Unit 1

Overview of Physiology and Anatomy

Learning Objectives

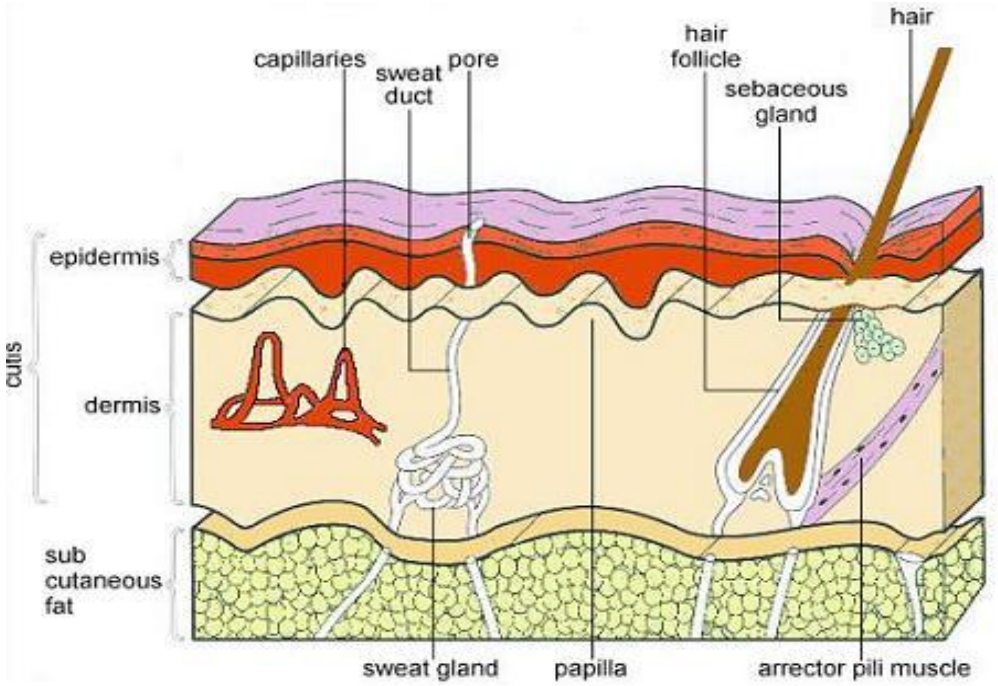
On successful completion of this unit the candidate will be able to:

- Explore the structure of hair and investigate the concept of hair growth
- Describe the nail structure and function
- Explore the composition and function of blood and lymph

Skin

Several functions in the body are performed by the skin. The skin protects our body from bacteria, dirt and injury like a waterproof jacket. The skin can stretch, mold in different shapes and even harden. As it responds to pain, pressure, and hot and cold temperatures, the skin functions as an effective communicator.
The body produces oils that keep the skin's outer layer smooth, soft and free from cracks and splits, thus preventing germs from entering it. Skin changes from one season to another and from one year to the next. An individual's skin reflects their diet, general health and lifestyle and makes up approximately 12 per cent of their body weight. The skin is made of three layers:

- Epidermis
- Dermis
- Subcutaneous layers



The epidermis is the upper most layer of the skin and consists mostly of dead skin cells. The skin flakes off constantly allowing for the new skin below to replace it. The skin's inner layers constantly move up and replace the outer layers which have been shed. It takes the skin approximately twenty-eight days to completely renew itself. As people get older, their skin becomes drier.

The skin is the largest organ in the body and provides the entire body with an unbroken covering.

Epidermis

The epidermis forms the skin's outer most layer, located exactly above the dermis. The epidermis is made up of five layers. The surface layer forms the outer most layer that we can touch and see. The most important function of the epidermis is protecting the deeper living structures from negative effects caused by the external environment. The different layers of the epidermis can be identified by their shape and the functions performed by the cells.

The epidermis is formed by the following five layers:

- Clear layer
- Horny layer
- Granular layer
- Basal layer
- Prickle layer

The first three layers, the clear, granular and horny layer, are formed of dead skin and are being shed constantly. The basal and prickle layers are formed of layers of live skin tissues that contain a nucleus and can therefore reproduce.

