

Russian scientists discover a new function of the nucleus lamina proteins

April 4 2019



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A group of Russian scientists has discovered a new function of nuclear lamina (NL) proteins: to arrange the genetic material inside cells. Understanding the mechanisms involved in gene packaging will help researchers to control and regulate the work of genes. The results of the study were published in *Nature Communications*.

The NL lines the living organisms' cell nuclei from the inside, with its proteins being the key helpers for the cell nucleus. It is well understood that the NL is responsible for the intranuclear chromatin architecture and that mutations in its proteins can lead to severe pathologies, such as progeria, which presents as rapid premature aging. The chromosome packing density varies inside the nucleus, with smaller densely compacted areas remaining inactive and expanded areas containing highly active [genes](#). The NL proteins are capable of changing chromatin structure and density.

In their new study, a large group of scientists, which included researchers from Skoltech, found new facts about the processes running in the [cell nucleus](#). Their model object was *Drosophila*, which has become a fixture in scientific experiments and discoveries. The researchers analyzed chromatin and the NL it interacts with using advanced laboratory and bioinformatics methods, and found that the NL plays a dual role in chromatin organization.

"We conducted an experiment jointly with our colleagues from the Institute of Gene Biology, RAS, in which we destroyed the NL in *Drosophila*'s [cells](#) and looked at how this affects the packaging of chromosomes inside the nucleus. We could clearly see that once the NL was destroyed, the chromosomes moved away from the nuclear envelope, forming a more densely packed pattern. Having applied fluorescent paint to the chromosomes, we studied them under the microscope and noticed that the dense chromatin globules that had been attached to the NL started to unfurl as they moved farther away from the lamina. Then our colleagues from the MSU Physics Department made simulations and showed that a single contact with the NL is enough for the chromatin globules to become more compact. It turns out that the NL makes the parts of the chromosomes it comes in direct contact with more condensed, while reducing the overall packing density of the [chromosomes](#) within the nucleus," explains Skoltech researcher

Ekaterina Khrameeva.

The [genetic material](#) packaging in the nucleus affects the work of genes. Each study in the field of [chromatin](#) organization in the [nucleus](#) is an important step towards the future where we can manage our genes.

More information: Sergey V. Ulianov et al. Nuclear lamina integrity is required for proper spatial organization of chromatin in *Drosophila*, *Nature Communications* (2019). [DOI: 10.1038/s41467-019-09185-y](https://doi.org/10.1038/s41467-019-09185-y)

Provided by Skolkovo Institute of Science and Technology

Citation: Russian scientists discover a new function of the nucleus lamina proteins (2019, April 4) retrieved 27 April 2024 from <https://phys.org/news/2019-04-russian-scientists-function-nucleus-lamina.html>

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