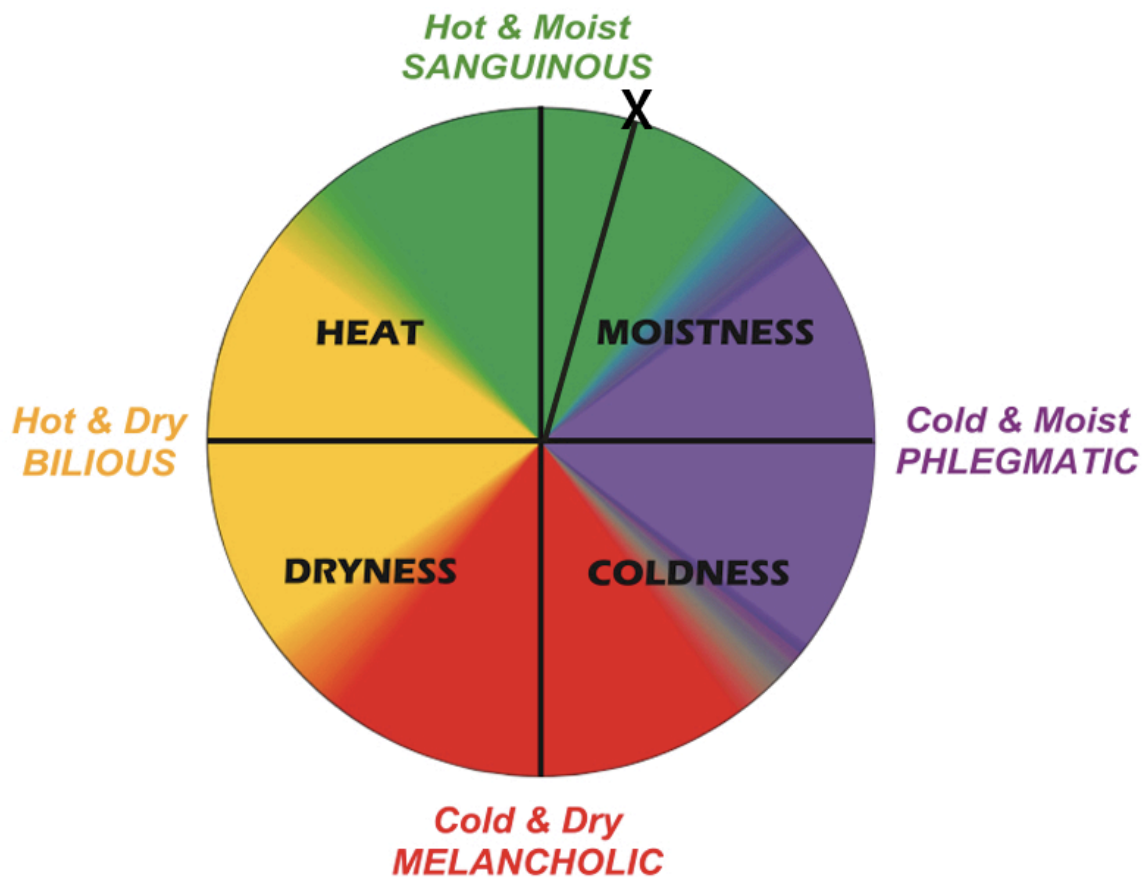


# Physiology of the Four Humours

## Pathology within the context of Humoral Theory

### Pathology in Tibb

Pathology in Tibb begins when there is a deviation from the ideal qualitative state associated with an individual's unique temperament, as indicated in the diagram below where the ideal qualitative state of a person with a dominant sanguinous and sub-dominant phlegmatic temperament is represented by the point marked 'X'.



As long as a person's ideal overall qualitative state of humours is in harmony with the overall qualitative requirement of his or her temperament, optimum health will be maintained. This state of equilibrium or homeostasis is mediated via the Tibb Lifestyle Factors, which the person's Physis is constantly restoring.

Any change to this humoral balance which is beyond the capability of Physis to restore balance, defines the beginning of a pathological process in Tibb.

Before discussing pathological processes associated with humoral imbalances, a review on elements (which make up the humours) as well as the role of humours is described below.

## The Elements

The elements are simple substances which are the primary constituents of the human body and which cannot be subdivided. It is by their combination and appropriate organization that the various orders of things in nature have been formed. Tibb philosophy speaks of four elements. Two of these are light and two heavy. Fire and air are light while earth and water are heavy.