The basal layer is the lower layer of the epidermis and is formed of one single layer of column-shaped cells. The cells divide continually, producing new epidermal cells called keratinocytes. This cell division process is known as mitosis. The layer of the epidermis called the prickle cell layer is made up of two to six rows of elongated cells. They have a surface of spiky spines connected to the surrounding cells.

The granular layer consists of one, two or three layers of cells known as keratohyaline granules. The varying layers of cells later form the keratin.

The cells start to die in the keratinisation zone and finally they shed from the skin.

Dermis

The inner portion of the skin is known as the dermis. This layer of skin is much thicker than the epidermis and is the 'true skin' containing many structures. The dermis is sub-divided into two sections:

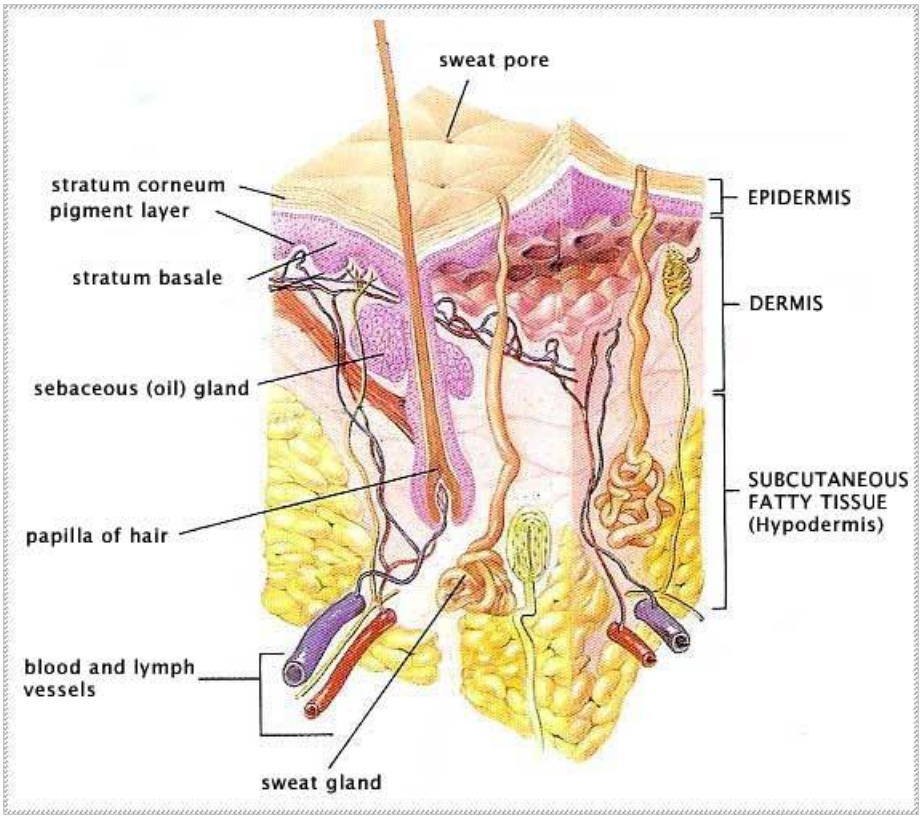
- The reticular layer
- The papillary layer

The Reticular Layer

A network of protein fibres forms the reticular layer. These protein fibres allow the skin to contract, expand and carry out supple movements. Until this network is strong, an individual's skin looks firm and youthful. However, as the network begins to lose elasticity, skin starts showing noticeable signs of aging.

The Papillary Layer

Tiny projections very close to the surface of the dermis are called papillae. They contain the capillaries and the nerve endings. The papillary layer provides nutrition to the upper epidermis.



