Scientists make major breakthrough in regenerative medicine

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Findings described in a new study by Stanford scientists may be the first step toward a major revolution in human regenerative medicine—a future where advanced organ damage can be repaired by the body itself. In the May 2007 issue of The FASEB Journal, researchers show that a human evolutionary ancestor, the sea squirt, can correct abnormalities over a series of generations, suggesting that a similar regenerative process might be possible in people.

"We hope the mechanisms underlying this phenomenon will ultimately lead to new insights regarding the potential of cells and tissues to be reprogrammed and regenerate compromised organs in humans," said Ayelet Voskoboynik, Ph.D., of Stanford University and first author of the study.

Missing limbs, scarred hearts, broken spines, and wounded muscles always try to repair themselves, but often the result is invalidism or disease. Even some tumors try to revert to normal, but are unsuccessful. If the genetic sequence described in the sea squirt applies to humans, this study represents a major step for regenerative medicine.

The sea squirt is more closely related to humans than many would expect. It may appear similar to a sea sponge, worm, or plant, but it is actually not closely related to any of these organisms. Sea squirt larvae have primitive spinal cords, distinguishing them in the greater chain of life and on the evolutionary ladder. Specifically, sea squirts, like humans, belong to a group of animals called chordates (organisms with

some level of spinal cord development), and many scientists believe that sea squirts approximate what the very first human chordate ancestor may have been like 550 million years ago. By studying this modern day representative of our evolutionary ancestor, researchers are able to identify fundamental principles of complex processes, such as healing and organ regeneration, on which new treatments are based.

"The aim of biomedical science is to understand life so we can defend our bodies against injury, deformity, and disease. The ultimate medical treatment would be to change an abnormal organ or tissue back to its vibrant, normal state," said Gerald Weissmann, M.D., Editor-in-Chief of The FASEB Journal. "This study is a landmark in regenerative medicine; the Stanford group has accomplished the biological equivalent of turning a sow's ear into a silk purse and back again."

Source: Federation of American Societies for Experimental Biology