The normal location of the earth element is in the centre of existence. In its nature it is at rest and because of its inherent weight, all other elements gravitate towards it. It is the heaviest, densest, most solid element. It is by means of the earth element that the parts of our body are fixed and held together into a compacted form. This is how our outward form is maintained. This is the reason for its intrinsic weight. Earth is naturally cold and dry, and it appears so to sight and touch, as long as it is not changed by the other elements. It retains, solidifies, condenses, coagulates, precipitates, sustains, supports, endures and attracts substances towards it.

Water in its natural state surrounds earth and is in turn surrounded by air. This positioning is because of its relative density. Water is cold and moist in temperament. Water is easily dispersed and assumes any shape without permanency. In the construction of things, the addition of water allows the possibility of their being shaped and molded and spread out. Shapes can readily be made from it and just as easily dispersed. *Moisture dispels dryness, the latter being overruled by the former.* Moisture protects dryness from crumbling (as earth, or mud) and likewise, dryness prevents moisture from dispersing. Thus the two elements of earth and water are interacting and interdependent. Water is of course absolutely essential to life. Water is the most passive, receptive element, and the greatest receiver and absorber of energy. Its properties include cooling, moistening, lubricating, dissolving, cleansing, and purifying.

Air is positioned in nature above both water and earth, but beneath fire. The temperament of air is hot and moist and its purpose in nature is to make things finer, lighter and more delicate and thus more able to ascend into higher spheres. When air is hot it rises and when it is cool it descends. Therefore it is prone to both extremities and affected by the elements around it.

Fire is situated higher than the other three elements. Fire is hot and dry in temperament. It is the most active, energetic and volatile element, and the greatest emitter of energy. It is light, rising and penetrating. Its role in nature is to rarefy, distill, refine, extract, digest, metabolise, transform and

intermingle things. By its heat it has the capacity to overcome coldness of the two cold elements, earth and water, and so creates and maintains harmony among the elements.

Each element is associated with a corresponding humour in the body as indicated below.

The sanguinous humour relates to air.

The phlegmatic humour relates to water.

The bilious humour relates to fire.

The melancholic humour relates to earth.

The four elements when admixed gives rise to the humours. Changes to these humours are a continuous process within the human body. In Tibb, the monitoring and observation of these changes becomes an important mode of evaluating precisely what is happening within each part of the body. Therefore classifying these changes is an indication of the pathological processes and pathways from the ideal humoral balance.

### **Humours – Normal and Abnormal States**

The Arabic word for humours is 'Akhlat' which literally means 'admixture'.

O.C. Gruner in his translation of Canon of Medicine states that:

“Humour should not be regarded as matter, but more as “an essence” or “quasi-material” that make up the body fluids”.

The metaphysical nature of humours is similar to, and associated with the four primary matters of earth, water, air and fire. Both primary matter and humours have assigned qualities which are in essence the link between energy and matter.

Gruner also states that:

“In a sense the body fluids are the meeting places of various opposing forces and/or primary matter.”

Humours, together with the body fluids exist at a cellular/sub-cellular level, from which tissues are formed. The humours, although metaphysical, influence the outcome of the physical manifestations of the body fluids. This includes the cells, tissues, organs and ultimately the entire human being.

Al-Abbas in his book al-Malki describes humours as:

Humours are those moist and fluid parts of the body which are produced after the transformation and metabolism of the aliments; they serve the function of nutrition, growth and repair; and produce

energy, for the preservation of the individual and his species. A right proportion and inter-mixture (homeostasis) of them, according to the quantity and quality constitutes health, whereas an imbalance according to the quantity or quality and irregular distribution leads to disease.

Al-Abbas interprets the role of humours in the following manner:

(i) The basis of health is the right proportion and specific equilibrium of humours according to their quality (and quantity) i.e. homeostasis in the internal environment. As long as this homeostasis in the internal environment is maintained the body remains healthy. This is the basis of health and preventative medicine.

(ii) When the normal proportion and specific equilibrium of humours is altered, the internal environment reaches a state of imbalance, and thus disease develops. This is the basis of aetiology and pathology of disease.

(iii) When this wrong proportion and altered equilibrium of humours is corrected, health can be recovered. This is the basis of treatment. The humoral theory deals with all aspects of disease i.e. aetiology, pathology, prevention and treatment.

