Hemostasis interstitial fluid which is located under

Hemostasis or haemostasis occurs immediately after the injury. When our skin breaks the body's first response is vasoconstriction. Vasoconstriction is when our blood vessels constrict to decrease the amount of blood leaving. " This response is triggered by factors such as a direct injury to vascular smooth muscle, chemicals released by endothelial cells and platelets, and reflexes initiated by local pain receptors" retrieved from http://www. hemostasis.

com/hemostasis/. Platelets flow in our blood and have 2 main receptors: glycoprotein 1b(GP1b) and glycoprotein 2b3a(GP2b3a). There is another glycoprotein found in our blood called the von Willebrand factor(VWF). When this binds to the GP1b receptor and the subendothelial collagen the platelet is activated. In platelets there are 2 granules called dense granule and alpha granule.

In these granules there are different substances called fibrinogen, VWF, serotonin, adenosine diphosphate (ADP), and calcium. These substances are released into the blood through degranulation. When combined with Thromboxane A2 they lead to more platelet aggregation which creates a platelet plug. Finally fibrinogen found in our blood changes to fibrin through the coagulation cascade. Fibrin creates a mesh on top of the platelet plug making it stronger. Figure 1: Hemostasis http://physiologyplus.

com/describe-the-three-steps-of-hemostasisStage 2: Inflammation When the skin is injured our body sends out chemokines, chemical messengers, into the interstitial fluid which is located under our skin but above the endothelial cells. The chemokines, a type of cytokine, tell the body something is

happening. The bacterium surrounding our cut comes into the body and may send out its own byproducts into the bloodstream. These byproducts or the chemokines can activate the mast cells in our skin.

The mast cells when activated will release histamine, an inflammatory mediator. Histamine goes to the endothelial cells and cause vasodilation in the capillaries. The capillaries are now filling up with fluid.

When this happens the endothelial cells move apart letting the blood flow through. The bacteria byproducts as well as the chemokines enter into the blood vessel. Neutrophils, a type of white blood cell, are attracted to these chemicals. They want to get close to them which they achieve by margination and extravasation. Margination is when the neutrophils adhere to the endothelial cells.

Extravasation or diapedesis is when the neutrophils start to leave the blood vessel through the gaps between the endothelial cells. The whole point of this is so that the neutrophils can get to the pathogens and go through phagocytosis. Phagocytosis will enable them to ‘ eat’ up the bacteria, the debris and any damaged cells. Dendritic cells, another cell in our skin, B-cells, T-cells, macrophages and other phagocytes help get rid of the bacteria just like the neutrophils. Through this process our body gives off heat, becomes red, starts to swell and hurt which are called inflammatory responses.

“ Redness: This occurs because the capillaries in the area are filled with more blood than usual” Nordqvist, C. retrieved from https://www.

medicalnewstoday. com/articles/248423. php. Swelling happens because of the increase in fluid.

More blood comes to the area because of vasodilation which makes our skin hot. The cut often gives us pain because the body releases chemicals that fuel nerve endings making the area sensitive. Figure 2: Inflammation process https://www. slideshare. net/pramodkuamarpamu/acute-inflammation-40385817Stage 3: ProliferationThe proliferation or granulation stage is when the wound closes and can from 4 to 24 days. Fibroblasts and myofibroblasts proliferate in the wound and end up making the extracellular matrix. Then the myofibroblasts attach to the fibronectin and collagen in the extracellular matrix and start to pull which contracts the wound by bringing the sides of the wound closer.

Any redundant fibroblasts are taken away through apoptosis, in other words a planned cell death. Collagen is made from fibroblast and is especially important in this stage as well as maturation. Blood vessels need an optimal supply of oxygen and nutrients for the granulation tissue to be made. The granulation tissue is made of extracellular matrix and collagen which lets the granulation tissue to develop a new web of blood vessels to take over for the damaged ones. This process I called angiogenesis. The colour of the granulation tissue can tell us if the process is going smoothly.

