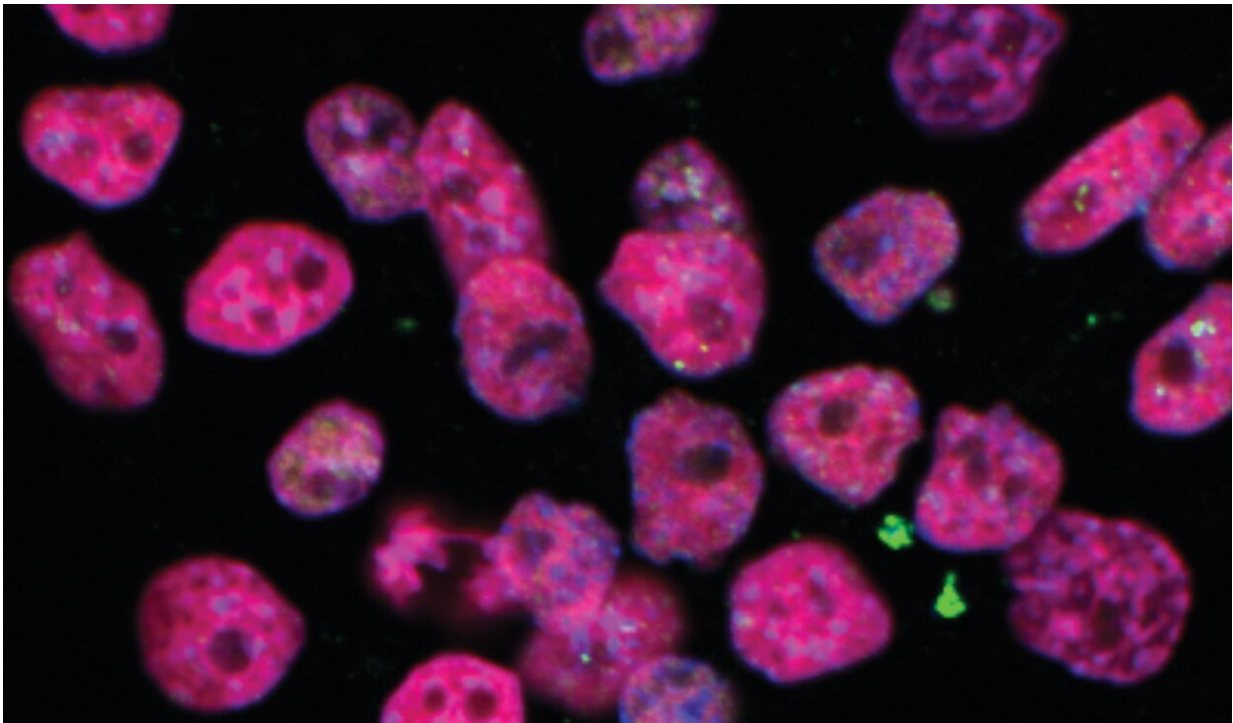


Molecular connection between nutrient availability and embryonic growth identified