The Subcutaneous Tissue

The subcutaneous tissue is a layer of fatty skin below the dermis. The subcutaneous tissue's job is to:

- Provide insulation from the cold
- Protect bones, muscles and internal organs from damage
- Provide the body a source of energy, if needed

Remember:
The surface of the lips does not contain sebaceous glands, therefore, to prevent them from drying up; lip emollient preparations should be used.

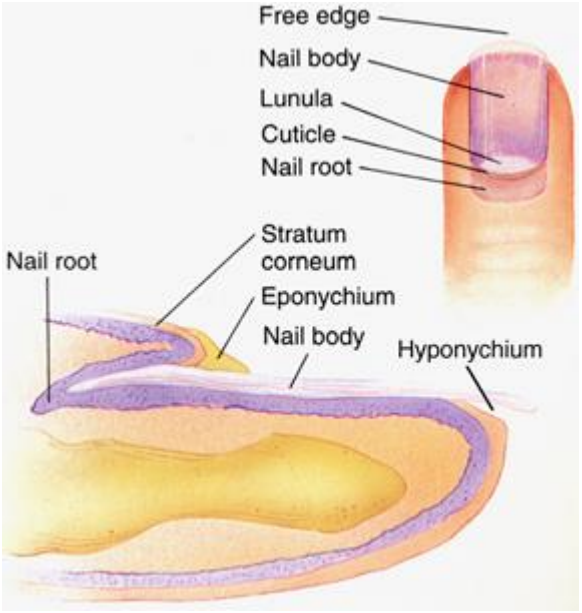
The Nails

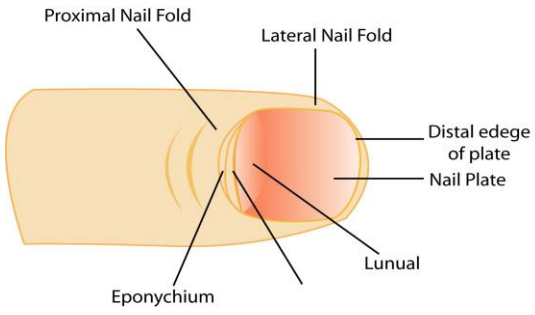
The hardened growth at the ends of toes and fingers are called nails. Nails work as a kind of protection for the fingers and help when small objects are picked up. The cell formation of nails is quite similar to that of the skin.

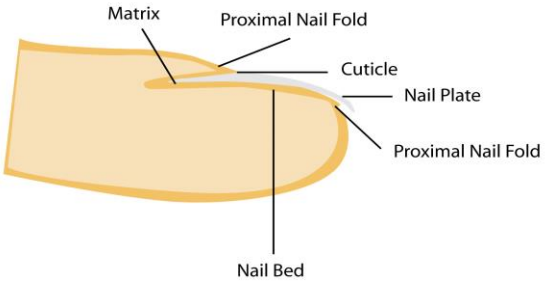
Structure

The Nail Plate

The nail plate is formed of translucent, closely-packed layers of keratinised epidermal cells. Nails grow forward gradually over the nail bed until they become free edge.







The Free Edge

The free edge is the hardest and strongest part of a nail. The free edge grows past the end of the fingertip and nail bed. This part of the nail does not hurt if it breaks since it is not connected to the blood vessels.

The Matrix

The nail root is sometimes called the matrix. The function of the nail root is to grow and replace the cells that form the nail. The nail's strength, quality and health are therefore decided in the matrix.

The Nail Bed

The soft and healthy tissue under the nail plate is called the nail bed. It is supplied liberally with blood vessels that provide essential nourishment for continuous growth. The nail bed gives the pink look to the nail.

The Lanula

The lanula is situated at the nail's base and is a visible portion of the matrix. The lanula is often called the half-moon because of its shape. It is present on all nails; however, it is comparatively easier to see on some nails.

The Nail Wall

The skin's folds that overlap on the sides of the nails are called the nail walls. If the nail wall is in good condition, it is loose and soft. The function of the nail wall is to protect the matrix from any kind of infection.

The Cuticle

The cuticle is located at the base of the nail and protects the matrix from germs by creating a barrier.

