

A link between mitochondria and tumor formation in stem cells

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Researchers report on a previously unknown relationship between stem cell potency and the metabolic rate of their mitochondria –a cell's energy makers. Stem cells with more active mitochondria also have a greater capacity to differentiate and are more likely to form tumors.

These findings, appearing this week in *JBC*, could lead to methods of enriching the best stem cells from a population for therapeutic use and may provide some insights into the role of stem cells in cancer.

This study, conducted by Toren Finkel and colleagues at the National Heart, Lung and Blood Institute (NHBLI), sorted mouse embryonic stem cells by their mitochondrial potential (the amount of voltage going across mitochondrial membranes, similar to how nerve activity is measured) and found that both visually and in the expression of key stem cell markers, low and high metabolism stem cells were indistinguishable.

Yet, when transplanted into mice, these two types of cells had contrasting properties, as cells with lower metabolic rates were more efficient at differentiating into other cell types while the highly metabolic cells were more prone to keep dividing and form teratomas, tumors characterized by having various tissue types mixed together.

The potential of stem cells to form teratomas remains a big obstacle in their clinical use, but these results may have at least uncovered the mechanism behind it. In fact, when Finkel and colleagues administered the mitochondrial inhibitor rapamycin to high metabolism stem cells,

their teratoma capacity decreased significantly.

While this work was done with mouse cells, the researchers believe a similar relationship holds true in human stem cells. Thus, developing methods to remove highly metabolic stem cells from a population could improve their safety.

Source: American Society for Biochemistry and Molecular Biology

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