are several ways that a cell can control how they are produced. However, it has long been an established "truth" that the composition and function of the ribosomes are the same in all cells and in all conditions.

This truth is now being disputed and in the present study the researchers show that *E. coli* bacteria can form specialised ribosomes that influence which proteins are produced.

"We exposed the bacteria to stress conditions by reducing the nutrient levels and found that a certain type of [ribosome](#) was produced in larger amounts. We could also link the increase in this type of ribosome to an activation of the cells' general stress response," says Theresa Vincent, group leader at the Department of Immunology, Genetics and Pathology, who participated in the study together with Professor Scott Blanchard at Weill Cornell Medicine in New York.

A ribosome consists of a large number of molecules that are all encoded by genes in the cell. In the study the researchers could show that variations in the DNA sequence in one of these genes gives rise to the specialised ribosomes.

"Our results support the finding that specialised ribosomes exist, that they are a result of natural gene variations and that they can control gene activity and the production of proteins. Since it has previously been believed that ribosomes have a passive role during the production of proteins, their importance in for instance diseases has not been

investigated. But specialised ribosomes also exist in [animal cells](#) and it is warranted to study if and how the gene variations behind those ribosomes affect the function of the [cells](#)."

**More information:** Chad M. Kurylo et al. Endogenous rRNA Sequence Variation Can Regulate Stress Response Gene Expression and Phenotype, *Cell Reports* (2018). [DOI: 10.1016/j.celrep.2018.08.093](https://doi.org/10.1016/j.celrep.2018.08.093)

Provided by Uppsala University

Citation: New study shows cells produce specialised protein factories under stress (2018, October 3) retrieved 12 July 2024 from <https://phys.org/news/2018-10-cells-specialised-protein-factories-stress.html>

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