Nail Growth

Nail growth can be affected by illness, poor diet, medication, age, neglect or injury to the nail bed or matrix.

A healthy finger nail grows an approximate length of 1mm a week, while a toe nail grows nearly 0.5mm per week.

Healthy nails must have:

- Natural gloss
- Soft, unbroken cuticle
- No inflammation
- A pink radiance
- Unbroken free edge
- No spots

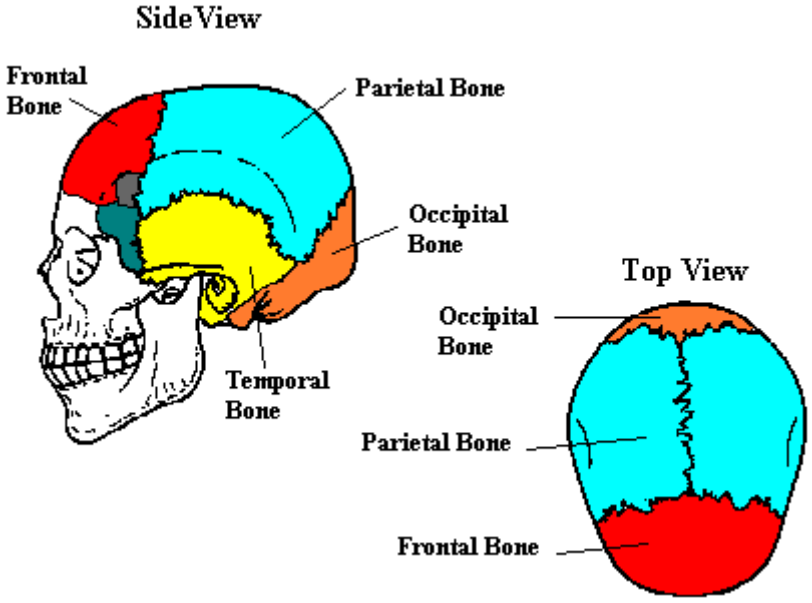
Activity:
Look at your nails very closely and write down the names of the parts you can see, along with those you cannot.

Muscles of Neck, Shoulders and Face

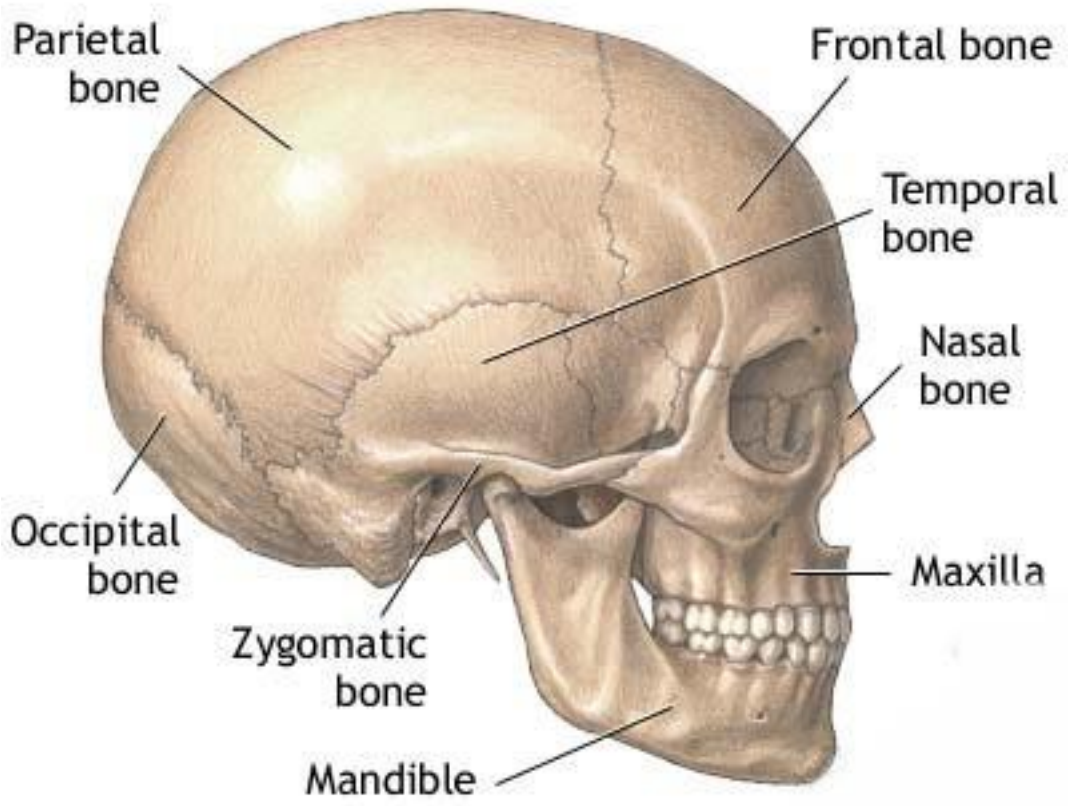
Bones and muscles are located underneath the skin. Every muscle contributes towards adding shape to the face. Facial movements are possible due to muscles, too. Muscles get support from bones, which also protect organs and the brain from injury.

