NUTRITION DEFINITION

- The study of food, it's composition ,the amount needed by the body and its effects on the body.

Nutrients

Macronutrients

Carbohydrates
60-70% of Daily energy intake.

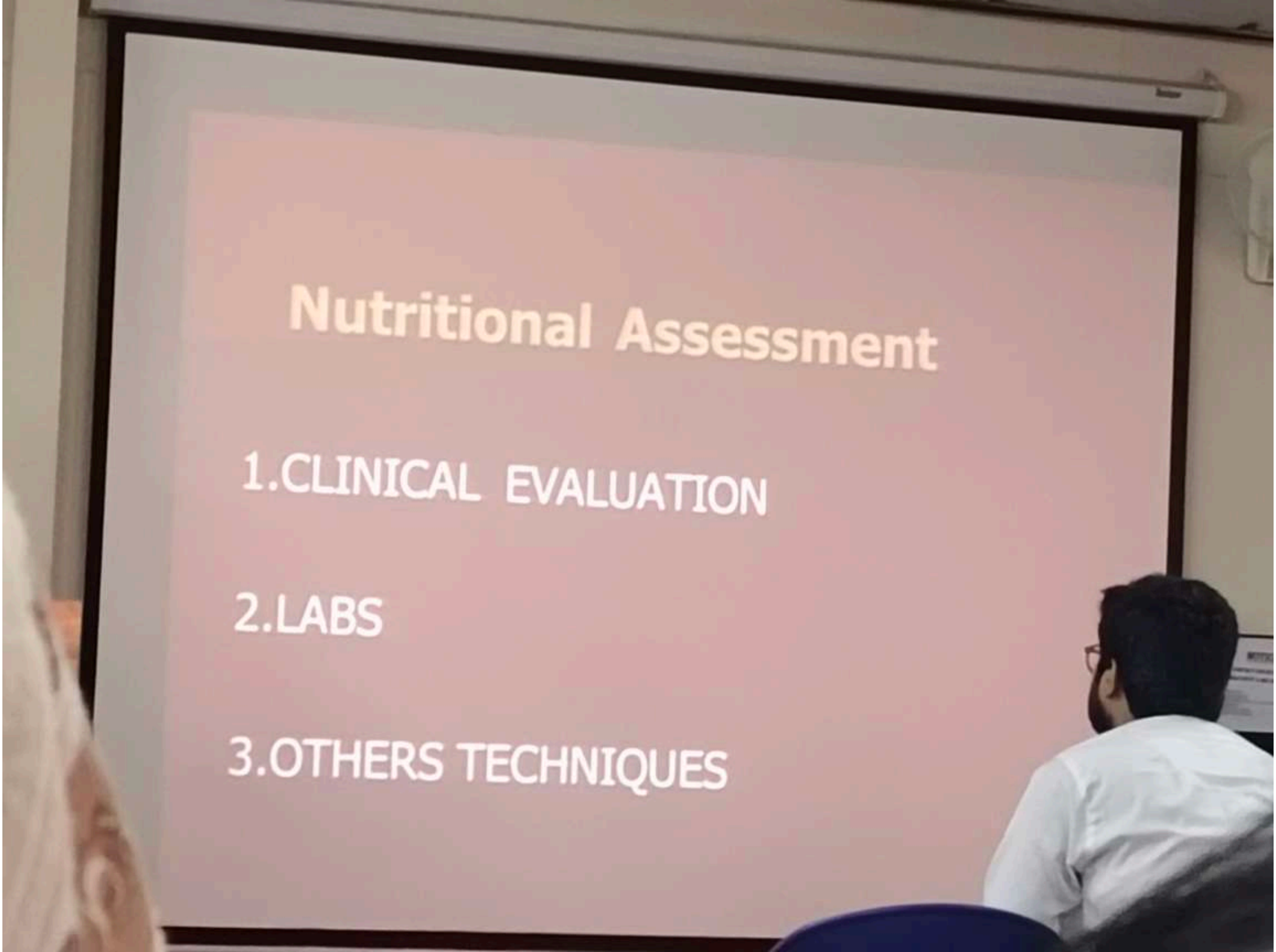
Protein
7-15% (At least 10%)

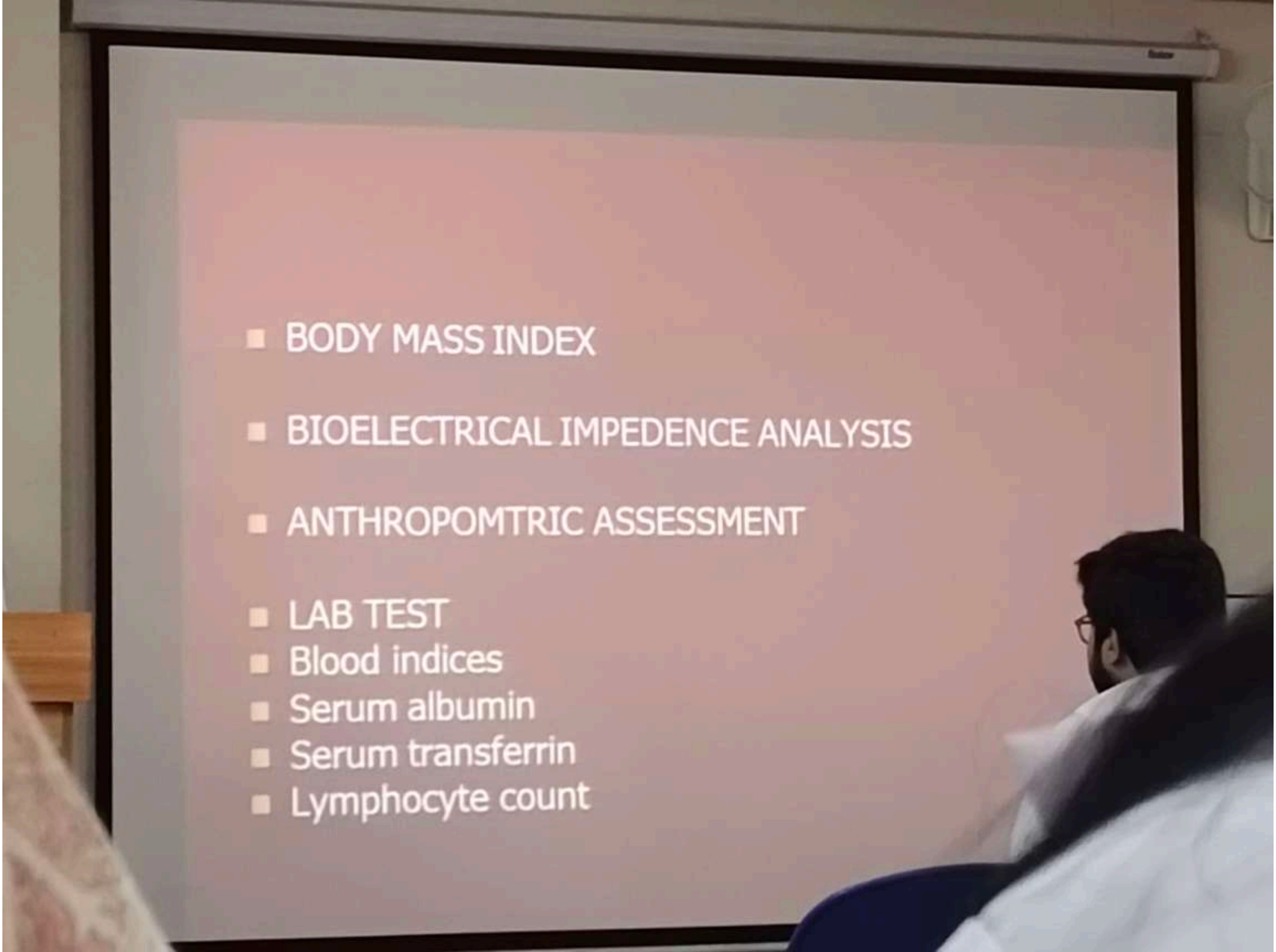
Fats
10-30%

Micronutrients

Vitamins

Minerals


Nutritional Assessment
1.CLINICAL EVALUATION
2.LABS
3.OTHERS TECHNIQUES

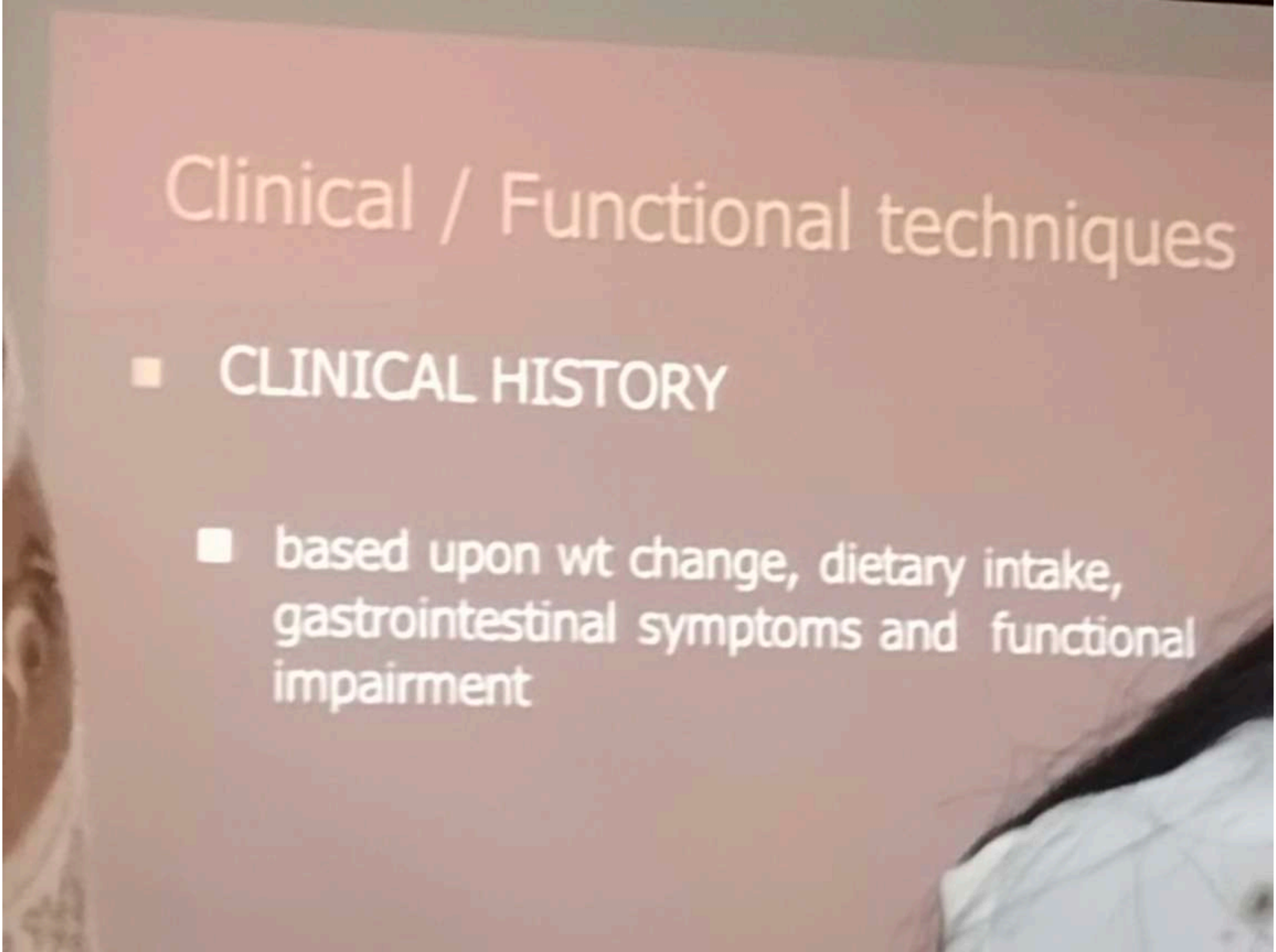

BODY MASS INDEX
BIOELECTRICAL IMPEDENCE ANALYSIS
ANTHROPOMTRIC ASSESSMENT
LAB TEST
Blood indices
Serum albumin
Serum transferrin
Lymphocyte count