### Normal States

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Each person has a unique concentration of humours. This is in harmony with the qualitative state of the person's temperament.

#### Types of humours:

- Sanguinous **humour** (*Hot & Moist*)
- Phlegmatic **humour** (*Cold & Moist*)
- Bilious **humour** (*Hot & Dry*)
- Melancholic **humour** (*Cold & Dry*)

### The production of humours

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The humours are produced in the liver, according to the nature of the foods eaten and the degree of their digestion. They are transferred to the vascular system, and from here they are distributed to all bodily cells, tissues and organs.

The production of humours is influenced by the qualities of heat, coldness, moistness and dryness which prevail during the metabolic processes in the liver. However, as the body's metabolic processes need substantial amounts of heat to function properly, the amount of heat available at the time plays an important role in the production of humours.

The phlegmatic humour is Cold & Moist, and requires the least amount of heat, so is produced first. This is followed by sanguinous (Hot & Moist) bilious (Hot & Dry) and finally melancholic (Cold & Dry), which needs most heat.

## **Features and functions of the four different humours**

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### **Normal Humours**

#### **Sanguinous Humour**

As the overall temperament of the human body is Hot & Moist, the sanguinous humour is present in the largest concentrations. The sanguinous humour is the most important humour. Its function is to provide nourishment to every cells tissue and organ within the body. Normal sanguinous humour manifests itself materially in the red colour of blood. It has no odour, and is hot and sweet to the taste.

The sanguinous humour serves as the carrier for the other three humours. It transports them to wherever in the body they are needed, in order to carry out their dedicated activities.

The reason for it being hot is that it is actually hot or potentially hot. Organs richly supplied with blood are hot and those whose blood supply is comparatively less are comparatively cold. Those organs whose blood supply is cut off, become extremely cold and dead such as in gangrene. It also maintains body temperature. The reason for it being moist is that it contains 91-92% water. Water has certain qualities needed to maintain body temperature:

1. High specific heat (specific heat is the amount of heat needed to raise one gram of a substance by one degree Celsius).
2. High thermal conductivity (thermal conductivity is the measure of the ability of a material to transfer).
3. High latent heat of evaporation (heat of vapourisation is heat absorbed by a unit mass of a material at its boiling point in order to convert the material into a gas at the same temperature).

Note: Heat and moistness is needed for the maintenance of life. For all life to exist, an ideal balance of heat and moistness is required. This can be observed in nature. Plants need an ideal level of heat and moisture for survival. During spring time, flowers blossom as the heat gradually starts increasing after the cold of winter. If either quality of heat or moistness is in excess or deficient, death will ensue. The overall quality associated with the temperament of the human being is hot and moist. This relationship is easily understood when we consider that the human body consists of 70% water and is at a temperature of around 37°C. This level of heat and moistness can be maintained via the lifestyle factors. As we are all uniquely created, the ideal level of heat and moistness needed by each individual will vary according to their temperament. Death, old age, and end stage of disease are associated with qualities of coldness and dryness as it is opposite to life giving heat and moistness. Similarly, in pathological

processes, obstruction of blood flow, ischaemia, necrosis etc. are linked to qualities of coldness and dryness.

### **Functions of the sanguinous humour**

1. Nutrition – the sanguinous humour provides nutrition to the body, thereby energy is produced and replacement of wear and tear is attained. It promotes growth. Nafis says: “The sanguinous humour is best of all and best of the nutriments for the body because whatever is lost from the body is replaced by the sanguinous humour.
2. It acts as a vehicle and transports all materials to the tissues.
3. It keeps the body warm and maintains the body’s temperature constant.
4. The sanguinous humour is known as the carrier of oxygen. When inspired air reaches into the alveoli of the lungs, oxygen is absorbed into the sanguinous humour and carried to the tissues. It is said that the arteries are filled with oxygen, which it transports to all the body’s tissues.
5. It carries the waste products of oxygen i.e. CO<sub>2</sub> from the tissues to the lungs to be expelled from the body.
6. It carries all other humoral waste products from the tissues to the excretory organs to be expelled.
7. The sanguinous humour carries such material which performs functions of defense against foreign bodies.
8. It produces beauty and shine in the skin.