Bones of Face and Skull

The bones in the skull and face keep the head muscles in place, protecting the brain and other sections of the head from getting injured. The head has twelve bones in all. The skull comprises five bones, while the face consists of seven bones.



Bone	Position
Occipital	Lies at the back of skull
Parietal	Lies at the back of head and forms the roof of skull
Frontal	Forms the front of the skull, forehead, upper eye
Temporal	Sockets at the side around ears

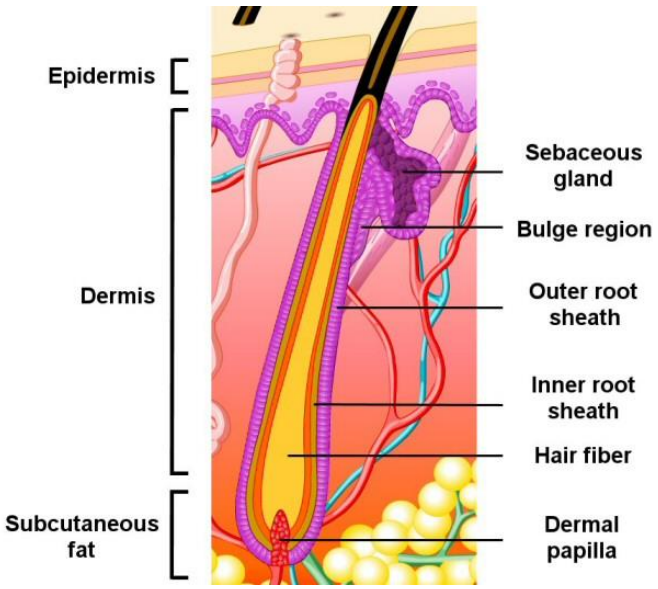


The Hair

Several different kinds of hair are found on the human body. These various types can be divided into two main types:

- Vellus
- Terminal

Vellus is soft hair that covers most areas of the body. Since vellus is generally straight hair, the follicles are not too deep.



Remember:
Vellus hair grows quite slowly and takes approximately 2-3 months to grow back after being waxed.