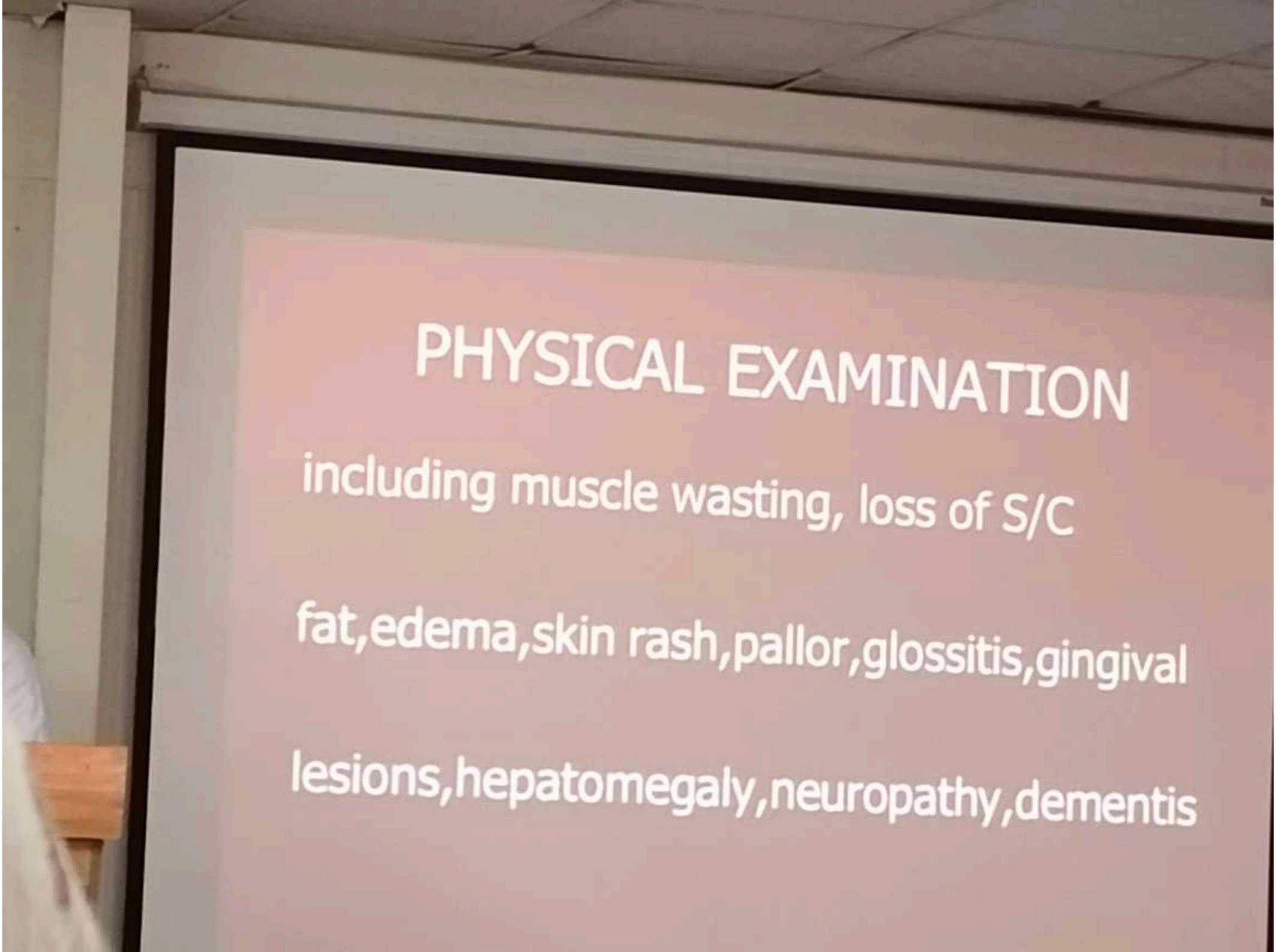
Formula for body mass index (BMI):

$$BMI = \frac{weight}{height^2}$$

Write a Python Program that asks the user for weight and height and then displays **weight class** based on BMI (use the table below for this).

BMI	Weight class
below 18.5	underweight
18.5 - 24.9	normal
25.0 - 29.9	overweight
30.0 and up	Very overweight


Clinical / Functional techniques
CLINICAL HISTORY
based upon wt change, dietary intake, gastrointestinal symptoms and functional impairment


PHYSICAL EXAMINATION
including muscle wasting, loss of S/C
fat,edema,skin rash,pallor,glossitis,gingival
lesions,hepatomegaly,neuropathy,dementis

Laboratory Techniques

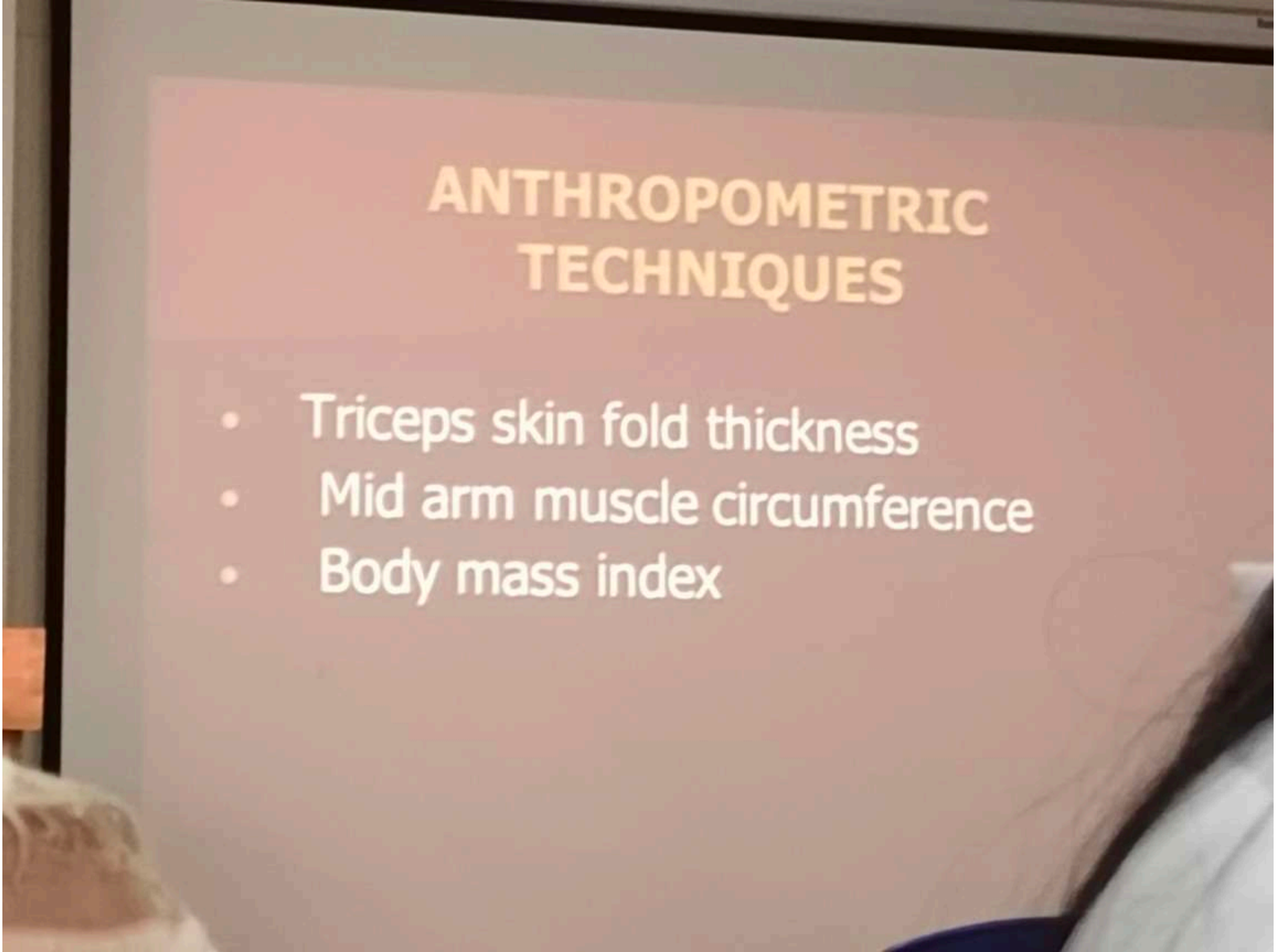
- Measurement of serum concentrations of a variety of proteins
- albumin, prealbumin, transferrin.

- SERUM ALBUMIN level < 30g/L

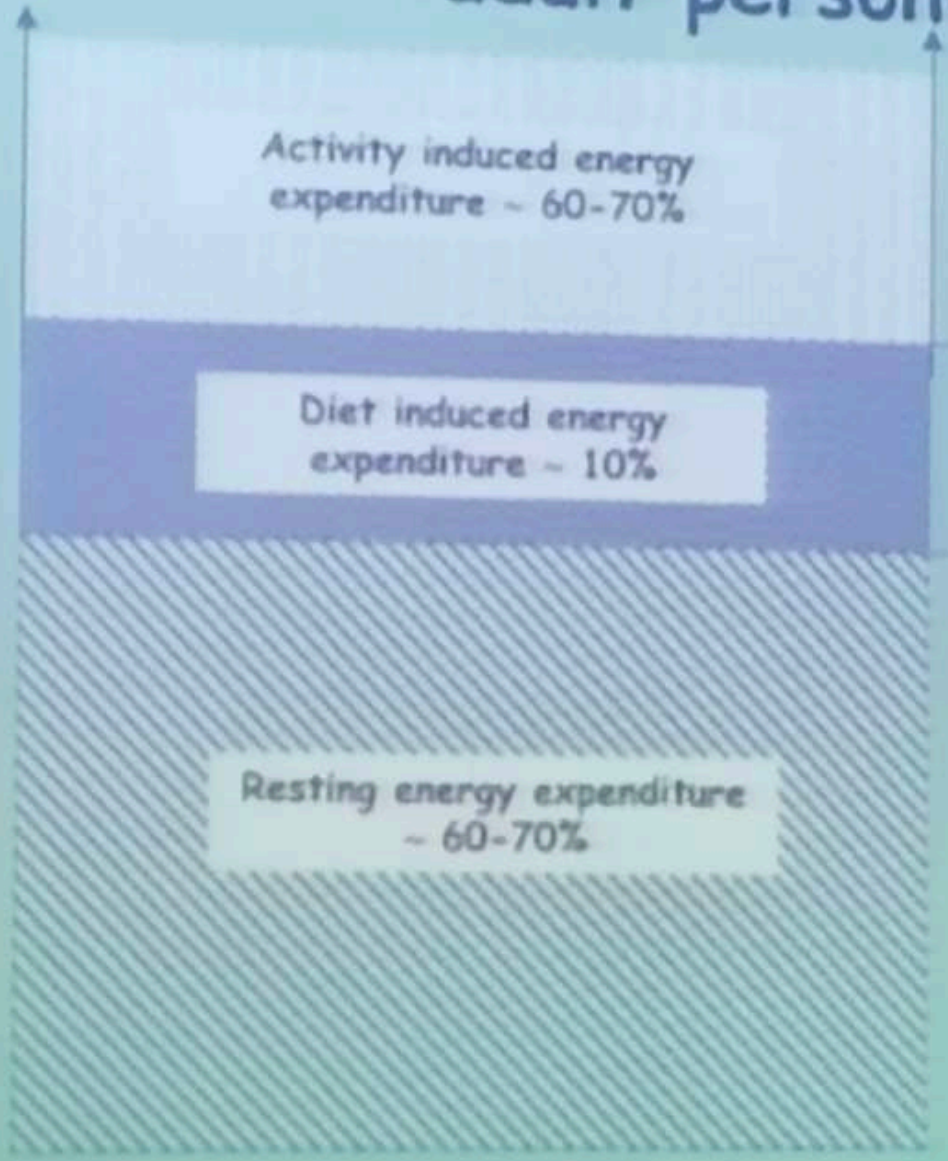
- PRE-ALBUMIN <10 mg/dl

- SERUM TRANSFERRIN < 200 mg/dl

- IMMUNE FUNCTION


ANTHROPOMETRIC TECHNIQUES
Triceps skin fold thickness
Mid arm muscle circumference
Body mass index

Components of energy expenditure -adult person-



- ✓ Is the most variable component of TEE
- ✓ Dependent on physical activity

- ✓ An postprandial increase in EE above basal fasting level
- ✓ Lasts for several hours after meal

- ✓ Maintaining cell membrane ion gradients
- ✓ Constant protein synthesis and breakdown
- ✓ Amino acid metabolism
- ✓ Glycogen synthesis and breakdown
- ✓ Fatty acids cycle
- ✓ Gluconeogenesis
- ✓ Energy for breathing and heart function

Harris-Benedict equations

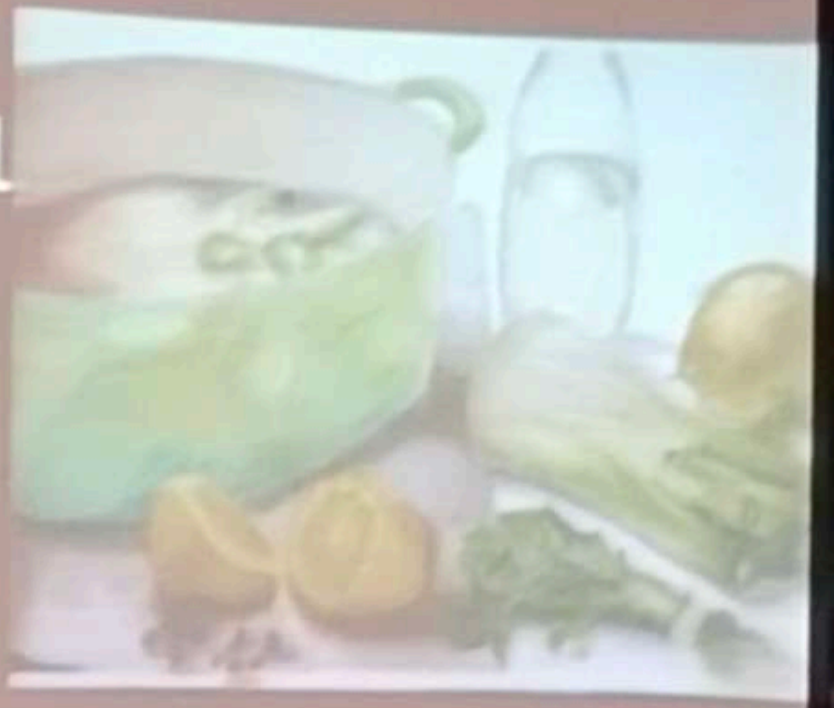
The most common approach to predict resting energy expenditure

