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Tissue engineering technique does not cause tumor growth

New Haven, Conn.--A gene therapy approach used in creating new arteries for older patients does not appear to cause cancer, according to a pilot study by Yale School of Medicine researchers reported in the Proceedings of the National Academy of Sciences.

Although the study was conducted on only eight patients, the results are promising for using the telomerase enzyme to extend the life of cells in older patients, said the senior author, Laura Niklason, associate professor in the Departments of Anesthesiology and Biomedical Engineering.

"This result is an encouraging step along the road to new tissues for patients to replace those that have failed or have been destroyed due to trauma or disease," she said.

Tissue engineers attempt to replace or repair bodily organs using cells or tissues grown in the laboratory. However, many strategies that work with animal cells do not work with cells taken from human patients. One problem for growing new arteries from cells biopsied from older patients with vascular disease is that the cells grow only for a short time in the laboratory before they stop dividing and become too "old" to form a tissue.

In order to get around this problem, Niklason, in research published last year, used a gene therapy approach to deliver telomerase, an enzyme that has been shown to lengthen the lifespan over which cells could divide. When her lab added the telomerase gene to vascular cells from older people, she found that she could grow blood vessels for every single patient that she studied.

The problem is that telomerase is also involved in the ability of most tumor cells to grow indefinitely. While there is essentially no evidence that telomerase by itself can create cancer, Niklason felt compelled to study the safety of the blood vessel cells into which she had inserted telomerase. This current study in PNAS studied that question.

"The cells were put through multiple tests," she said. "In no cases did the team find that telomerase-containing cells were capable of forming tumors, either in the lab or in animals. In addition, the team found that telomerase-containing cells actually had chromosomal makeups that were more normal than control cells, in other words, adding telomerase appeared to protect chromosomal integrity, to some degree."

Niklason said they will study cells from many more patients before they can deem the strategy truly safe.

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