Regeneration of a Human Finger

Kevin Murphy, Biomedical Engineering, University of Rhode Island
BME 281 First Presentation, November 7, 2012 <kevinmurphy22@my.uri.edu>

Abstract— Regenerative medicine is at the forefront of modern medicine using functional tissues to repair or replace tissues or organs lost due to age, disease, damage, or congenital defects.

I. INTRODUCTION

REGENERATIVE medicine is revolutionizing the modern field of medicine using functional tissues to repair or replace tissues or organs due to old age, disease, damage, or congenital defects. Most importantly, regenerative medicine will greatly help out the shortage of denotable organs and people waiting for organs on the transplant list. There are also more soldiers getting hurt and losing limbs on the battle field these days. Back in World War 2 the ratio of killed to injured soldiers was around 1 to 2. These days because of modern warfare the ratio is 1 to 9 due to all the improvements to body armor. Because of modern medicine people are getting injured instead of killed, so regenerative medicine will be allowing people with severe injuries to live a normal life.

II. METHODS

In order to regenerate missing or damaged limbs you need to immediately be treated before scaring can occur. When a limb is severed, the cells die, and their contents seep into the surrounding tissue. The immune systems number one defense against this is to cause inflammation and scar to close off the severed area. In order to not have scaring you have to immediately put a powder on the finger before any scaring can occur. The powder consists of a pig’s bladder that has been voided of all cells. You are left with extracellular matrix, which is grinded up into a powder. Extracellular matrix houses the signal that directs cells to divide and build themselves into a specific form. The extracellular matrix on the raw wound calls stem cells to the area. Due to all the stem cells in the area the limb reverts to a fetal state which can kick start certain types of regeneration. Scientists say to apply the extracellular matrix till the wound was completely covered, and do this process 5 times over 10 days. The tissue around the wound starts repairing the damage in the way it would in a developing fetus. The tissue divides and rebuilds, creating new, normal tissue. Not scar tissue. Now, until the wound is completely healed you have to keep it very clean because infections can easily set in.

III. RESULTS

Scientists believe that when a fetus reaches full development, extracellular matrix stops functioning. But the extracellular matrix from a pig’s bladder can kick start certain types of regeneration. The patient severed the tip of his middle. The extra cellular matrix applied to the wound triggered cells to revert to a fetal state and started repairing and rebuilding the wound. Months later the patient had regrown his finger tip tissue, nerves, bone, fingernail, skin and all. He even had the same fingerprint as he did back in the army in 1960.

IV. DISCUSSION

Regenerative medicine currently works best for the youth because stem cells in adults don’t have the healing capabilities that kids do. Until researchers find ways to rejuvenate adult stem cell, the organs that can be grown by these old cells, will only last a limited number of years. The elderly won’t be able to use regenerative medicine altogether because there stem cells will be too old and the organs grown by them will only last a few months at best. In the future regenerative medicine could heal blindness, deafness, heart damage, Parkinson's disease, and many other conditions using rejuvenated stem cells. Once scientists can rejuvenate stem cells one day we may be able to move onto brain regenerative medicine, which can heal and rejuvenate a patients aging brain, like they can do with other organs.

REFERENCES