Male:
REE = 66.5 + (13.8 x weight) + (5.0 x height) - (6.8 x age)

Female:
REE = 655.1 + (9.6 x weight) + (1.8 x height) - (4.7 x age)

NUTRITION REQUIREMENTS

1. Carbohydrate 4KCal/1
2. Lipid 9 Kcal/1g.
3. protein 4KCal/1g



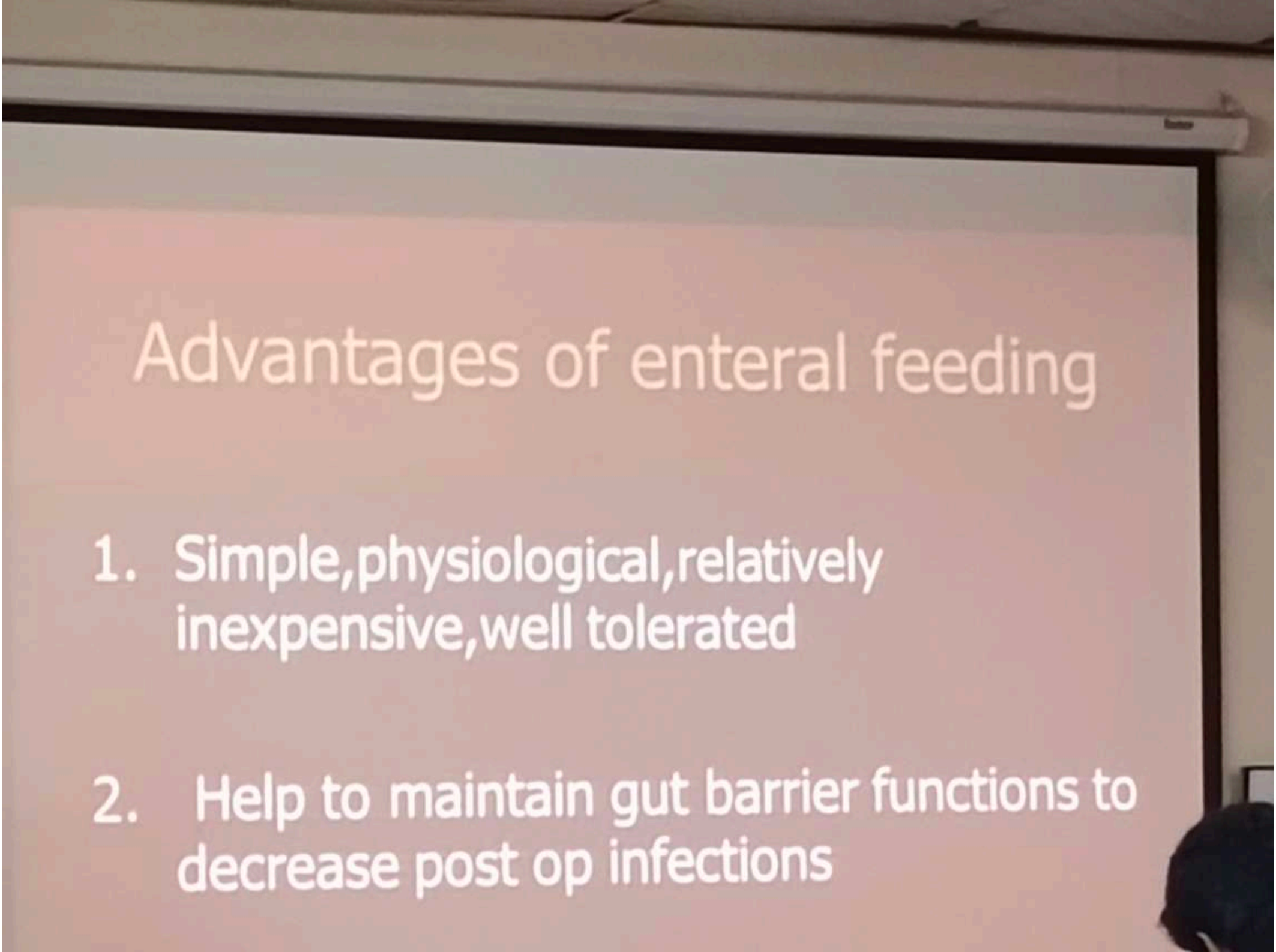
4. vitamin B&K as coenzyme
   vit C as cofactor in wound healing

Nutritional therapy

- **Healthy adult-** approx 25 kcal/kg/day, 1 gm protein/ kg per day
- **Pretty sick or moderately sick-** 30 kcal/kg/day, 1.5 gm/kg per day
- **Very sick-** 35 kcal/kg/day, protein 2 gm/ kg/day
- **Very very sick-** 40 kcal/kg/day, 2.5 gm/kg/day

Techniques used in nutritional support

- Enteral
  - Oral Supplements
  - Naso enteric feeding
  - Tube Entrostomy
  - Tube Gastrostomy
  - Tube Jejunostomy
- Parenteral
  - periperal line route
  - central line route


Advantages of enteral feeding
1. Simple,physiological,relatively inexpensive,well tolerated
2. Help to maintain gut barrier functions to decrease post op infections

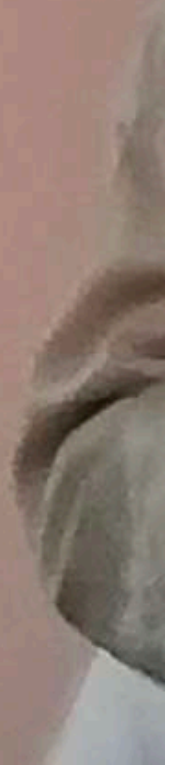
Indication & Contraindication for enteral Feeding

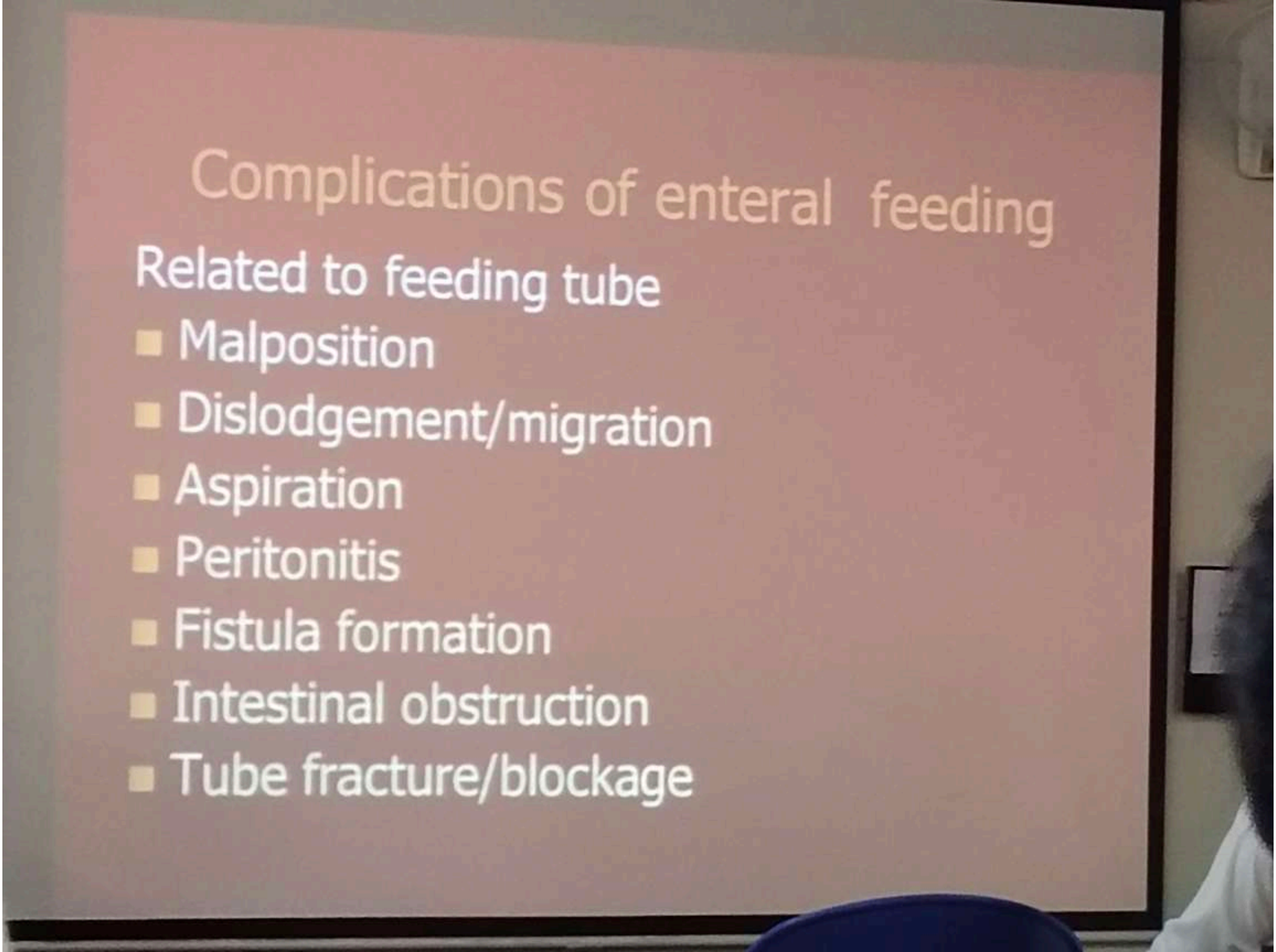
Indication

- Protein-energy malnutrition
- Dysphagia, except for fluids
- Major trauma (including surgery)
- Inflammatory bowel disease
- Distal, low-output (<200ml) enterocutaneous fistulas
- To enhance adaptation after massive enterectomy

Contraindications

- Small bowel obstruciton or ileus
- Severe diarrhoea
- Proximal small intestinal fistulas
- Severe pancreatitis



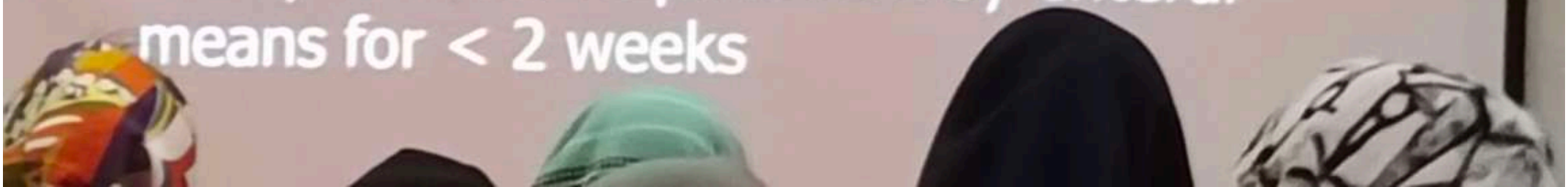

Complications of enteral feeding
Related to feeding tube
Malposition
Dislodgement/migration
Aspiration
Peritonitis
Fistula formation
Intestinal obstruction
Tube fracture/blockage