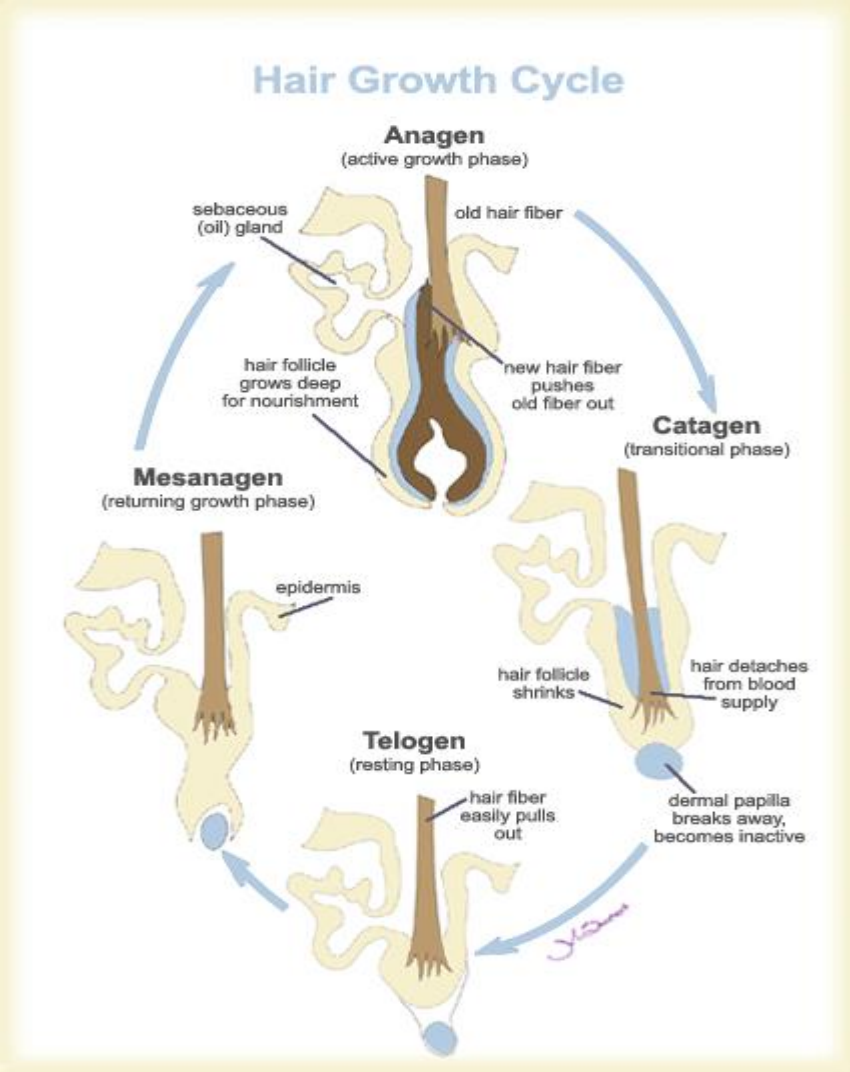
Terminal hair grows from follicles that are quite deep and go down to the layer of the skin called subcutaneous. This very strong hair contains pigment and grows on the eye brows, scalp, underarms and pubic areas.

Hair Growth

The body's hair comes from a tube-shaped pocket, known as a follicle. A hardened protein known as keratin forms the hair. The scaly layer outside each hair is called cuticle. Hair growth happens from the base of the cuticle through cell division. Hair growth requires a good supply of blood from the dermal papilla.

The normal hair's life is divided into three phases:

- Anagen
- Catagen
- Telogen



Anagen

In the anagen stage, the hair gets nourishment through blood from the dermal papilla.

Catagen

In the catagen stage, the dermal papilla disconnects and the hair's lower end becomes loose from the follicle's base.

