AJK Medical College,
Muzaffarabad

Homeostasis Module (0113)
2nd Year MBBS

Duration: 2 Weeks

HOMEOSTASIS

2nd Year MBBS

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Module Team Members

Name	Designation
Prof. Muhammad Ayub	Planner
Dr. Zahid Azeem	Coordinator
Dr. Fauzia Hameed	Member
Dr. Asad Bilal	Member
Dr. Abdul Khalid Awan	Member
Dr. Sarmad Latif Awan	Member

Rationale

The term homeostasis is applied to the maintenance of the internal environment and regulation of normal standard values according to the age and sex of the organism. Here the student will be required one to know bout the water, electrolyte and acid-base balance. Other facts of homeostasis will be dealt with along with other modules.

Diarrhoea and dehydration are major problem in Pakistan and in most cases this leads to electrolyte imbalance. Hence the importance of learning the basics and the abnormal processes and mechanisms becomes essential. In addition to the pathological causes of electrolyte imbalance due to high temperatures in most parts of the country in summer, dehydration occurs very frequently. Even in winter months due to lack of awareness in the citizens regarding optimal fluid intake the imbalance occurs at minimal levels. For a complete understanding of the imbalances occurring as a result of various diseases the students should have basic knowledge of homeostasis.

The module will deal with regulation of temperature, acid base, and water and electrolyte balance.

General Learning Objectives

By the end of this module the students will understand the role of the autonomic nervous system and other systems related to temperature regulation, acid base, fluid and electrolyte balance and imbalance.

Specific Learning Objectives

At the end of the module the student should be able to:

a) describe normal intake and output of water and method of measurement;
b) describe normal distribution of various electrolytes in the body;
c) identify normal values of acids and bases which are produced in the body;
d) explain what is meant by acid base balance;
e) explain the processes leading to deviation from normal values of water and electrolytes and acid base disturbances citing examples of some conditions (e.g., vomiting and diarrhoea);
f) evaluate reports of serum electrolytes and blood gas analysis;
g) mention the causative factors of food poisoning and their relation to food hygiene and sanitation;
h) explain the role of ORS in rehydration therapy.

Instructional Methods

a) Tutorials problem based learning
b) Lectures
c) Demonstrations and simulations
d) Practicals in biochemistry
e) Strong assignment to diarrhoea control centre,
f) ICU or paediatrics general ward

Texts and Learning Material

1. Textbook of Medical Physiology 12th Ed. Guyton & Hall
2. Review of Medical Physiology 24th Ed. William F. Ganong
3. Review of Biochemistry by Harper
4. Davidson's Textbook of Medicine

Organization of Module

The module consists of 6 themes, and 2 PBLs based on a real life situation. Each theme has its Learning Objectives (LOs). The module will employ different modes of instruction. Major emphasis will be on discussion, analysis and deductions; all by the students and guided by the faculty.

The clinical presentation of themes will give the students a clue that how a patient presents in a real life situation and to draw a conclusion from the information given by the patient and signs elicited by clinical examination. Your daily activities would be divided into different slots. Please refer to timetable for more details regarding organization of learning activities.

Teaching Strategies

The content of this module will be delivered by a combination of different teaching strategies. These include small group discussions (SGD), large group interactive sessions (LGIS), demonstrations in dissection hall, laboratory practical, journal club meetings, dissection/skill videos and clinical skill sessions at skill lab. Curriculum will be delivered through clinical case scenarios. Students are required to read the case scenarios and the objectives which are supposed to be encountered the next day, understand the case and read the relevant information.

Following learning/teaching strategies will be used in this module:

SGDs:

Much of the course content will be delivered in small group sessions. Each theme has an associated case. The case will be the centre around which learning will take place. Depending on the case you might be required to deduce objectives and learning issues or only learning issues. Every group will have a facilitator assigned to it. The facilitator will be there to keep students on track, giving them maximum liberty to discuss and achieve the objectives as a group. Rest of the information will be in the schedule/timetable.

LGIS:

LGIS will be employed at times to augment small groups. By enlarge, these will be used to pass on general concepts regarding the theme. Large group instruction will be employed at times sparingly. Large group sessions are intended to identify important points, ask questions on concepts not well understood in the textbooks, and measure students' learning comprehension.

Assessment

Formative and surprise tests, home assignments and short tests will be incorporated in the module. A full-fledged summative assessment will be conducted at the end of module combined with some other module. Marks obtained in the module examination will contribute to 30% (of internal assessment) towards end of year Professional University Examination. **There is no 'resit' exam for module written assessment and block IPE** under any circumstances. If any of these are missed, contribution to internal assessment out of that exam/assessment will be recorded as 'Zero'.