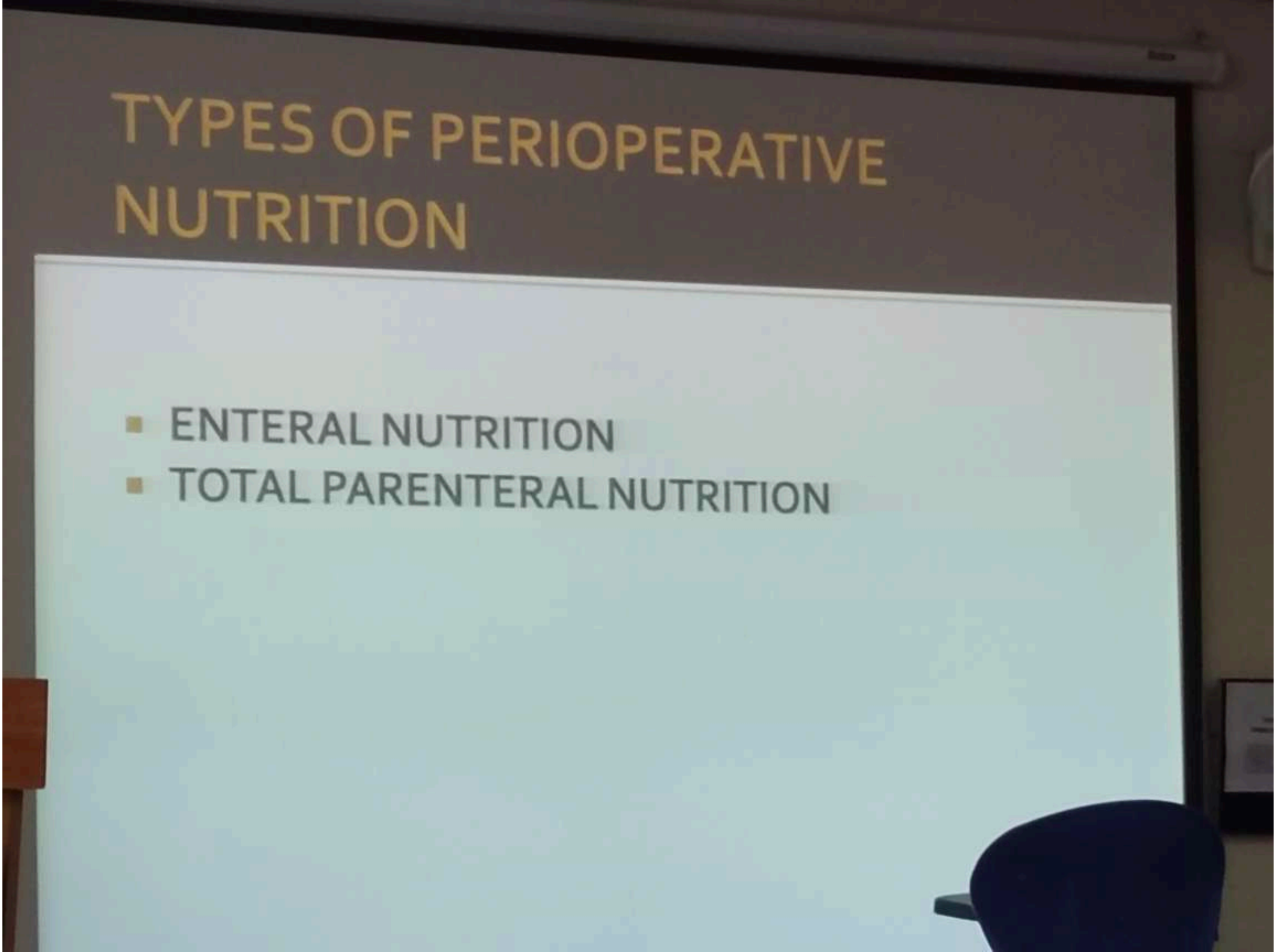
Parenteral Feeding

1. Peripheral parenteral Nutrition
2. Total Parenteral nutrition

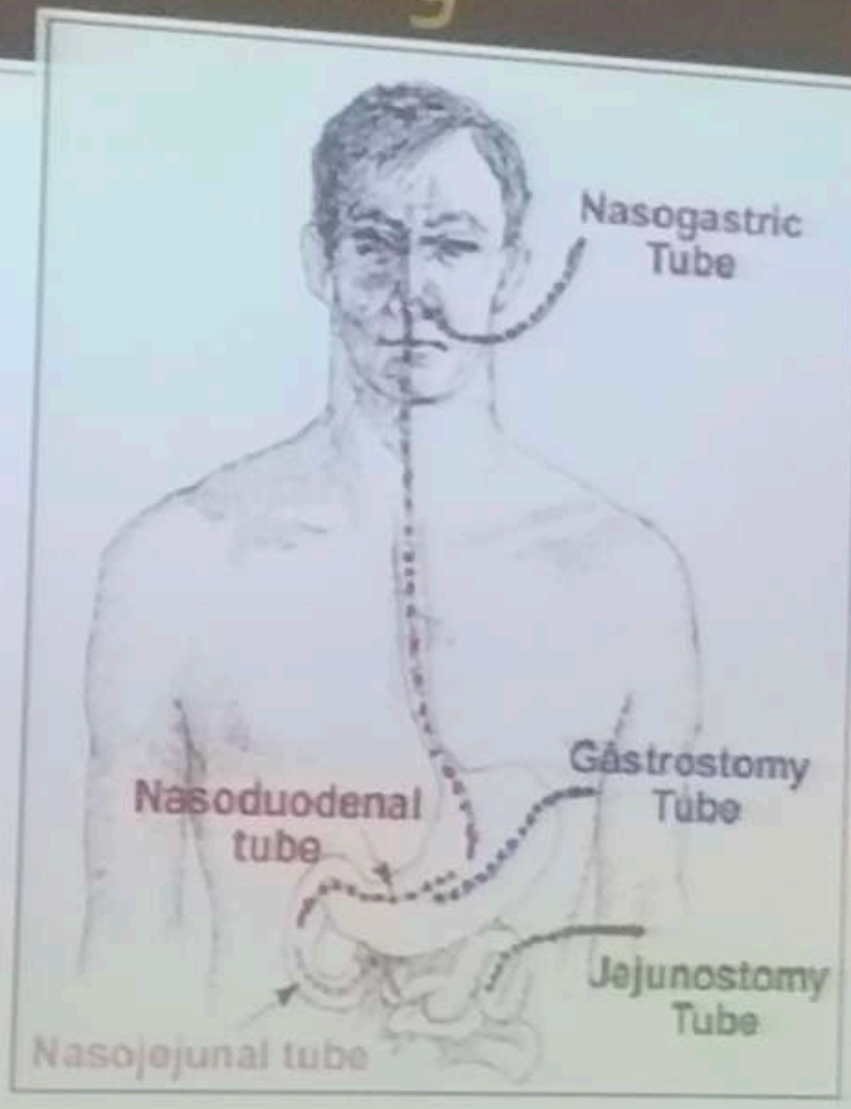
Indication

Inability to meet requirement by enteral means for < 2 weeks

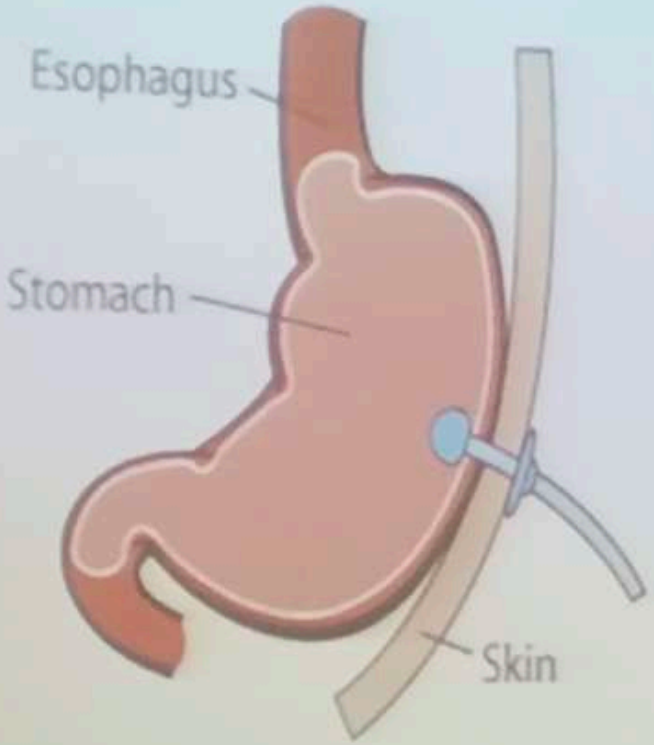



TYPES OF PERIOPERATIVE NUTRITION
ENTERAL NUTRITION
TOTAL PARENTERAL NUTRITION

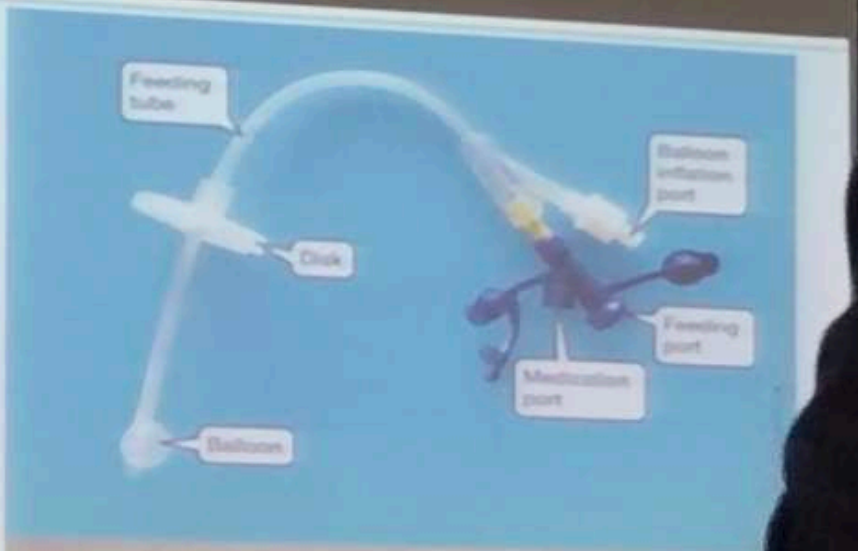
Enteral Feeding



Gastrostomy (PEG Tube)