March 6 2019



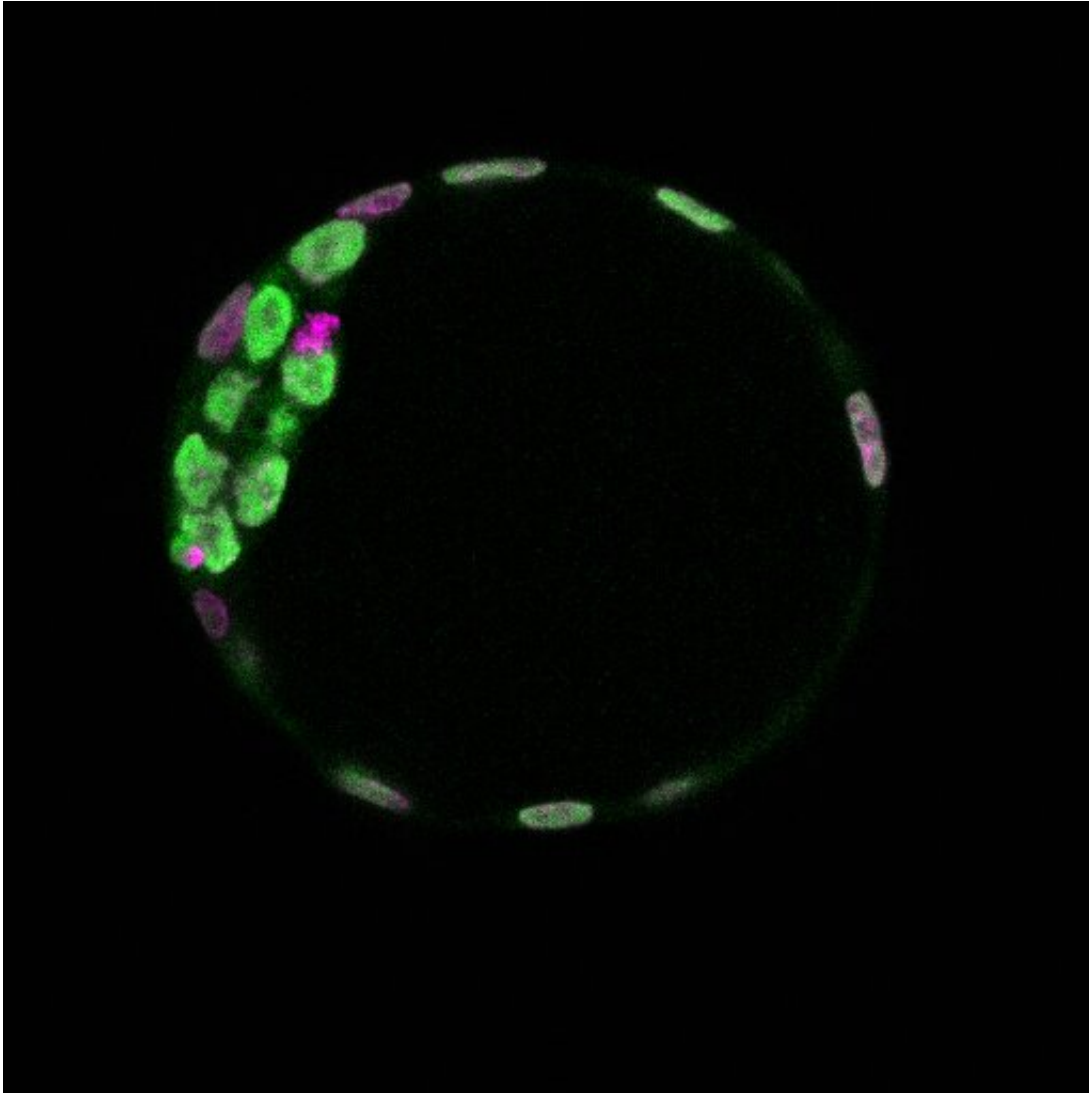
Incorporation of chromatin labelling reagent (EdU) in embryonic stem cells.
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The union of an ovule and a spermatozoon initiates a complex cell division process that will ultimately yield a new living being. In fact, all the body's cells come from embryonic stem cells that must divide in a controlled and exact fashion to give rise to proper organ and tissue

formation in the embryo. However, phenomena as yet understood by science include the way that stem cells manage to control this accelerated division process without losing control, as occurs with tumour cells, and how division speed is adapted to energy and molecular supplies.

In this regard, a group of scientists from the Centre for Genomic Regulation (CRG) in Barcelona, led by the ICREA Research Professor Luciano di Croce, Sergio Aranda, lead author and co-leader of the study, and Eduard Sabidó, head of the CRG/UPF Proteomics Unit, have identified a [molecular mechanism](#) that regulates stem cell division speed. Their discovery, published in *Science Advances*, could have a major impact on research into infertility.

More specifically, the researchers have described a hitherto unknown function of a protein called AHCY that directly regulates gene activation in embryonic stem [cells](#). To this end, CRG scientists combined molecular, cellular and computational tools to describe what proteins are bound to the genome of embryonic [stem cells](#). "We have managed to obtain a snapshot of the proteome (the set of proteins associated with the DNA) of the [embryonic stem cells](#) that has provided us with a great deal of unexpected data," stated Aranda. "For example, we discovered the presence of certain metabolic enzymes, including AHCY, directly associated with gene regulation," he added.



Mouse embryo day E4.5 before being implanted into the mother's uterus. Credit: © CRG 2019. All rights reserved.

These new findings not only establish AHCY as an activation regulator, but also point to a direct molecular association between nutrient metabolism, genomic regulation and the control of pluripotent stem cell division speed during embryonic development, and possibly in tumour cells. "The presence of nutrients is essential for the embryo to grow properly. Thanks to our study, we have identified, at [molecular level](#),

how this relationship between nutrient availability and embryonic stem cell division speed is established," added di Croce.

These findings could also have a major impact on [scientific research](#) into infertility, since, as the laboratory's preliminary findings show, the AHCY protein performs an irreplaceable function in human beings. "We would now like to investigate a possible association between AHCY and defects during embryonic development in human beings, as this would enable us to provide tools for molecular diagnosis and the prediction of possible fertility problems in human beings," explained Aranda.

More information: "Chromatin capture links the metabolic enzyme AHCY to stem cell proliferation" *Science Advances* (2019).
advances.sciencemag.org/content/5/3/eaav2448

Provided by Center for Genomic Regulation

Citation: Molecular connection between nutrient availability and embryonic growth identified (2019, March 6) retrieved 27 April 2024 from <https://phys.org/news/2019-03-molecular-nutrient-availability-embryonic-growth.html>

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