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MSU find could alter debate on stem cells

Process may end destruction of embryos, eggs

By Matthew Miller
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EAST LANSING - Michigan State University researchers have taken the first steps toward developing a process that could allow scientists to produce embryonic stem cells without using human embryos or even human eggs.

A team led by Jose Cibelli, a professor of physiology and animal science, reported this week in the Proceedings of the National Academy of Sciences that they have identified the genes that are active only in the human egg.

Identifying those genes, Cibelli said, brings them closer to figuring out how eggs produce embryonic stem cells and to being able to duplicate that process without eggs or embryos.

Because embryonic stem cells can form any type of cell in the body, many researchers believe they have incredible potential for treating conditions such as Parkinson's disease, heart disease and leukemia.

What does it mean?

- An MSU research team has identified 66 human genes that seem to play a unique role in the process that produces embryonic stem cells. If they are able to determine exactly which genes are responsible, they might be able to make embryonic stem cells without using either embryos or eggs. Such stem cells, researchers believe, have the potential for treating such conditions as Parkinson's disease, heart disease and leukemia.

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But their use is controversial, because harvesting them involves the destruction of human embryos.

If Cibelli's research pans out - and he grants any therapeutic applications are five to 10 years down the road - it could render such issues moot.

66 likely candidates

"There is this magic trick that's in the egg," Cibelli said, "and we don't know what it is."

Specifically, when a cell from another part of the body is fused with an egg, he said, the egg shuts down the genes that make that cell a particular sort of tissue - liver tissue, for example. It then activates the genes that will turn that cell into an embryo, which can be cultured to produce embryonic stem cells.

It's essentially "turning these cells back in time," he said.

In order to find the genes responsible for that process, Cibelli and his team compared genetic material from human eggs with material from every other part of the body, except the ovary, eliminating those found in other tissues.

By cross-referencing with genes from embryonic stem cells, they found 66 likely candidates.

"Now we're in the process of cloning these genes one by one and seeing if they have a function in this reprogramming activity," Cibelli said.

If they identify the genes responsible, he said, it could one day be possible to create stem cells simply by reintroducing those genes into normal tissue cells.

Research offers promise

Another potential advantage of the MSU research is that it could allow scientists to produce embryonic stem cells without using human eggs.

Marcy Darnovsky, the associate director of the Center for Genetics and Society, said acquiring eggs for research is an ethically problematic process and one that is currently unregulated.

"Women who need the money very badly are willing to take the risks of the egg-extraction process, which is not a walk in the park," she said.

Cibelli's research offered promise, she said, but only promise.

"We still have to get from here to there," she said.

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