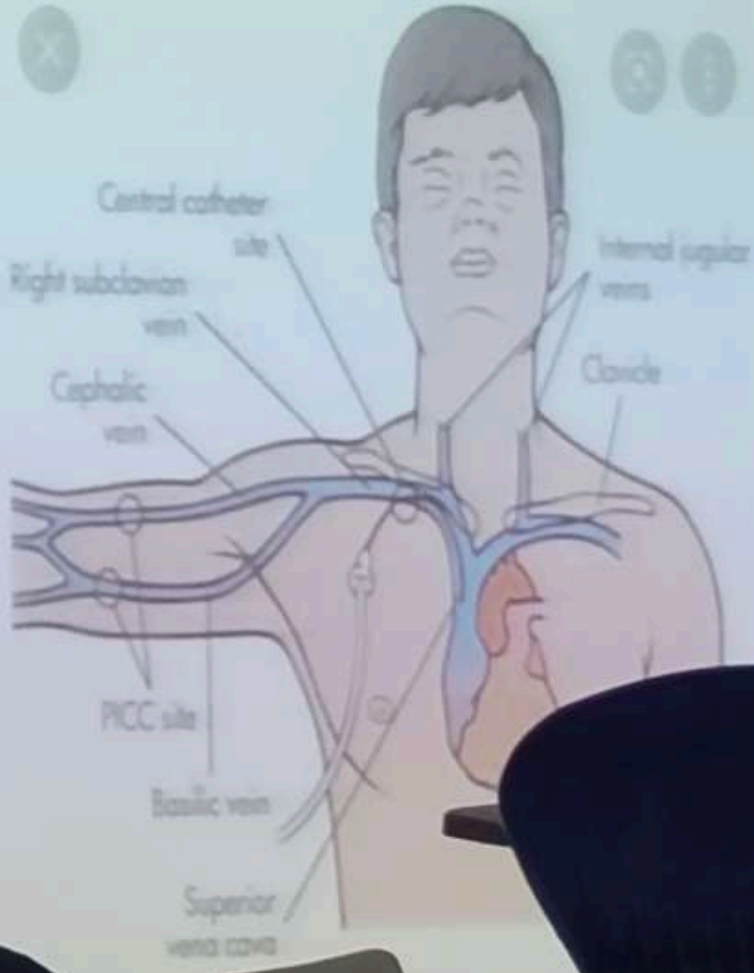
Gastrostomy Tube Placement

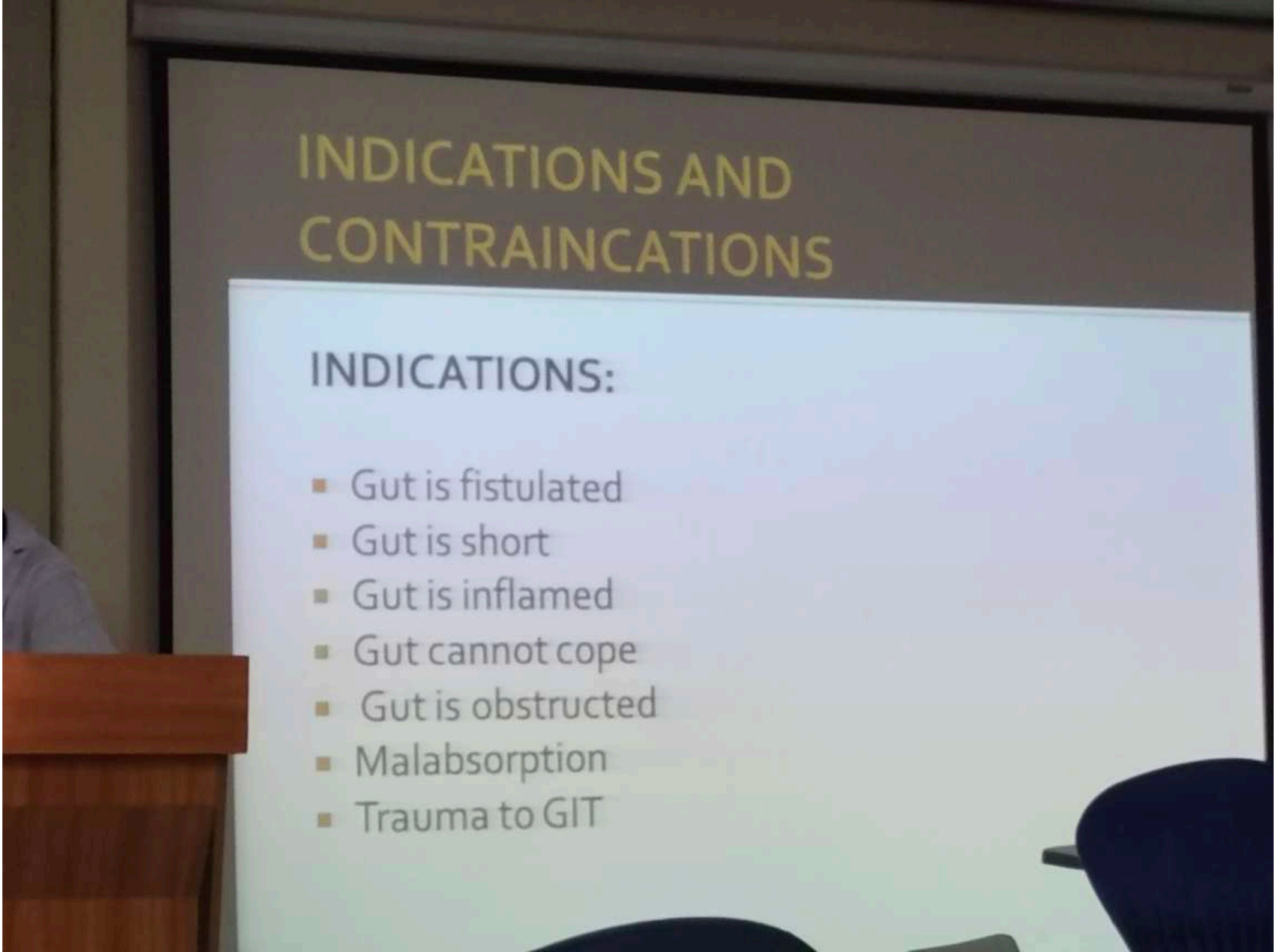


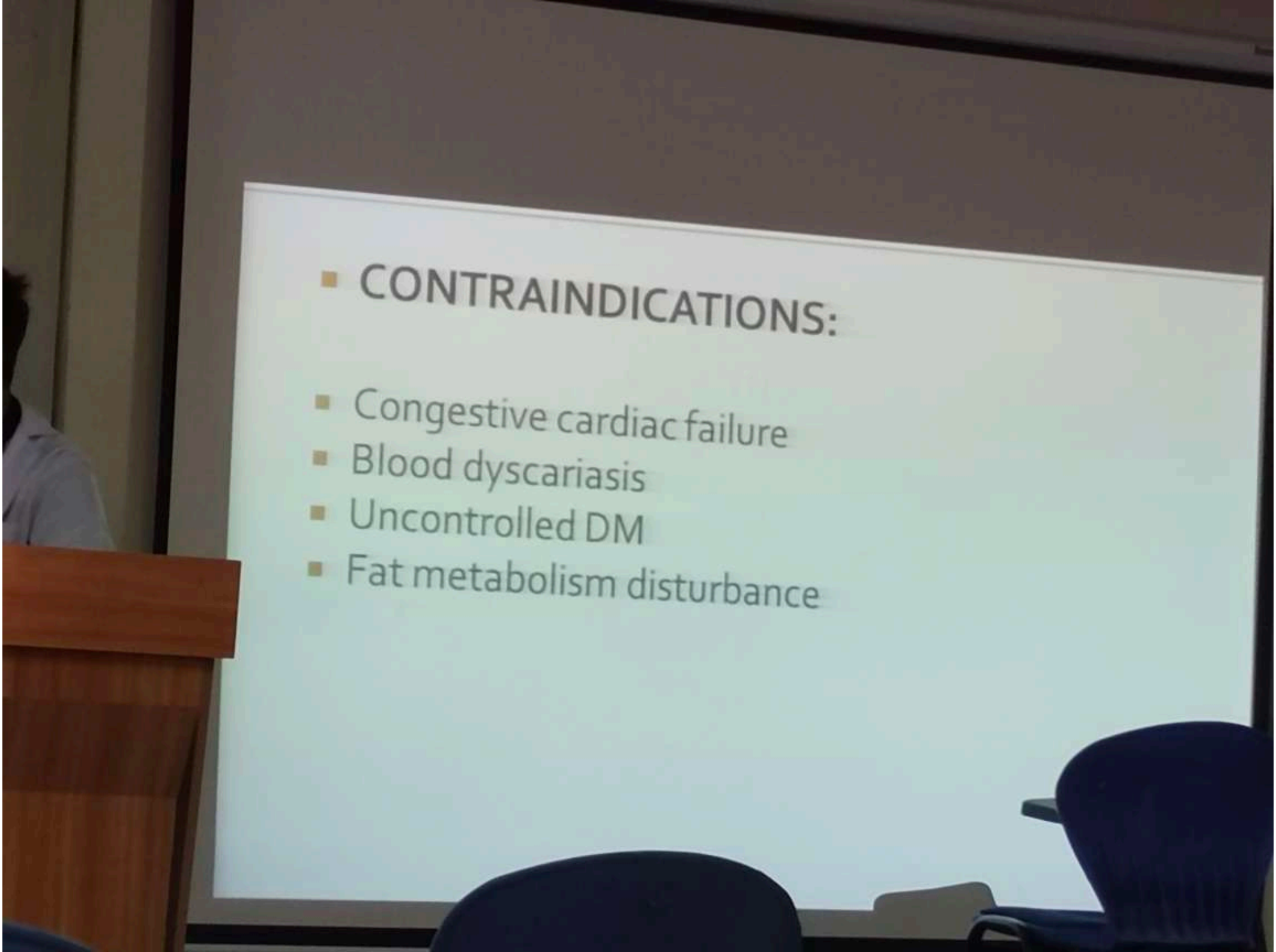
TOTAL PARENTERAL NUTRITION

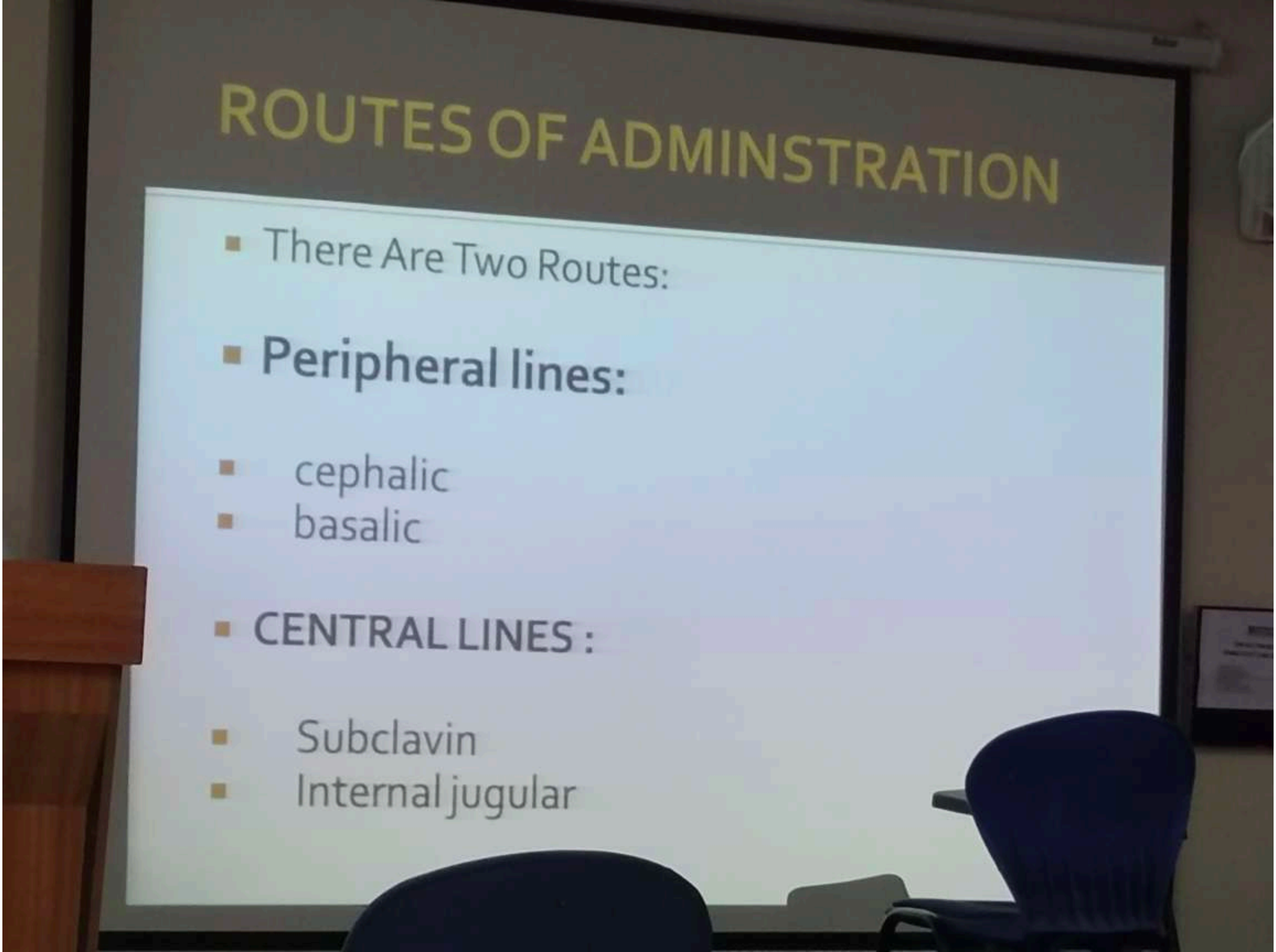
DEFINITION:

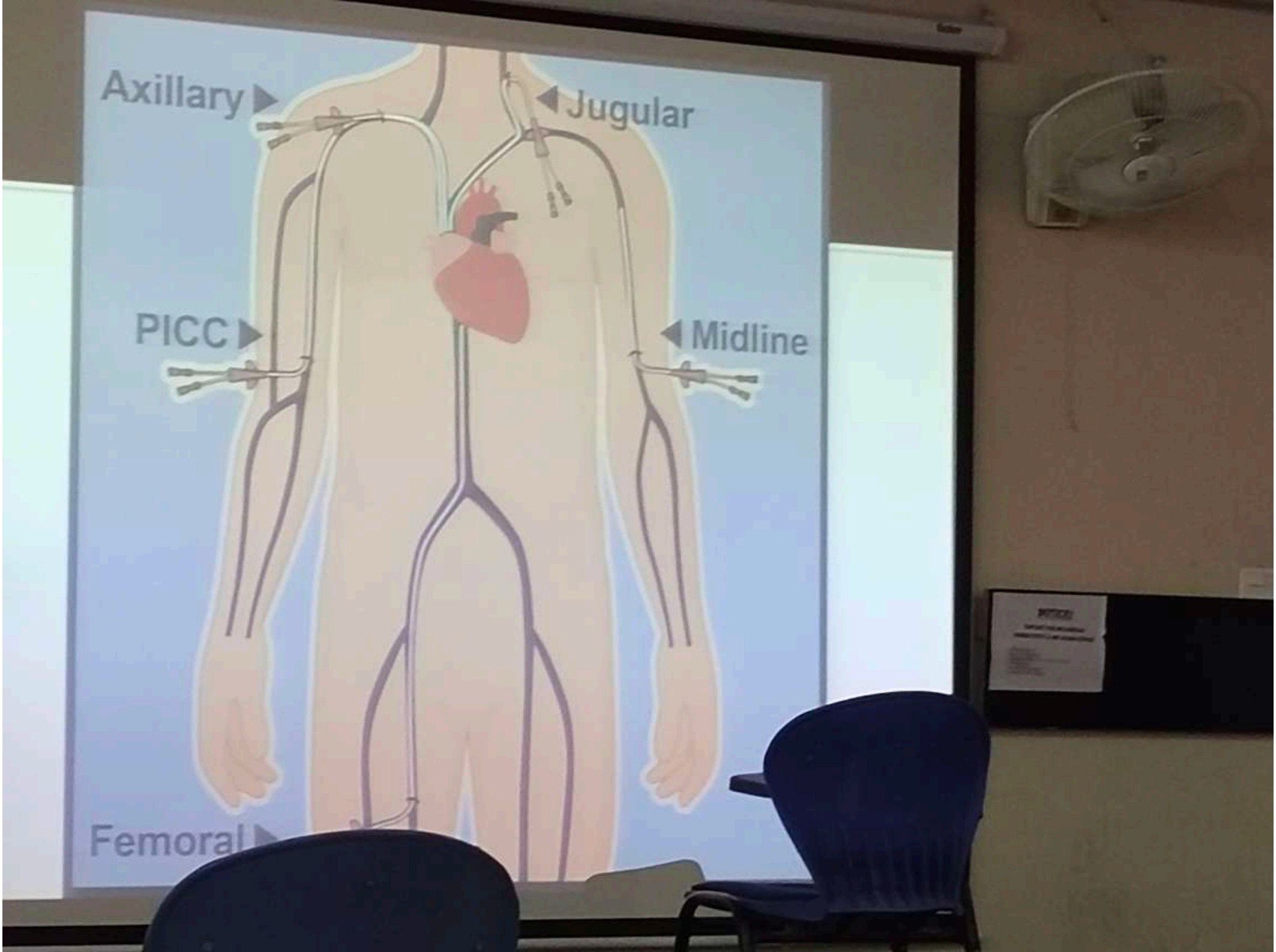
The provision of all the nutritional requirements by means of the intravenous routes without the use of gastrointestinal tract