### **The phlegmatic humour**

The phlegmatic humour is the second most abundant humour. It is similar to the sanguinous humour in that it does not have a storage reservoir, unlike the bilious and melancholic humours. The reason is that like the sanguinous, the phlegmatic humour is needed by virtually every organ in the body. The material form of normal phlegmatic humour is sweet (but to a lesser extent than the sanguinous), and moderately cold.

*The phlegmatic humour serves the following purposes:*

1. When there is a shortage of the sanguinous humour in the body, the phlegmatic humour is transformed into the sanguinous humour due to its nature of being incompletely digested. Nafis says: “since the phlegmatic humour can be needed at any place for the nutrition of the body, hence there is no vessel for the storage of the phlegmatic humour, but it has been flown with the flow of the sanguinous humour and it has been spread away in the organs (cells and tissues), so that whenever there is deficiency of the sanguinous humour in tissues it could be readily available.”

2. To supply the body's organs, particularly the brain and associated nervous tissues, which possess a dominance of the phlegmatic humour, specifically moistness.
3. An ideal concentration of phlegmatic humour is necessary for normal day-to-day activities, physical maintenance and repair.
4. To serve as a general lubricant within the body. It prevents friction between and within body structures, so protecting the body's internal organs and structures like the skeletal joints. The phlegmatic humour in the synovial cavities supply nourishment to the intracapsular parts of the joints and furnish lubrication.
5. Likewise the mucous and serous fluid is secreted from various mucous and serous membranes of the body and perform diverse functions e.g. G.I. tract, naso respiratory tract, urogenital tract, pericardial fluid, pleural fluid and peritoneal fluid.
6. The intraocular fluids (aqueous and vitrious humour) also furnish nourishment to various parts of the eye and maintain intraocular pressure.

### **The bilious humour**

The bilious humour is stored in the gallbladder, secreted into the lumen of the gastro-intestinal tract, and excreted via the stool and urine in the form of bilirubin, biliverdin and other substances. These and related metabolites give the stool and urine their typical brown and yellow colours respectively. The material form of normal bilious humour is yellow in colour, light and pungent.

### **The bilious humour has a number of functions:**

1. To supply the body's tissues and organs which possess a dominance of the bilious humour (specifically heat), such as the lungs and the gallbladder.
2. To allow thinning of the vascular fluid (specifically its Hot & Dry qualities), in order to penetrate into the narrow capillaries.
3. To prevent the formation of blood clots (*emboli*), by exerting its anti-melancholic and anti-coagulant properties.
4. To emulsify fats present in the diet, so aiding digestion.
5. To cleanse the intestines of thick and viscous mucus, so removing phlegmatic and melancholic humours.
5. To stimulate the musculature lining the intestines, so promoting efficient defaecation.
6. The bilious humour acts as a vermifuge.

## **The melancholic humour**

The melancholic humour is stored in the spleen, which it nourishes. The material form of the normal melancholic humour is a sediment or residue which forms in collected blood when left standing. Its taste varies between bitter and acrid.

### **The melancholic humour acts to:**

- Supply and nourish the tissues and organs such as the bones which have a preponderance of the melancholic humour, specifically dryness.
- Signal the intensity of appetite experienced by the person.
- Provide density and consistency to the vascular fluid.
- Aid the activity of platelets in the blood coagulation process.
- Assist in the formation of *melanin*, a compound which provides skin pigmentation.

*Each humour has specific qualities associated with it. Changes to these qualities, brought on by the Lifestyle Factors, will result in the conversion of the normal humoral state to an abnormal one. These abnormal states will lead to clinical disorders if Physis is unable to remove the abnormal humour from the body effectively, and in good time.*

Understanding the features and functions of normal humours is important in understanding the pathology of disease according to the Tibb philosophy. For example, the melancholic humour has coagulation properties. Therefore an excess (or abnormal) melancholic humour may be the cause of vascular lesions causing ischaemia. Similarly, the phlegmatic humour has lubricating properties. Joint pain in arthritis for example may result due to a corruption of the normal phlegmatic humour, causing it to become too hard or too thin thus eradicating the soothing properties of this humour. The bilious humour being pungent causes a burning sensation in the oesophagus when regurgitated. And the preponderance of the sanguinous humour can lead to conditions related to hypervolaemia such as hypertension.

## **Abnormal states**

Whilst we may not fully understand the exact mechanisms underlying the manifestation of abnormal states of humours, the existence thereof can be identified in various pathologies. A poor diet is one of many causes of the development of abnormal states of humours. Refined, processed, genetically modified foods etc. all affect the quality of the humours produced i.e. poor quality foods yields poor quality humours.