Table of Specifications

Content	Weightage (%)
Equilibrium	5
Salt & Water Balance	20
Temperature Control	20
Acid-Base Balance	20
Endocrines in Homeostasis	15
Homeostasis Disruption and Management	20
Total	100

Themes & Core content

1. **Equilibrium**
   a. Discuss Role of equilibrium in homeostasis
   b. Describe role of Hypothalamus homeostasis
   c. Explain functions of Limbic system
   d. Discuss role of Autonomic nervous system in homeostasis

2. **Naqsha Bibi Survived**
   a. Describe composition of ICF and ECF
   b. Explain Water balance & volume diuresis
   c. Discuss Salt regulation and electrolyte balance
   d. Discuss water balance and role of kidneys and ADH.

3. **Soldier on Siachin**
   a. Discuss Temperature regulation in normal and extreme circumstances.
   b. Explain role of Sweating, shivering, skin circulation in temperature regulation.
   c. Discuss the Insulation role of by Adipose tissue and its break down to produce heat.
   d. Explain positive and negative feedback mechanisms.

4. **A little acid in blood**
   a. Describe different Buffers systems of body.
   b. Define and Discuss PH regulation and its clinical implications.
   c. Describe water ionisation

5. **Brain and Glands**
   a. Discuss normal Feedback mechanism in different systems.
   b. Discuss role of different endocrines hormones in the regulation of homeostasis

6. **Disruption of homeostasis and management**
   a. Discuss heat stroke during hajj.
   b. Explain renal failure in cholera.
   c. Explain oedema and fluid overload in liver failure and heart failure.

PBL-1

Pak Army is guarding our territorial borders in roasting deserts of Bahawalpur to frozen Siachin glaciers. Siachin is the hardest battlefield on the globe. Soldiers have to live in a temperature well below the freezer compartment of a refrigerator (during summer season!). Their lives are not only threatened by the enemy attack, but also by the weather conditions. Our brave soldiers combat both challenges very well; they keep the enemy away from the borders and fight well to the weather conditions.

More than a year ago, many soldiers died under land and ice slide in Giari Sector while resting in their tents and igloos at night without even a flash of what was going to happen next moment.

Questions/Triggers:

1. Why are some areas called 'Hard Areas'?
2. What are the challenges the soldiers face in the hard areas?
3. How can they maintain their core temperature compatible with life in extreme weather conditions?
4. How do sweating and shivering help in such conditions?
5. What other factors, other than the temperature, affect the life of these soldiers?
6. What advice as a Field Medical Officer will you give to these soldiers to keep them fit?

PBL-2

In 2005 disaster many victims were missing. Some of them were rescued or recovered dead from under the wreckage.

A German rescue team member found body of a lady under the remains of a house. Apparently she was dead but not decomposed. Initially she was labelled as 'dead'. Suddenly the doctor noticed that she is 'just alive'. She was immediately transferred to the field hospital and then to the tented CMH. She was severely dehydrated and malnourished and probably was alive on the scanty drops of water dripping on her face and mouth from a nearby broken pipe.

She was re-hydrated with glucose in saline, blood transfusion and nutrient infusions and was referred to a tertiary care hospital in Islamabad where she survived after massive treatment regimen.

She is still alive with some brain deficit and psychological shock.

Questions:

1. What is dehydration?
2. What is malnourishment?
3. How can the condition of such a patient be managed?
4. How did she survive for 20 days under the wreckage?

AJK Medical College, Muzaffarabad
HOMEOSTASIS Module 2017
2nd Year MBBS

WEEK-1 (29th May – 2nd June 2017)