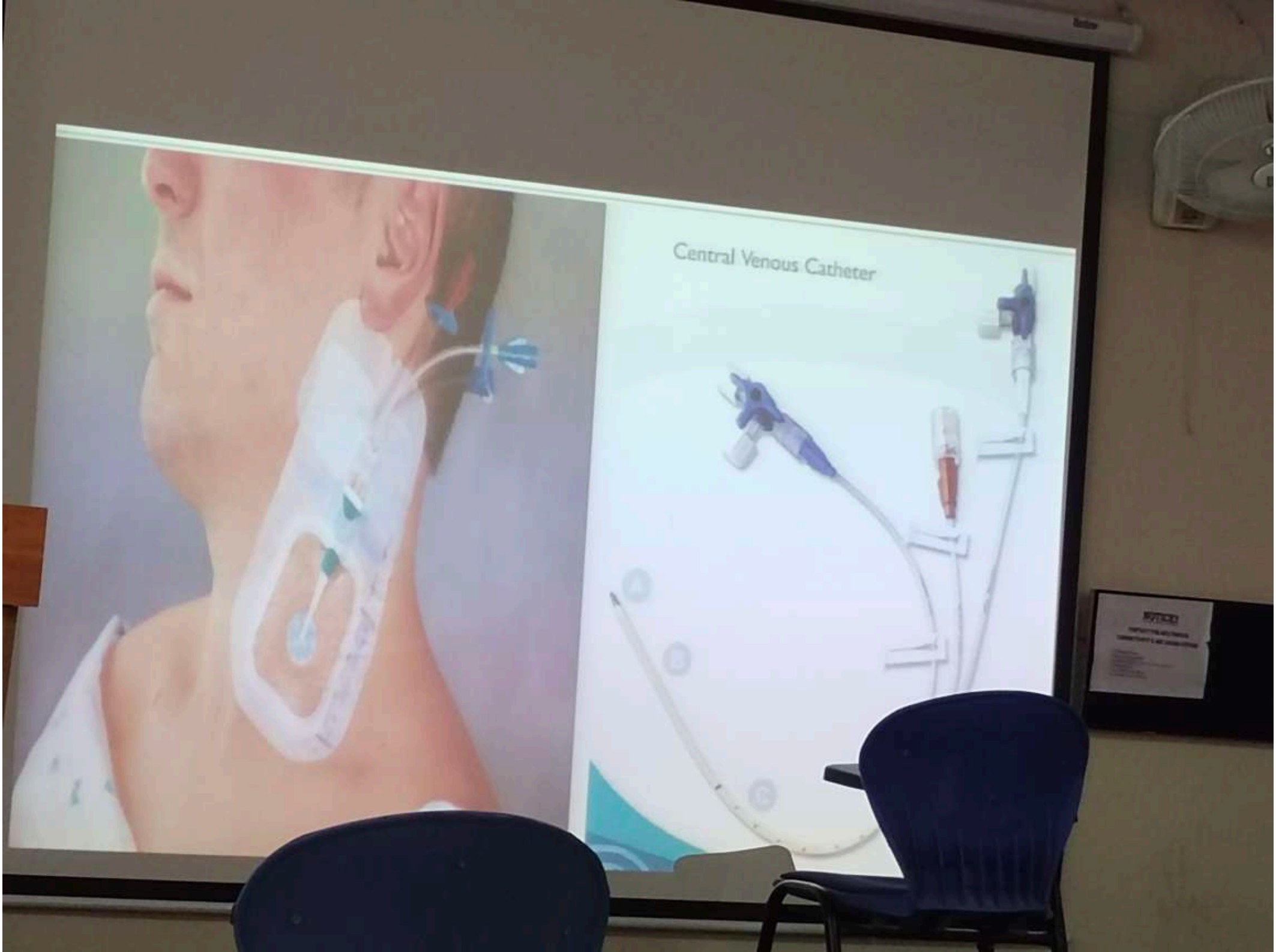


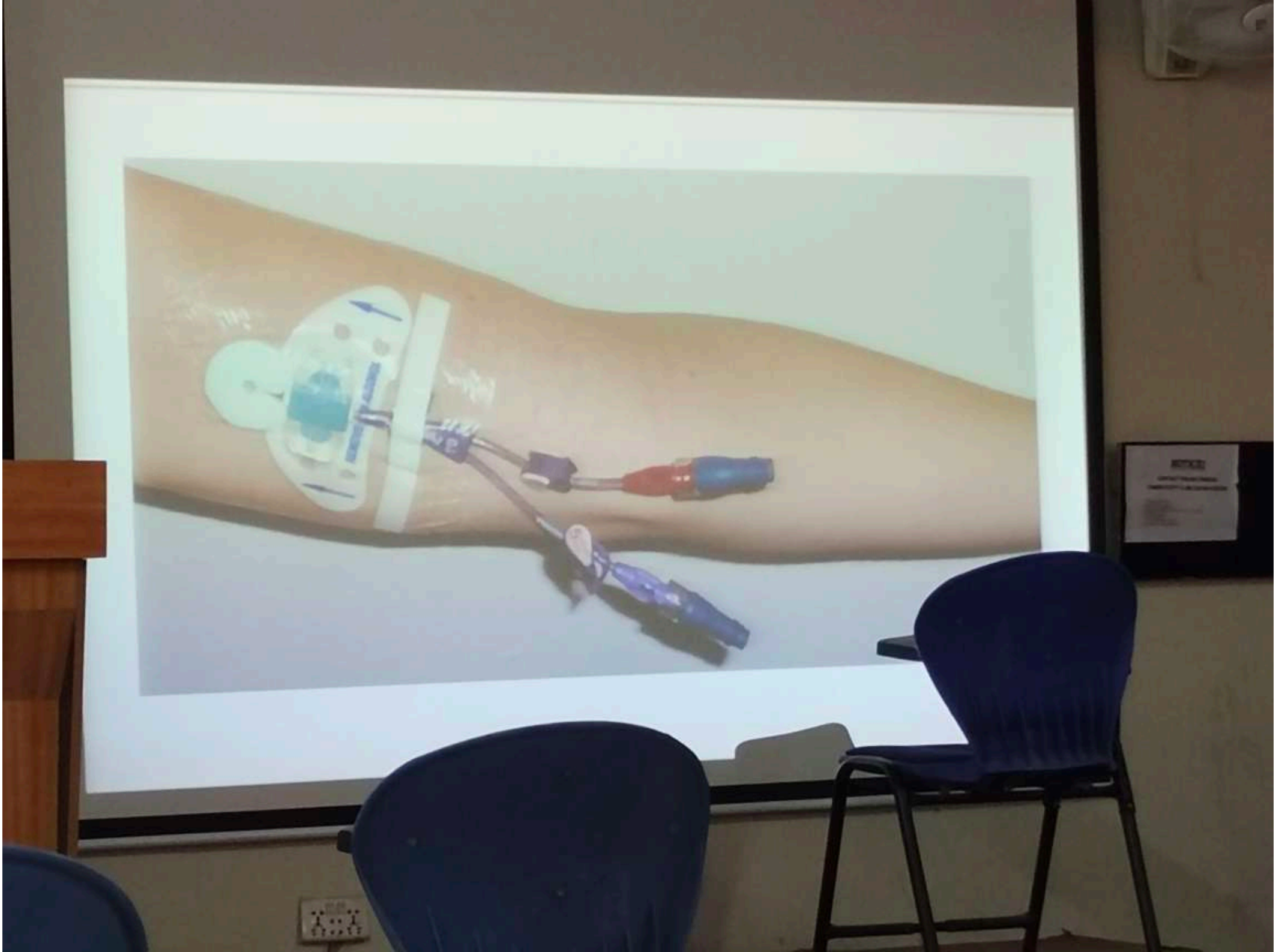

INDICATIONS AND CONTRAINCATIONS
INDICATIONS:
Gut is fistulated
Gut is short
Gut is inflamed
Gut cannot cope
Gut is obstructed
Malabsorption
Trauma to GIT

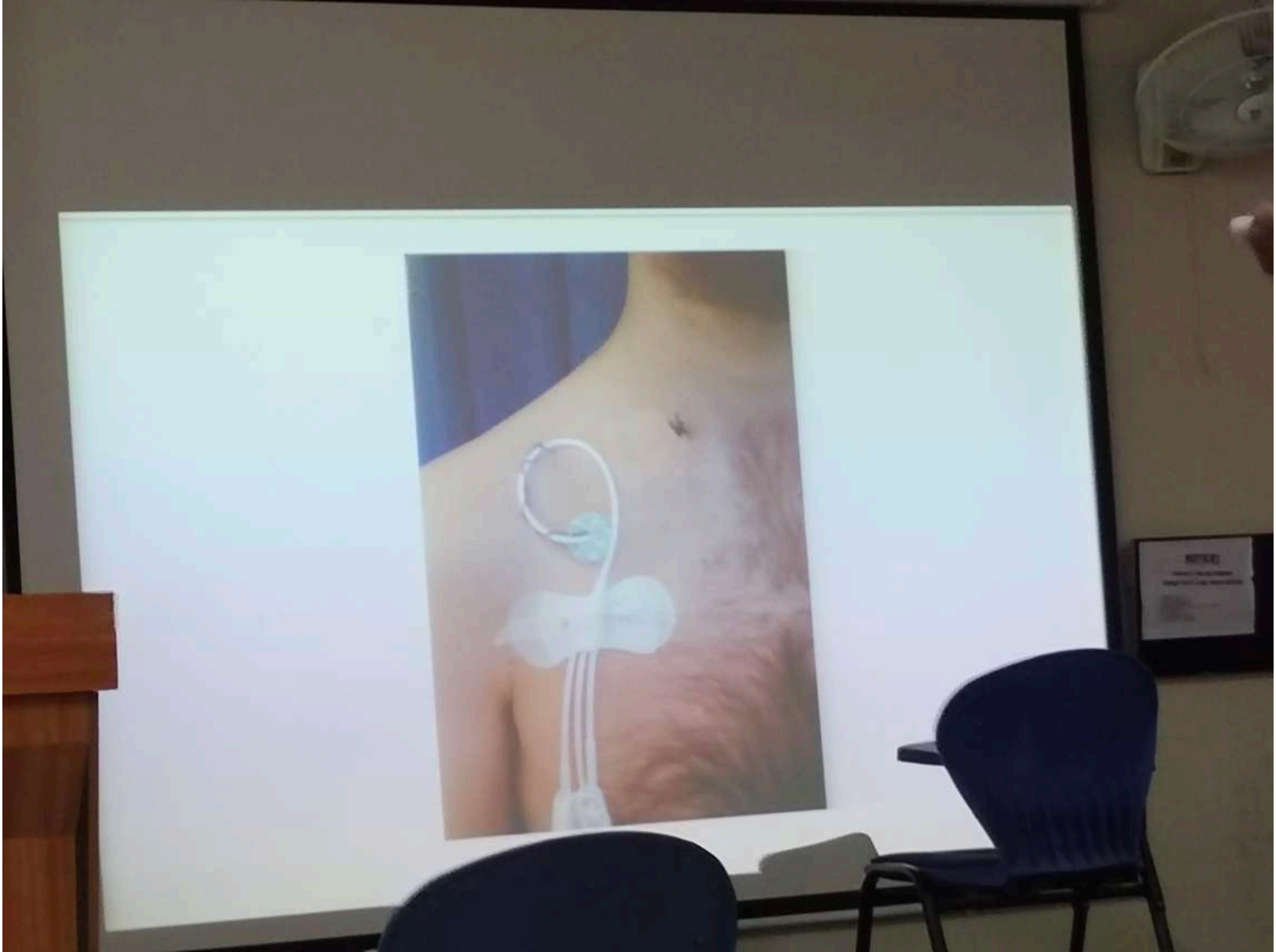

CONTRAINDICATIONS:
Congestive cardiac failure
Blood dyscariasis
Uncontrolled DM
Fat metabolism disturbance

