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Study opens up possibility of targeting protein states for therapeutic applications

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Aurora A plays a crucial role in ensuring that the spindle poles dissolve at the right time

A new study from researchers at the Indian Institute of Science (IISc), Bengaluru and Université Paris-Saclay reveals how a key enzyme called Aurora A helps cells pull off a genetic division.

Cells must carefully duplicate and divide its genetic material (chromosomes) equally, and then rebuild the nuclear envelope around the separated halves. If this process goes wrong, the resulting nuclei can be misshapen or disorganised – features often seen in cancer and ageing-related diseases.

The research team found that Aurora A plays a crucial role in ensuring that the spindle poles dissolve at the right time. Without this enzyme, the poles remain ‘sticky’, causing the chromosomes to bend awkwardly around them and leading to distorted nuclei.

Another protein central to this process is NuMA, which is essential for spindle pole organisation. Normally, NuMA gathers at spindle poles during mitosis and then disperses as cells complete dividing. Aurora A keeps NuMA in a dynamic, liquid-like state, allowing it to move in and out of spindle poles.

When Aurora A is inhibited, however, NuMA hardens into a more solid-like state and clumps at the poles. Using advanced imaging techniques, the team showed how Aurora A–mediated phosphorylation of NuMA prevents the latter from hardening at the poles. The team also identified specific regions and amino acids in NuMA that drive this shift between dynamic and solid states.

The findings highlight the elegant choreography involved in mitosis and open up the possibility of targeting these protein states for therapeutic applications.