

New insights on cell competition

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Scientists from the Spanish National Cancer Research Centre (CNIO) describe how natural selection also occurs at the cellular level, and how our body's tissues and organs strive to retain the best cells in their ranks in order to fend off disease processes. These results appear this week in the new issue of *Cell Reports*. The research, carried out in the CNIO, is led by Eduardo Moreno, who is currently working at the University of Bern in Switzerland.

Recent studies suggest that natural selection described by [Charles Darwin](#) also occurs at the cellular level, as our body's tissues and organs strive to retain the best cells in their ranks in order to fend off disease processes.

[Pancreatic cells](#) perform very different functions from [skin cells](#) – [insulin secretion](#) and barrier protection respectively – even though their genetic material is exactly identical; and this is true of the 200 different cell types that form a human being.

Despite burgeoning interest in the mechanisms of cell competition, which keep all such functions running smoothly in each body compartment, the exact cellular and [molecular mechanisms](#) responsible for maintaining this homeostasis have yet to be established.

Through their studies on fruit flies (*Drosophila melanogaster*), among the most widely used animal models in research, the authors of the paper have been able to show that cell competition proceeds in various stages.

First, the cells picked as winners for their superior ability to perform [cell functions](#) eliminate the loser cells via [programmed cell death](#) or apoptosis. Then the dead cells' remains are ingested by the haemocytes, the fly equivalent of our macrophages.

"The paper's main contribution is that we provide first-time evidence of the role of the haemocytes, cells circulating in the fly haemolymph, in eliminating cell residues during competition", explains first author Fidel Lolo.

Co-author Sergio Casas-Tintó adds that the study's results indicate that the genes necessary for the haemocytes to eliminate these residues – in a process known as phagocytosis – are not required for the apoptosis of loser cells.

"We suggest that phagocytosis is not a cause but a consequence of cell death", affirms Eduardo Moreno, "and more work will need doing to determine the forces governing the selection and subsequent destruction of losers".

IMPLICATIONS ON CANCER

Cell competition is closely linked to pathogenic processes such as cancer. "There is growing evidence for the importance of these processes at tumour borders, where biological markers suggest an accumulation of [dead cells](#), as if we were contemplating a line of battle", Lolo continues.

Understanding the mechanisms of cell competition may provide crucial insights into the earliest stages of a tumour's formation, favouring early detection, even without macroscopic evidence, and the design of new drugs able to block tumour growth from the very first development stages.

More information: Cell competition timeline: winners kill losers, which are extruded and engulfed by hemocytes. Fidel-Nicolás Lolo, Sergio Casas Tinto and Eduardo Moreno. *Cell Reports* (2012). [doi: 10.1016/j.celrep.2012.08.012](https://doi.org/10.1016/j.celrep.2012.08.012)

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