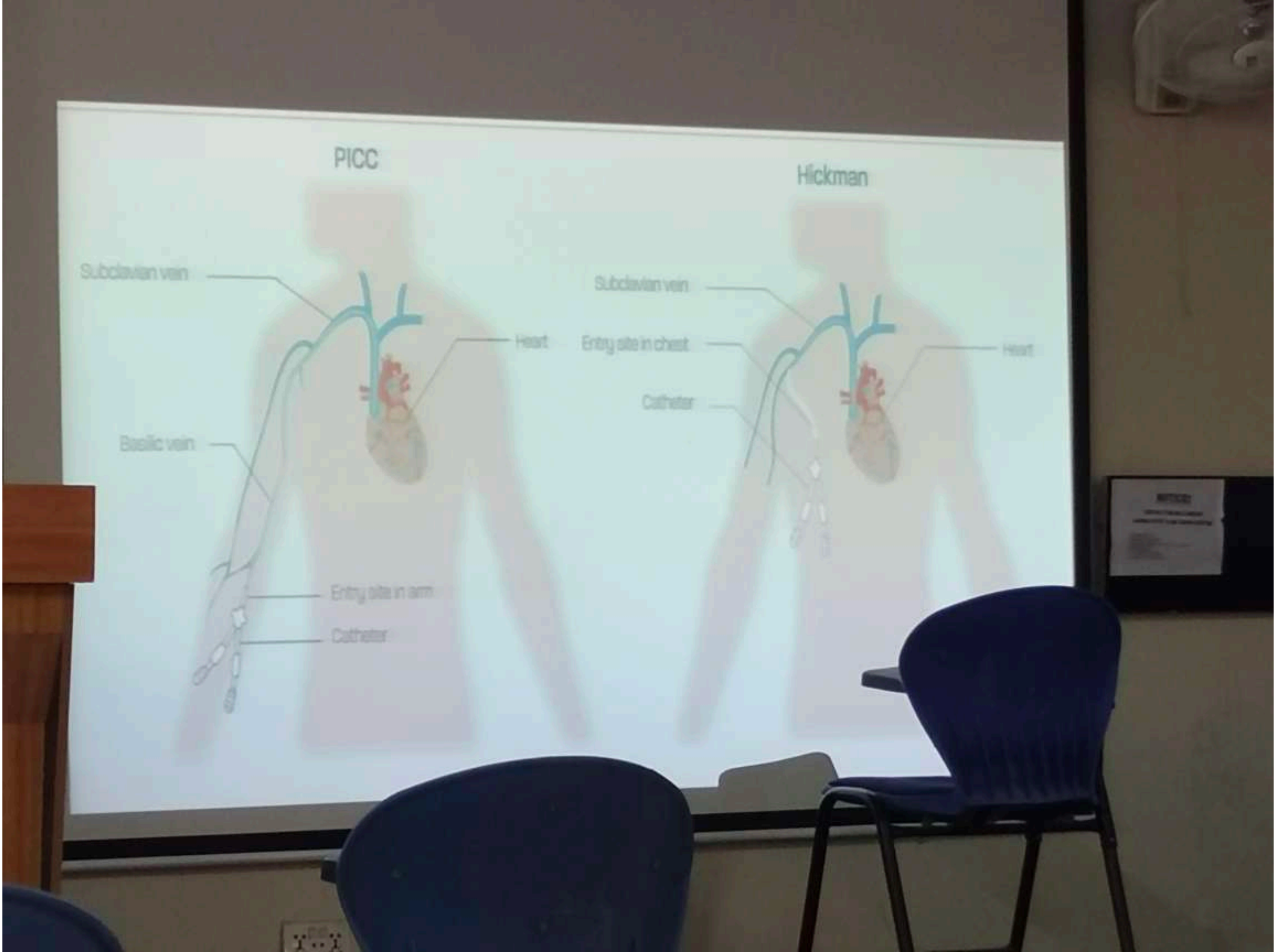

ROUTES OF ADMINSTRATION
There Are Two Routes:
Peripheral lines:
cephalic
basalic
CENTRAL LINES :
Subclavin
Internal jugular


Axillary
Jugular
PICC
Midline
Femoral


Central Venous Catheter






PICC
Subclavian vein
Heart
Basilic vein
Entry site in arm
Catheter
Hickman
Subclavian vein
Entry site in chest
Catheter
Heart

Types of parenteral Nutrition

Type	Uses	Lipid emulsion
TPN (3) C.V.P. Internal or external Jagular Catheter	► Nutritionally complete. ► High hypertonic solution. ► Provide large calories and nutrients need. ► When need 2 wks or more Nutrition ► used in nutritional depleted pt ► Improve tolerance of surgery	► May interfere with immune mechanisms ► In pt. with respiratory compromise, reduce co2 build up
TPN (3) Peripheral Catheter	► Nutritionally complete. for short time. 2 wks or less. ► Provide up to 2000 C/ day. ► Not used in nutritional depleted pt. ► Not used in volume restricted pt. ► Maintain adequate nutrition status. ► As effective as re-assume bowel function and oral feeding after few days.	►In pt. with respiratory compromise, reduce co2 build up

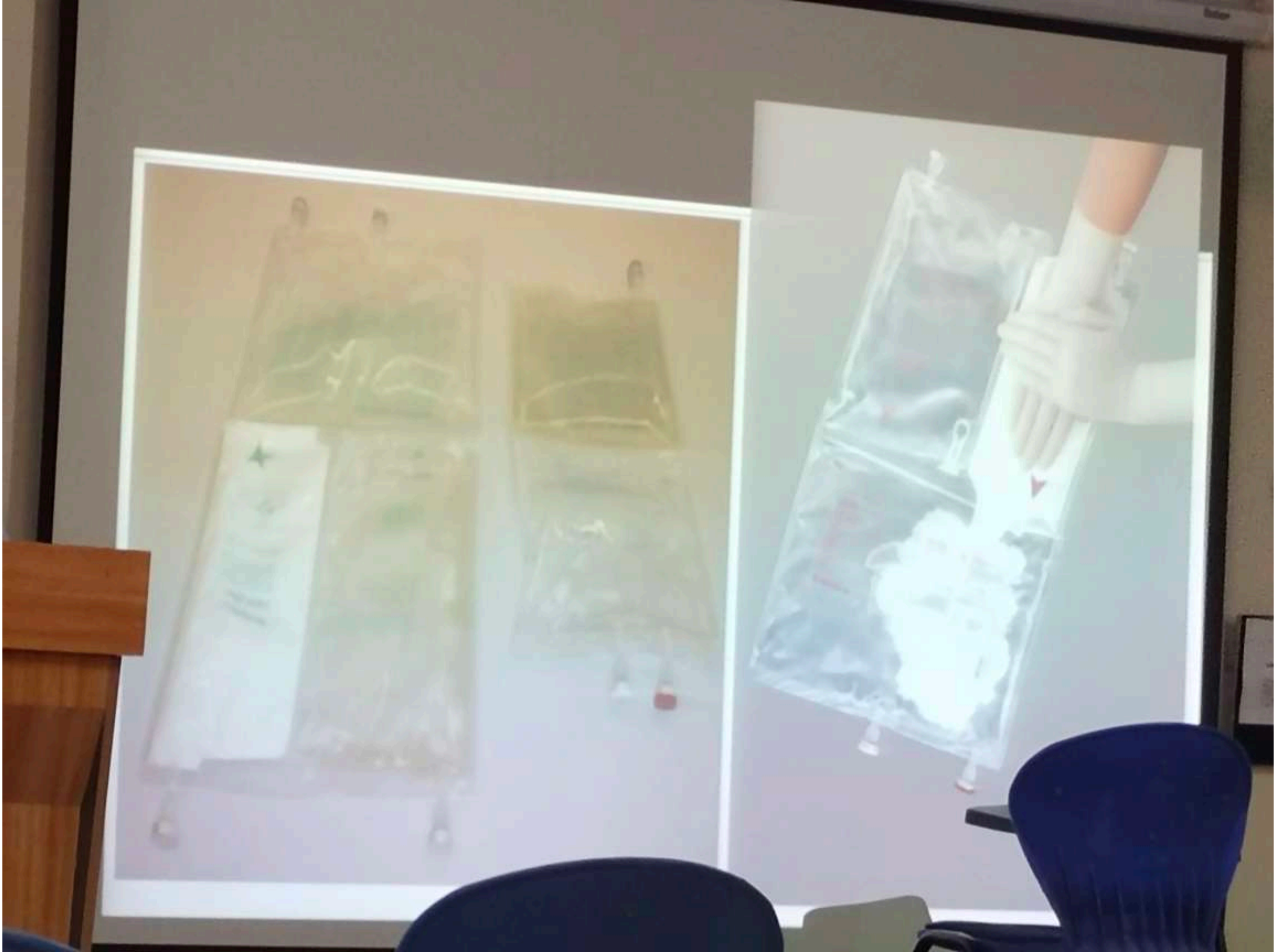
COMPOSITION OF TPN

- Volume of TPN should be 2-4 liters and it provide 1500 to 3200 kcal per day

- **TPN SOLUTION CONTENTS:**
- Water :30 to 40 ml/kg/day
- Amino acid :1 to 2 g/kg/day
- Glucose usually D50W OR D20W : 25 -35%
- Lipids :10 -20 %
- Essential fatty acid
- Electrolytes
- Minerals

COMPOSITION OF TPN

Ingredient	Concentration
Dextrose	25%
Travasol [1]	3%
Sodium	150 mEq/L
Potassium	80 mEq/L
Magnesium	5 mEq/L
Calcium	18 mEq/L
Chloride	75 mEq/L
Phosphorus	7 mmol/L
Acetate	75 mEq/L
Infuvite Pediatric Multivitamin [2]	5 mL
Selenium	10 mcg/L
Multitrace-4 Concentrate [3]	1 mL
Heparin	1000 units/L



NUTRITIONAL REQUIREMENT

Component	Requirement in health	Requirement after major surg
Protien	1.0-1.5 g/kg	1.5-2.0 g/kg
Water	40mL/kg	Variable according to losse
Energy 40	kcal/kg	40kcal/kg
Electroytes	75 mmol sodium 50 mmol potassium	Variable according to losse
Minerals	15 mEq calcium 40 mmol phosphate 10 mEq magnesium	Variable according to losse
Vitamins	B group, C, fat solube	Some vitamins benifit in surgi

DIET DURING DIFFERENT FAILURE

- **RESPIRATORY FAILURE:**
- Large amount of glucose should be avoided bcz it produce co2and it increase respiratory elimination.

- **RENAL FAILURE:**
- Glucose should be major source of energy.
- Extra fluid is restricted.

- **Hepatic failure:**
- Branched chain amino acids mobilized by skeletal muscles .These are used in liver failure pt .

TYPES OF INFUSIONS

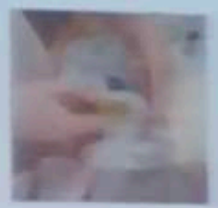
- TWO TYPES:
- CONTINUOUS
- CYCLIC

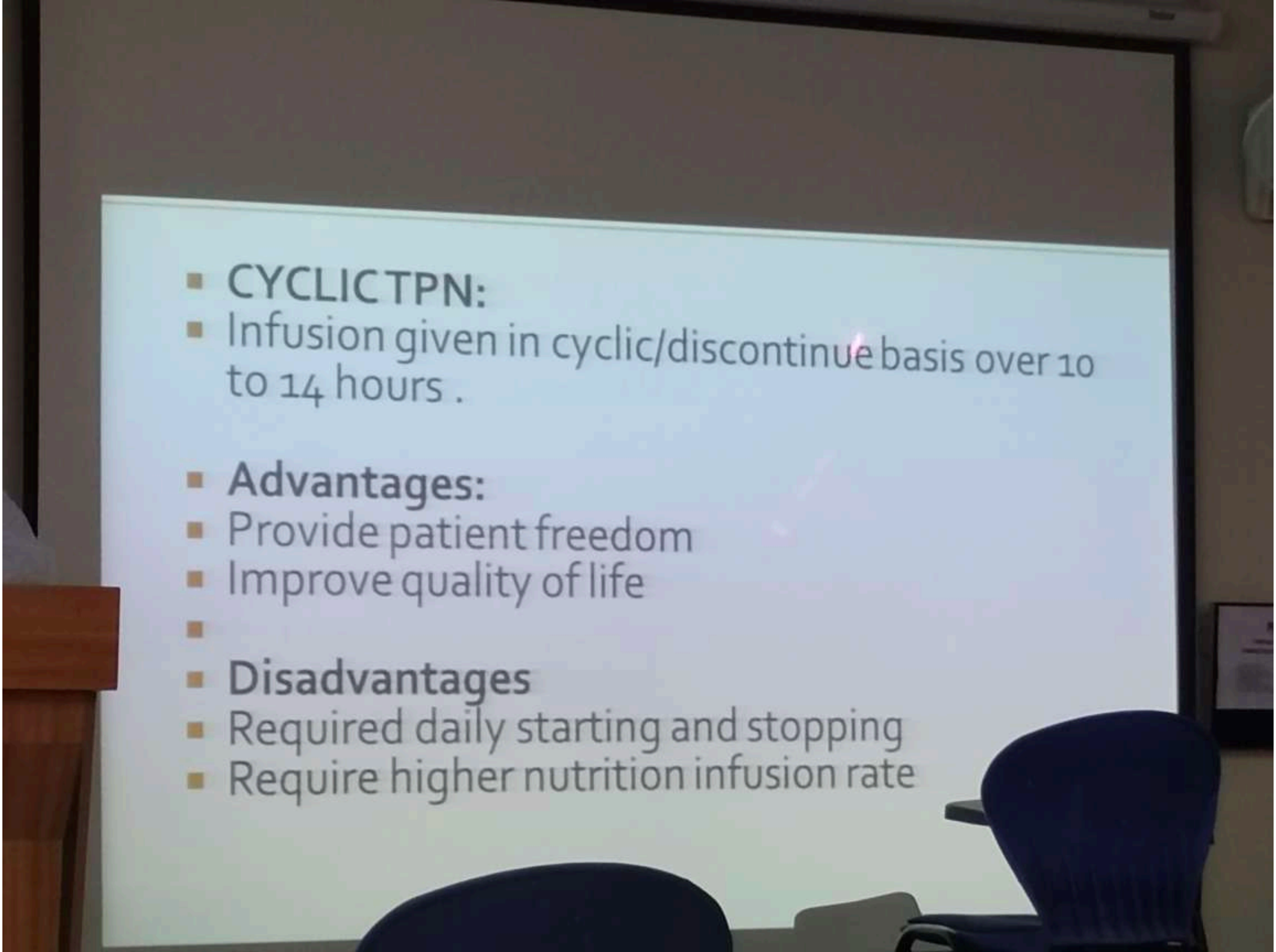
- **CONTINUOUS INFISION:**
- Typically given in 24 hours
-
- **Advantages:**
- Dec nursing time
- Less manipulation
- Disadvantages:
- Interfere daily activities
- Immobilize pt

TYPES OF TPN INFUSION :

Continuous TPN.