If it is pink or red that means the tissue is healthy but if it is dark it could mean there is an infection, a poor delivery of blood also known as perfusion or a stoppage of blood which is known as ischemia. The body changes damaged mesenchymal cells into fibroblasts to help cells move around. They

secrete collagen and liquids which helps to strengthen the wound. The wound continues to grow stronger as the fibroblasts help in the formation of new tissue and accelerate the healing process. The epithelial cells come to surface of the wound and close the wound. If there is a scab in the way then this process will take much longer than it should. Figure 3: Collagen and fibroblast at the wound in the proliferation stage https://tbtri2dc00482337. wordpress.

com/about/Stage 4: MaturationMaturation or remodeling is the last stage in the healing process and transpires after the wound is closed. This stage can last months even years. It is responsible for the formation of new epithelium and scar tissue. In this stage the new granulation tissue made in the proliferative stage becomes stronger and flexible. The collagen fibers reorganize whereas the tissue remodels and matures. Any cells left that are of no use anymore are removed by apoptosis.

The amount of blood vessels in the injured area decreases as they leave the area. In the proliferative stage the collagen is all over the place and disorganized. In this stage collagen type III, the main material in granulation tissue, is replaced with collagen type I, the main component in the dermis.

The collagen now aligns itself with the tension lines and water is absorbed which lets the collagen fibers lie next to each other and cross link. The intramolecular and intermolecular cross links of collagen results in an increased wound bursting strength. Wound bursting strength is the amount of pressure needed to break the wound. The final scar reaches only 80% of its original tensile strength. Infection Infection happens when

bacteria, viruses, or other microbes enter our body and star to multiply. Disease happens when the cells in our body are damaged and signs of an illness appear.

A lot of the symptoms we suffer through when we are infected are caused by our immune system fighting off the infection. White blood cells, antibodies and other microbes get rid of the pathogen. The immune system may cause the following symptoms in order to help fight off the infection: fever, headache, rash or malaise. Viruses have nucleic acid in them, DNA or RNA, which is surrounded by a protein shells and sometimes lipids. They cannot reproduce on their own so when it enters a host cell it uses the host's metabolic system to make copies of itself. These copies can come out of infected cells or a cell membrane. They make us sick by killing cells and disrupting their cell function.

Most of the time our body will respond with a fever; a fever inactivates viruses. The body will also secrete interferon, a chemical that stops viruses from reproducing. Another way our body might stop a virus is by sending all the antibodies to the pathogen. Bacteria are single celled organisms that can either help us or hurt us. They carry DNA which programs the genes needed to reproduce and other functions. Sometimes they also have plasmids which encode for specialized functions like antibiotic resistance. Bacteria can only carry one set of chromosomes. They reproduce by splitting into two cells through binary fission.

The offspring are clones with the same genetic material. If a mistake were to occur during replication a mutation can happen. It would create variety in

the population that could lead to the ability to adapt in a changing environment. Bacteria can evolve rapidly and suddenly when they take genetic material from other bacteria, viruses, plants and even yeast. Bacteria have learned how to adhere to cells, make toxins that hurt other cells, avoid or restrain our defenses and resist not only drugs but our immune system’s antibodies. Some bacteria reproduce so quickly that they crowd our tissues and interrupt normal functions.

They can kill cells and tissues. The toxins they create can paralyze, destroy a cells metabolic system, or form an immune reaction that is toxic. Bacteria can be in our body without causing an infection but the chance of infection increases when there is a break in the skin. A common example of a bacterial skin infection would be cellulitis.

Cellulitis can cause skin to swell, turn red and become warm; three out of the four inflammatory responses. It can happen anywhere on your body and forms deep in our skin. Its symptoms range from fever, numbness, infection near our eyes or ears to swelling, bruising, and a sense of coldness. Cellulitis is typically caused by either Streptococcus pyogenes (strep) or Staphylococcus aureus (staph). It can appear by itself or a result from an infected wound.

The only way cellulitis can spread is if the infected person comes in contact with another person and the bacteria enter through a cut in their skin. Another bacterial skin