DATE	29th May 2017	30th May 2017	31st May 2017	1st June 2017	2nd June 2017
TIME	**MONDAY**	**TUESDAY**	**WEDNESDAY**	**THURSDAY**	**FRIDAY**
8:00am-9:00am	**Written Assessment EMR Module**	**IPA Block-2**	**SGD** Buffers **Prof. Alam & Team-2 Wrap-up Prof. Alam Khan**	**SGD Role of skin and adipose tissue Team-1** Wrap-up **Dr. Asad Bilal/Shakil**	**PBL-1B Prof. Ayub & Team-2**
9:00am-10:00am					
10:00am-11:00am	**LGIS** Introduction to Homeostasis Module **Prof. Ayub & Module Team**		**LGIS** Water ionization **Dr. Zahid Azeem**	**LGIS** Role of skin in Homeostasis **Dr. Sadaf**	**SGD Topography of Brain and Limbic System Wrap-up Dr. Shakil Sadiq**
11:00am-12:00am	**LGIS** Temperature regulation **Prof. Ayub**		**LGIS** *p*H regulation **Prof. Alam Khan**	**LGIS** Body fluids compartments & composition **Prof. Alam Khan**	
12:00am-1:00pm	**PBL-1A Prof. Ayub & Team-2**		**Practical Histo Lab:** Histology of skin (1-35) **Physio Lab:** taking temperature of normal subject (36-70) **Biochem Lab:** *p*H estimation (71-105)	**Practical Histo Lab:** Histology of skin (36-70) **Physio Lab:** taking temperature of normal subject (71-105) **Biochem Lab:** *p*H estimation (1-35)	**Practical Histo Lab:** Histology of skin (71-105) **Physio Lab:** taking temperature of normal subject (1-35) **Biochem Lab:** *p*H estimation (36-70)
1:00pm-1:30pm	**PRAYER BREAK**				
1:30pm-3:00pm	**DSL Role of Nose in Homeostasis**	**SDL**	**SDL**	**DSL** CA Homeostasis	**SDL**

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WEEK-2 (6th – 9th June 2017)

DATE	5th June 2017	6th June 2017	7th June 2017	8th June 2017	9th June 2017
TIME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
8:00am-9:00am	**SGD** Positive & Negative Feedback mechanisms **Dr. Fauzia and Team-2**	**SGD** Heat stroke **Team-2** **Wrap-up** **Dr. Imtiaz**	**LGIS** Fluid balance before and after Iftar **Dr. Ijaz Anwar**	**Skill Lab** History taking & Examination of oedema patient **Drs. Bashir, Munazza, Khalid**	**PBL-2B** **Dr. Ijaz Anwar**
9:00am-10:00am			**LGIS** Role of respiratory system in homeostasis **Prof. Dr. M. Ayub**		
10:00am-11:00am	**LGIS** Renal failure in hypovolaemia **Dr. Ali Arshad**	**LGIS** Hypovolemic Shock and principles of management **Col . Muhammad Ilyas**	**Practical** **Histo Lab:** Histology of Blood vessels & Lymphatic (Capillaries) (1-53) **Physio Lab:** Taking temperature of normal subject and noting effect of exercise on it. (54-105)	**LGIS** Fluid balance & Oedema formation **Prof. Javed Rathore**	**Skill Lab** IV drip administration **Team-1**
11:00am-12:00am	**LGIS** Salt & water balance & diuresis **Prof. Ayub**	**Skill Lab** Examination of dehydrated patient & preparation of ORS **Drs. Robina, Ashfaq, Imtiaz**	**LGIS** Dehydration in children and role of ORS **Dr. Naheem Ahmed**	**SGD** Thirst, hunger & satiety **Team-2** **Wrap-up** **Prof. Alam Khan**	
12:00am-1:00pm	**PBL-2A** **Dr. Ijaz Team-2**		**LGIS** Endocrines in Homeostasis **Prof. Alam Khan**	**Practical** **Histo Lab:** Histology of Blood vessels & Lymphatic (Capillaries) (54-105) **Physio Lab:** taking temperature of normal subject and noting effect of exercise on it. (1-53)	**Practical** **Histo Lab:** Histology of Blood vessels & Lymphatic (Capillaries) (54-105) **Physio Lab:** taking temperature of normal subject (1-53)
1:00pm-1:30pm	**PRAYER BREAK**				
1:30pm-3:00pm	**DSL** Study on PBL-2A	**DSL** Prevention of Heart Stroke	**DSL** Role of equilibrium in Homeostasis	**DSL** Respiratory Acidosis and compensation	**DSL** Metabolic Acidosis and compensation

AJK Medical College, Muzaffarabad
Homeostasis Module 2015
1st Year MBBS (Class of 2019)

Week 2 (8th — 12th June 2015)					
Date	**8th June 2015**	**9th June 2015**	**10th June 2015**	**11th June 2015**	**12th June 2015**
Time	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
8:00 –9:00 hrs					
9:00 – 10:00 hrs					
10:00 – 10:30 hrs	**Tea Break**				
10:30– 11:30 hrs				**PBL-2B** **Dr. Abdul Khalid Awan & Team-2**	
11:30 – 12:30 hrs					
12:30 – 13:.30 hrs	**Lunch and prayer break**				
13:.30 – 14:30 hrs					**DSL** Revision
14:30 – 16:00					

Inquires & trouble shooting

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