

# Study into the process of wound healing



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The scientific definition for a wound is any break in the epidermis, or outermost layer of the skin. As different as all wounds are, they are all placed into two classifications. These categories are namely acute wounds (such as paper cuts) and chronic wounds (such as burns). Acute wounds are usually less severe and painful than chronic wounds and take much less time to heal. Acute wounds can take from just under two weeks to five weeks to heal. Chronic wounds are much more serious and take much more time and effort to heal. They are usually caused by various surgeries. They can take from five weeks to never healing at all! If not treated immediately and properly, an acute wound may transform into a chronic wound. Another factor that could trigger an acute wound to change into a chronic wound is an underlying medical condition. Many medical conditions, such as diabetes, hinder the healing process.

The recovery process is divided into four stages. These four phases are namely the inflammatory phase, the proliferative phase, the remodeling phase, and epithelialization. Each step takes its own amount of time to do its job. This amount of time can vary from person to person on the basis of many deciding factors. These factors may include the age of wounded individual, the ability to recover, and the severity of wound.

The Inflammatory Phase is the first step in the healing process (WebMD 2010). This step is basically receiving the wound or injury. During this step, all of the bleeding and pain that is going to happen will occur. The blood also clots in this phase. Many different chemicals are released into the wound at this stage. The chemicals help begin the healing process. Another purpose of this phase is to allow specialized cells to clean the wound of debris, dust,

scarred cells, and dead cells (In text Citation for full paragraph: WebMD 2010).

The Proliferative Phase is the second phase of the healing process (WebMD 2010). This is the phase where the new cells that replace the dead cells are made. These cells include not only skin cells, but also blood cells. The blood cells formed are known as capillaries. The job of these blood vessels is to supply oxygen and other necessities, such as water and proteins, to the new skin cells that cover the wound. The job of these skin cells during this phase is also to produce collagen, a protein that keeps skin firm and acts as an outline for the skin cells. During this phase, a wound also obtains its pinkish-red color. This color is reached because of the clotting blood. This is one of the most important phases of the healing process. (In text Citation for full paragraph: WebMD 2010)

The third phase of the healing process is known as the Remodeling Phase (WebMD 2010). In a chronic wound instance, this stage of the recovery procedure could take from two to three weeks after receiving the wound to begin. The outline, or framework, created by the collagen, made in the proliferative phase, really toughens up and becomes much more organized. In this stage of recovery, the new blood vessels are also strengthened. The wound also loses the pinkish color it received in the proliferative phase. This phase is basically about strengthening what is already there. For this reason it takes up the largest portion of time of the healing process. This phase can take up to six months because of the amount of work in this phase. By the time this phase ends, 70% of the wound has mended. (In text Citation for full paragraph: WebMD 2010)

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The fourth and final stage of the healing process is Epithelialization. This stage of recovery deals with the placing down of the new skin cells. The new cells are called epithelial cells. The epithelial cells are what make up the skin. The skin is important because it forms a barrier against bacteria and stops unnecessary water loss. It basically forms a defense for the body from the outside world. Because this phase is so important, it has been known to begin just a few hours after the inflammation phase. Once this phase, is completed, one knows whether they have a scar or not. A scar is formed when an injury spreads too deep into the deepest layers of skin, or the dermis (WebMD 2010). (In text Citation for full paragraph: WebMD 2010).

Throughout the course of the years, there have been many scientific breakthroughs in the field of wound healing. These breakthroughs have been published in various journal entries by their original author. This paper lists and talks about two of these groundbreaking discoveries in this field.

The title of my first article that is a scientific breakthrough in the field of wound healing is “ Aging influences wound healing in patients with chronic lower extremity wounds treated in a specialized wound care center”. The experiment for this journal entry was conducted on aging people with chronic wounds on their legs and surrounding areas that were treated in clinics that are specialized in wound healing as the name suggests. Overall, 55% of the patients were male and 45% were female. One- third of the patients were in their low 40s. Another one- third of the patients were in their 50s. The final one- third of the patients were in the age group of 60- 80 years old. Also, all of the patients had at least one of the following underlying medical condition: diabetes mellitus, peripheral arterial disease, chronic

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venous insufficiency, a pressure ulcer, or polyneurotherapy. This experiment was conducted in Germany by representatives from the Department of Surgery in the University of Tübingen. One of these representatives was Corinne Wicke. She is an MD. This study was conducted over a course of five years beginning in around the year 1999 and obviously ending in around the year 2004. During these five years, the healing potential for over 4500 chronic wounds was studied in over 1900 patients. In Germany, most of the experiments were conducted in the Tübingen Wound Care Center, which was established in 1992. To prove their hypothesis, they set up an experimental design. In it, they took a computerized photo of each patient's chronic wounds upon every visit. They also took the wound's depth, surface area, and the open surface. They took the depth of the wound by entering a probe into the wound and pushing it in deeper and deeper until it reached the deepest tissue possible. They then recorded how far the probe went in. They took the surface area by simply measuring the length and width. They measured the open surface by taking samples and tracings from the wound and placing them on transparent film strips. They then scanned the strips with a digitizer pad. The representatives also checked the quality of the dressing changes and labeled them one of three options: good, medium, or poor. Wound dressings are the bandages or castes on a wound. On each visit, they followed the same steps to check whether the chronic wound was healing or not. The independent variable in this experiment was the information taken. The dependent variable was the healing rate of the wound. The results for this experiment were that in a five year period, open wounds healed . 6 centimeters and closed wound healed at an average of 1. 5 centimeters.

The title of my second article that is a scientific breakthrough in the field of wound healing is “ The Clinical Effect of Topical Phenytoin on Wound Healing: A Systematic Review”. As suggested in the title, my article is a collective review about research that has been conducted in the past. This research was conducted by J. Shaw, C. M. Hughes, K. M. Lagan, and P. M. Bell. All of these people work for the Regional Centre of Endocrinology and Diabetes in the University of Ulster. This university is located in the United Kingdom. Although no research dates are given, this article was published in the year 2007. This means that one can safely assume that the collective research was conducted between 2005 and 2006. The information was received using the databases PubMed, Medline, and Cinahl. Into these databases, many different keywords such as phenytoin, wounds and injuries, wound healing, and wound care were entered to gain access to the papers needed to write this collective entry. Papers were not included in the study if they were not written in the English language or if they were only observational studies. The Cochrane Library and the library of the University of York also contained many sources that they used. They also used randomized control trials of papers to test their validity. This report was written as a collection of works on how phenytoin may possibly be used to help wound healing progress. The researchers mainly focused on the works of Shapiro and how he carried out the first controlled experiments testing the effects of phenytoin on wound healing. Out of all of the resources that they went through, they realized that topical ointments made out of phenytoin were very effective against wounds because it considerably lowered the wound sizes. All in all, the researchers located over 340 references. These references included databases, journals, and books. The average quality of the papers was 75%. This means that

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about three quarters of the papers were of good quality. Their research also led them to double- blinded experiments conducted between phenytoin and placebos, justifying the fact that phenytoin is very effective. Some other papers they came upon talked of phenytoin being a better pain killer for leg ulcers than leading leg ulcer medications. Many other topics included phenytoin being better treatment for burns, chronic wounds, leprosy wounds, diabetic foot wounds, war wounds, and even one's everyday acute wounds.

I believe that this experiment made a groundbreaking discovery because by recollecting all of the data, they were able to show the beneficial effects of phenytoin on many different types of wounds in a clear and organized approach. This formant also groups all of beneficial factors of phenytoin in one easy to read paper.

## **Literature Cited**

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