Another mechanism is from conventional medication, based on the receptor theory, which interferes with normal biochemical of Physis, which results in abnormal humour manifestation. Physis attempts to restore balance by eliminating excess matter. This may be in the form of fever, diarrhoea, vomiting etc.



which in conventional medicine is interfered with and in so doing results in further abnormal humoral states to arise.

Qualitative changes of normal humours also due to oxidation, with heat or coldness, or by mixture with corrupted humours.

Listed below are abnormal states of the respective humours.

### **Abnormal sanguinous humour**

The sanguinous humour, being Hot & Moist, can be altered by a number of factors. These include excessive heat (oxidation) or infection (putrefaction). The changes can affect the quality and purity of the humour, resulting in it becoming thicker or thinner, darker or paler, or contaminated. They can have similar effects in varying the odour and taste of the humour.

Oxidation of the sanguinous humour is due to excessive heat. For example, from improper diets, which often contain an excess of refined sugar and over-processed food items. In addition, a lingering fever may cause the sanguinous humour to thicken, leading to stagnation. This abnormal humour has qualities of dryness associated with it.

- Signs and symptoms include an emaciated dark, reddish tongue.
- Examples of illness conditions: Inflammatory skin disorders, such as eczema and psoriasis.

### **Abnormal phlegmatic humour**

Once it has been utilised and eventually exhausted, the phlegmatic humour is excreted from the body in a variety of forms. These vary in quantity, texture, consistency, colour and taste. This indicates that once the phlegmatic humour is generated it progresses through many different qualitative changes and increasing degrees of abnormality.

The taste of one's saliva is an important indicator of the overall state of one's phlegmatic humour. Saliva consists of both serous and mucous fluid. The taste of normal saliva is mildly sweet or bland, but if one's saliva tastes unduly sweet, sour, acrid or bitter, it may indicate morbid qualitative changes in the Phlegmatic humour.

#### *Inspid phlegmatic humour*

- This is thin and watery. It is produced by coldness, such as exposure to cold weather, or from drinking ice-cold drinks. It is the most Cold & Moist variant of the phlegmatic humour, and is tasteless and odourless.
- Signs and symptoms include: watery, tearing eyes; runny nose; moist, glossy, pale tongue.
- Example of illness condition: Post-nasal drip, phlegmatic asthma

#### *Salty phlegm*

- This arises from being mixed with abnormal bilious humour. It is the hottest, driest and lightest form of the phlegmatic humour. Salty phlegm is hot and dry comparative to normal phlegmatic humour. This variety of phlegm being thinner than the normal phlegmatic humour has qualities of heat and dryness, where heat dominates. Being hot, the salty phlegmatic humour reduces the nourishment and soothing protection offered by the phlegmatic humour. Phlegmatic fluids that require a certain degree of viscosity, such as the synovial fluid, when made unduly thin, diminishes the supportive and protective function resulting in increased friction and irritability of the skeletal joints.
- *Example of illness condition:* Allergic rhinitis. This manifests as a runny, nose, with thin mucus and red, inflamed nasal mucous membranes. Ulcerative colitis is an inflammatory condition which results in inflammation of the mucous membrane with the result of excessive mucousy diarrhoea. Rheumatoid arthritis is another inflammatory condition where the protective and lubricating properties of the phlegmatic humour is lost resulting in inflammation, pain, swelling and loss of function in the joints.

*Phlegmatic humour corrupted by abnormal sanguinous humour*

- This is very sweet in nature, and has qualities of moistness. It is due to excessive heat and moisture arising from the digestive and metabolic processing of an improper diet.
- *Example of illness condition:* Metabolic disorders such as diabetes.

*Mucilaginous phlegmatic humour*

- Is thick and slimy and may be clear, milky and translucent, or white and opaque. It is the result of excessive intake of mucous producing foods.
- Example of illness condition: Illness condition: Sinusitis

*Calcerous phlegmatic humour*

- Is white and chalky, and has qualities of coldness and dryness associated with it.
- Usually found in the joints of the elderly suffering from arthritis and rheumatic disorders in localised deposits (*tophi*).