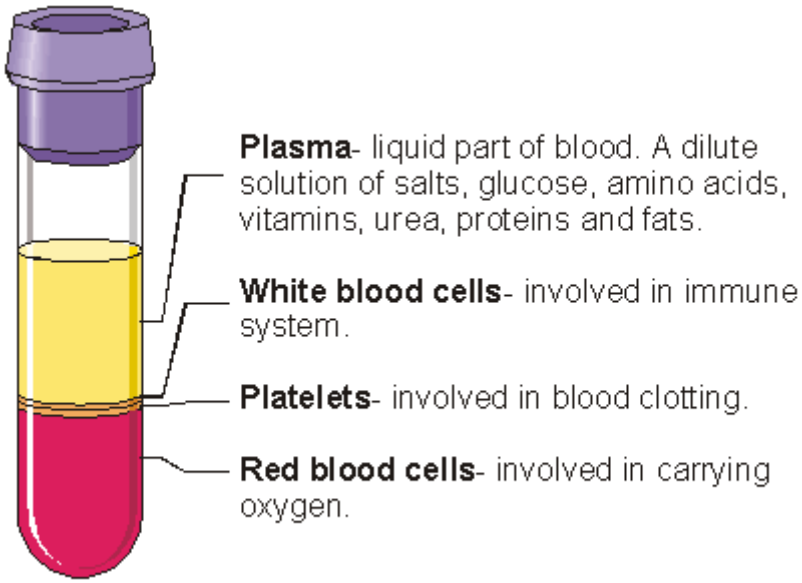
Telogen

The telogen is the last stage in a hair's growth and lasts for some weeks. The club hair is usually retained until the production of new hair, after which the club hair is pushed out.

Blood

Different substances are transported around the body through the blood. The heart pumps blood to different parts of the body. The vessels which transport blood to various destinations within the body are arteries, veins and capillaries.

From the heart, the oxygenated blood flows through the arteries. The deoxygenated blood travels back to the heart via the veins. Blood contains 45 per cent blood cells and 55 per cent plasma.



Plasma is the liquid part of the blood. It is a yellow transparent liquid consisting mainly of water. Proteins are also present in the plasma in small amounts.

Blood cells are of three main types.

Red Blood Cells

Red blood cells transport oxygen to the cells and then returns to the heart to be oxygenated.

White Blood Cells

The most important function of white blood cells is protecting the body, destroying dead cells and foreign bodies, and transporting debris through a process called phagocytosis.

Platelets

Platelets have a very vital role in blood-clotting.

Functions of the Blood

Transport

- From the lungs, the blood carries oxygen to the body's cells.
- Blood also transports the carbon dioxide to the lungs from the cells.
- It also provides nutrients to cells.
- The blood passes medication to the cells.
- The cell receives hormones through the blood.

Regulation

Blood regulates the water content of cells and the body's heat.

Protection

The body receives protection from diseases and infections through the blood. Blood also protects the body from blood loss through clotting.

The Effects of Massage on Blood Circulation

- Massage increases blood flow through the veins. Improved blood flow helps in carrying away metabolic waste.
- Massage also brings nutrients and oxygenated blood to the cells. This helps in the repair and growth of cells.
- Improved flow of the blood creates a feeling of warmth that is quite relaxing for a client.
- Massage improves the efficiency of muscles.
- As waste products get removed, the muscles have a toned effect.

The Lymphatic System

The lymphatic system and the blood system are connected quite closely. In many ways, the lymphatic system supplements the blood system, as it takes away waste matter from the tissues which the blood cannot manage to transport. The fluid that remains behind is known as the lymph. Removing the lymph from the body ensures that the tissues do not become swollen or clogged. In this way, the lymphatic system has a very important role in preventing infections in the body. The lymph travels though the nodes or glands, where it is filtered of germs and bacteria. Antibodies that fight infections are also produced in the lymph.

Facial massage has a very important role in assisting the flow of lymph fluid, thus improving removal of waste products that are transported in the lymph.

Composition of Lymph

The lymph contains:

- Proteins
- Plasma
- Toxins
- Lymphocytes
- Waste products
- Oxygen
- Fats
- Urea
- Carbon dioxide

Function of the Lymph System

The purpose of the lymph is collecting bacteria, germs and waste present in the body's system and carrying them to the lymph glands. These substances are filtered in the lymph glands and turned into harmless substances.

Advantages of Treatments on the Lymph System:

- Massages stimulate the flow of lymph, therefore fluids and toxins are removed from the specific area.
- Massage reduces general swelling.
- As massage helps in renewal of cells, therefore the skin feels softer.
- Massage makes muscles feel greatly relaxed.

Suggested Further Reading:

- ✓ *Beauty Therapy, (2008), By Jane Hiscock, Frances Lovett*
- ✓ *Anatomy and Physiology for Holistic Therapists (2001), By Francesca Gould*
- ✓ *The Anatomy & Psychology Workbook: For Beauty & Holistic Therapies at Levels (2007), By Tina Parsons*