**Abnormal bilious humour**

- Oxidation of the bilious humour due to excessive heat and dryness may result in it becoming thick and hard.
- Examples: tuberculosis

### **Abnormal melancholic humour**

Abnormal melancholic humour is often the charred, oxidised residue of any of the four humours, including the melancholic humour itself. These abnormal variations are hotter and lighter in quality compared to the normal melancholic humour, so they have a greater penetrating power, and are more corrosive.

### **Abnormal melancholic humour can be generated or aggravated by several causative factors:**

- Excessive heat in the liver, causing burning, charring or excessive oxidation of the humours.
- Excessive metabolic heat generated by certain types of chronic or extreme fevers, usually involving the liver can burn or char the humours.
- Excessive cold in the body congeals and solidifies the humours and secretions of the body. Prolonged stagnation, often caused by cold, aggravates abnormal melancholic humour and strengthens its deleterious effects.
- Stagnation leads to putrefaction. In many putrefactive processes the denser residue left behind is usually some form of abnormal melancholic humour.

### *Sanguinous-Melancholic humour*

- Cause – excessive oxidation or putrefaction
- *Example of illness condition:* Complications of diabetes mellitus, such as gangrene.

### *Phlegmatic-Melancholic humour*

- Cause – oxidation of the mucous and serous fluids of varying composition and consistency. Excessive cold resulting in stagnation and coagulation.
- *Example of illness condition:* Angina

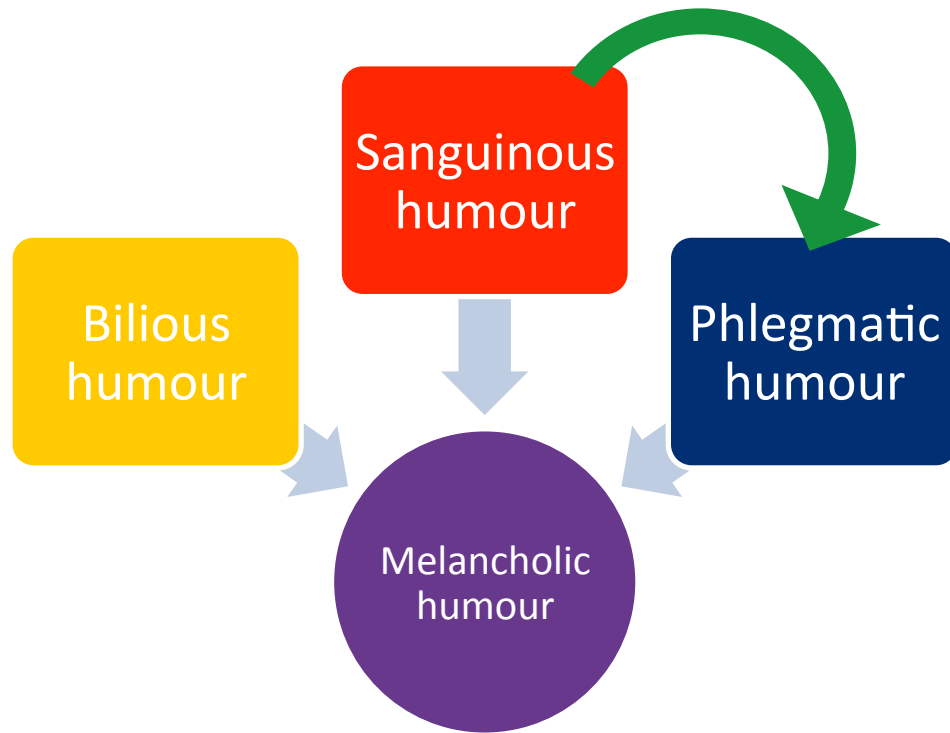
### *Bilious-Melancholic humour*

- Cause: Oxidation of the bilious humour, which renders it very corrosive, caustic and toxic.
- *Example of illness condition:* Tuberculosis

### *Oxidised melancholic humour*

- *Example of illness condition:* Carcinoma of the colon

Most cancers arise from abnormal states of the melancholic humour – either from the melancholic humour itself, or from abnormal states of the other three humours.



### ***Putrefaction of humours***

- Infection means that putrefaction is underway due to bacteria, viruses or other causes. Every humour that is infected causes fever, and fever is the main sign of infection. Infection must be watched carefully because putrefaction can increase dramatically in a short time. Serious or extensive infections may require medical treatment. Treatment with antibiotics may be advised for bacterial infections.
- *Example:* Lung abscess

The above discussion provides information on changes from normal to abnormal humours, resulting from the influence of qualities.