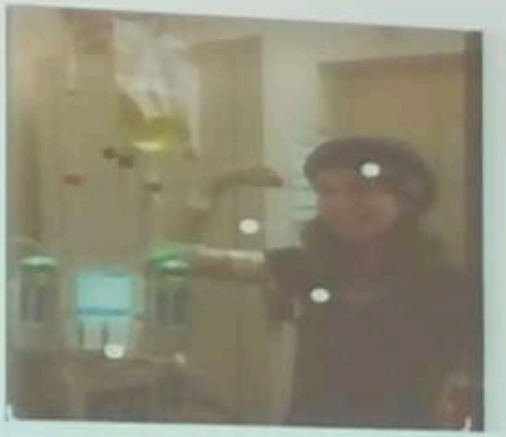
Cyclic TPN.

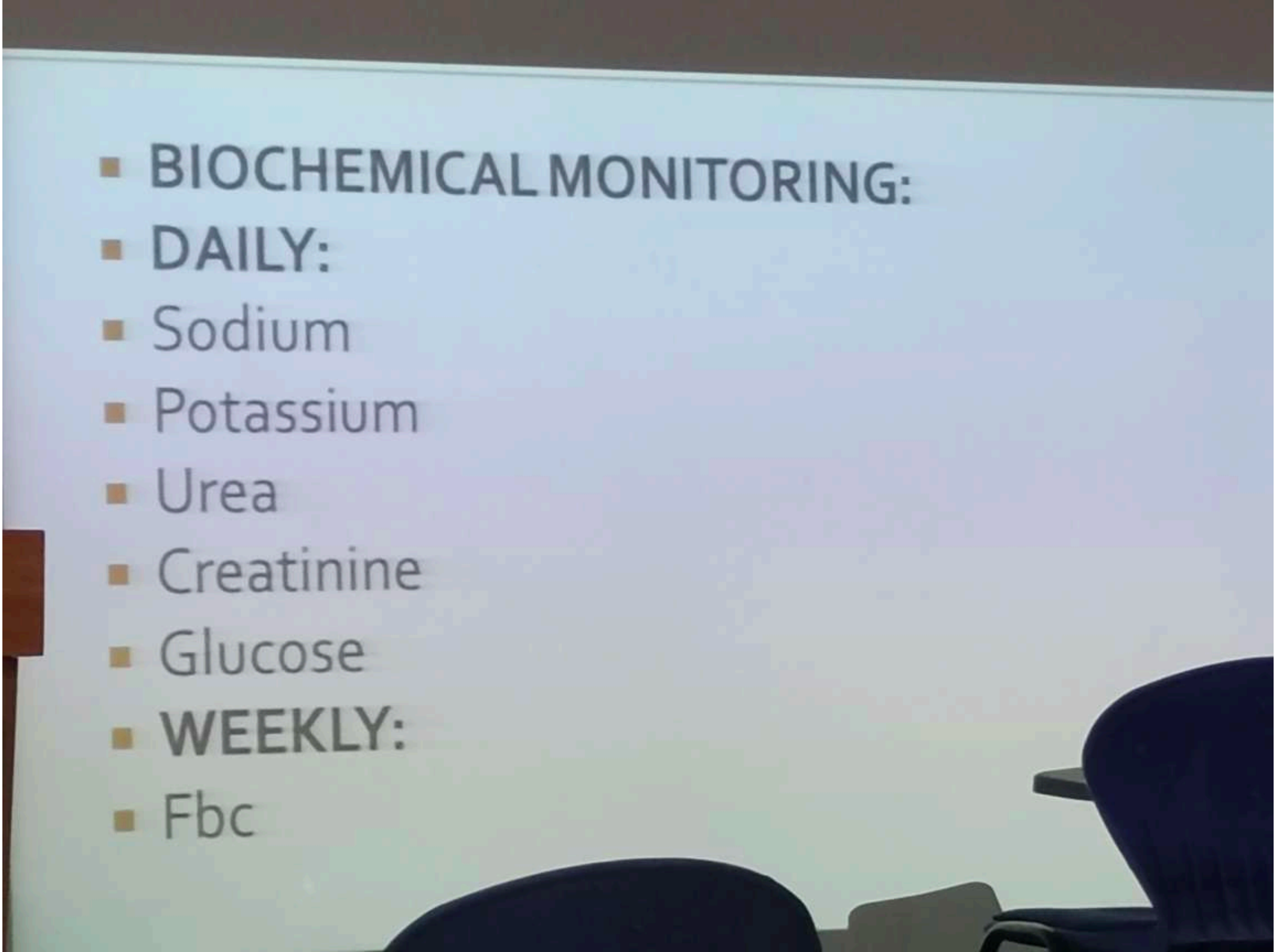


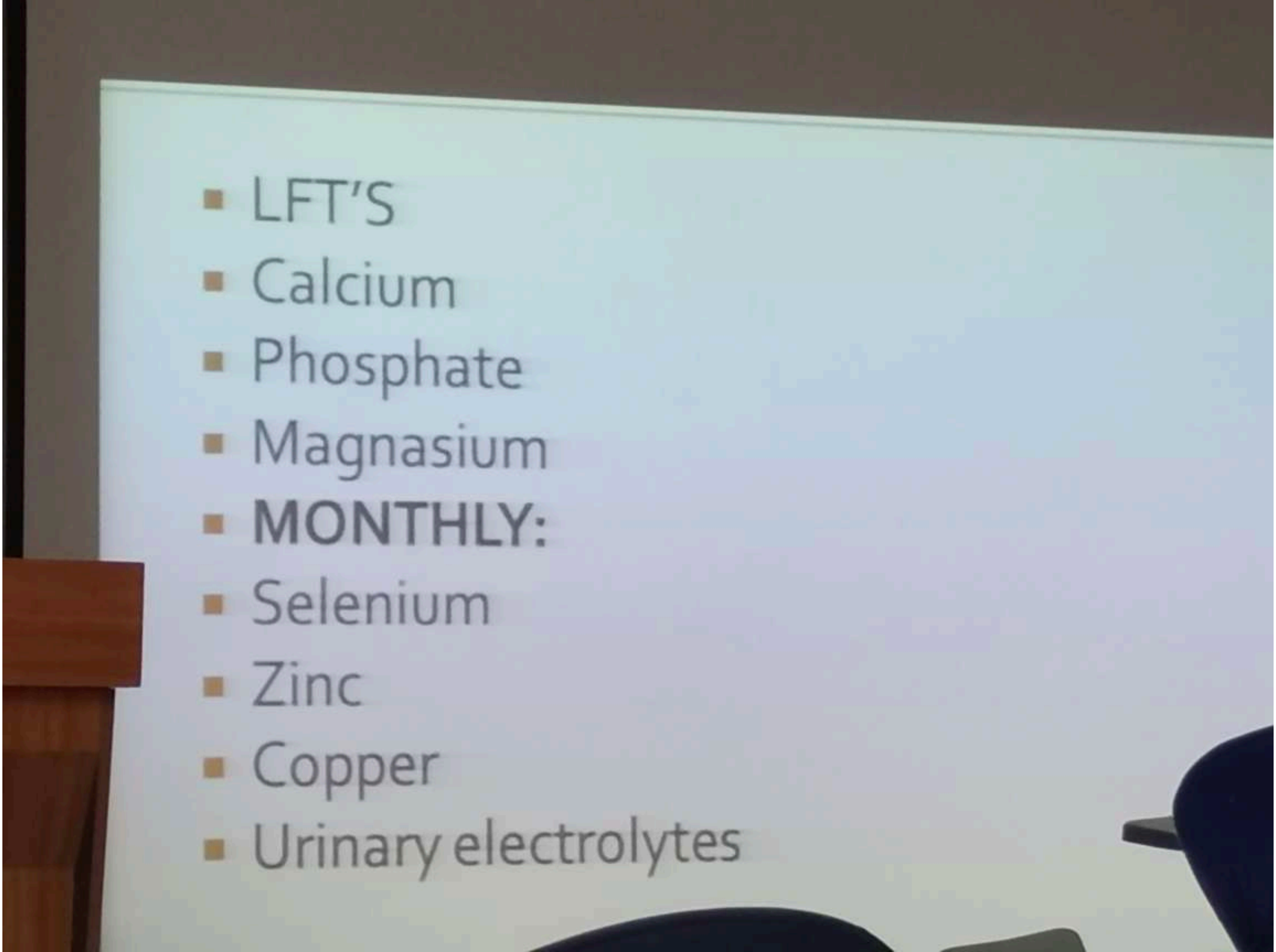

CYCLIC TPN:
Infusion given in cyclic/discontinue basis over 10 to 14 hours .
Advantages:
Provide patient freedom
Improve quality of life
Disadvantages
Required daily starting and stopping
Require higher nutrition infusion rate

MONITORING OF PARERTEAL NUTRITION

- **CLINICAL MONITORING:**
- Fluids balance
- Vital monitoring
- Weight
- Entry site of catheter
- Feeding line should use for feeding
- 5% pt on TPN developed metabolic derangement
- Blood culture for any sign for sepsis.



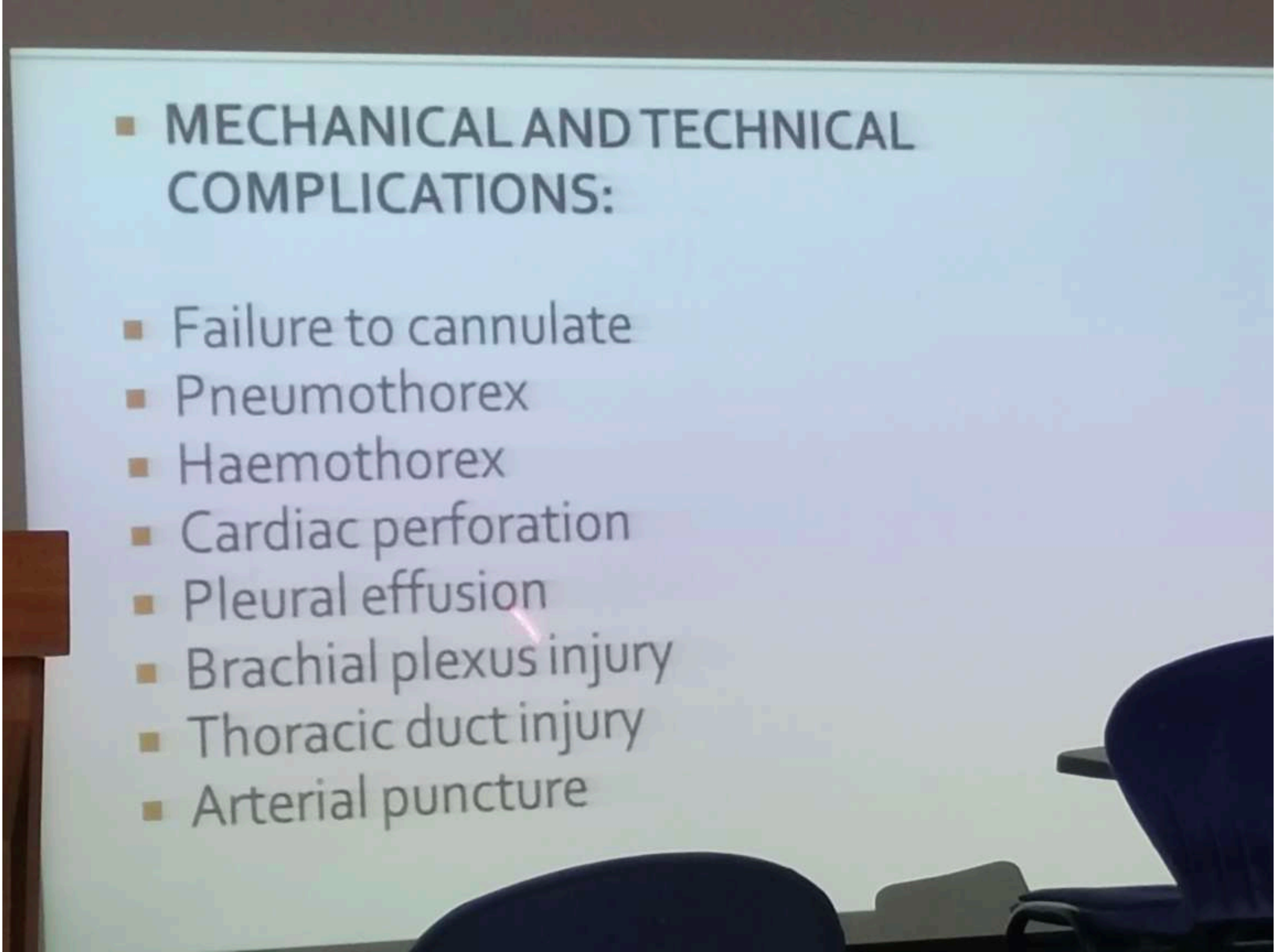

BIOCHEMICAL MONITORING:
DAILY:
Sodium
Potassium
Urea
Creatinine
Glucose
WEEKLY:
Fbc

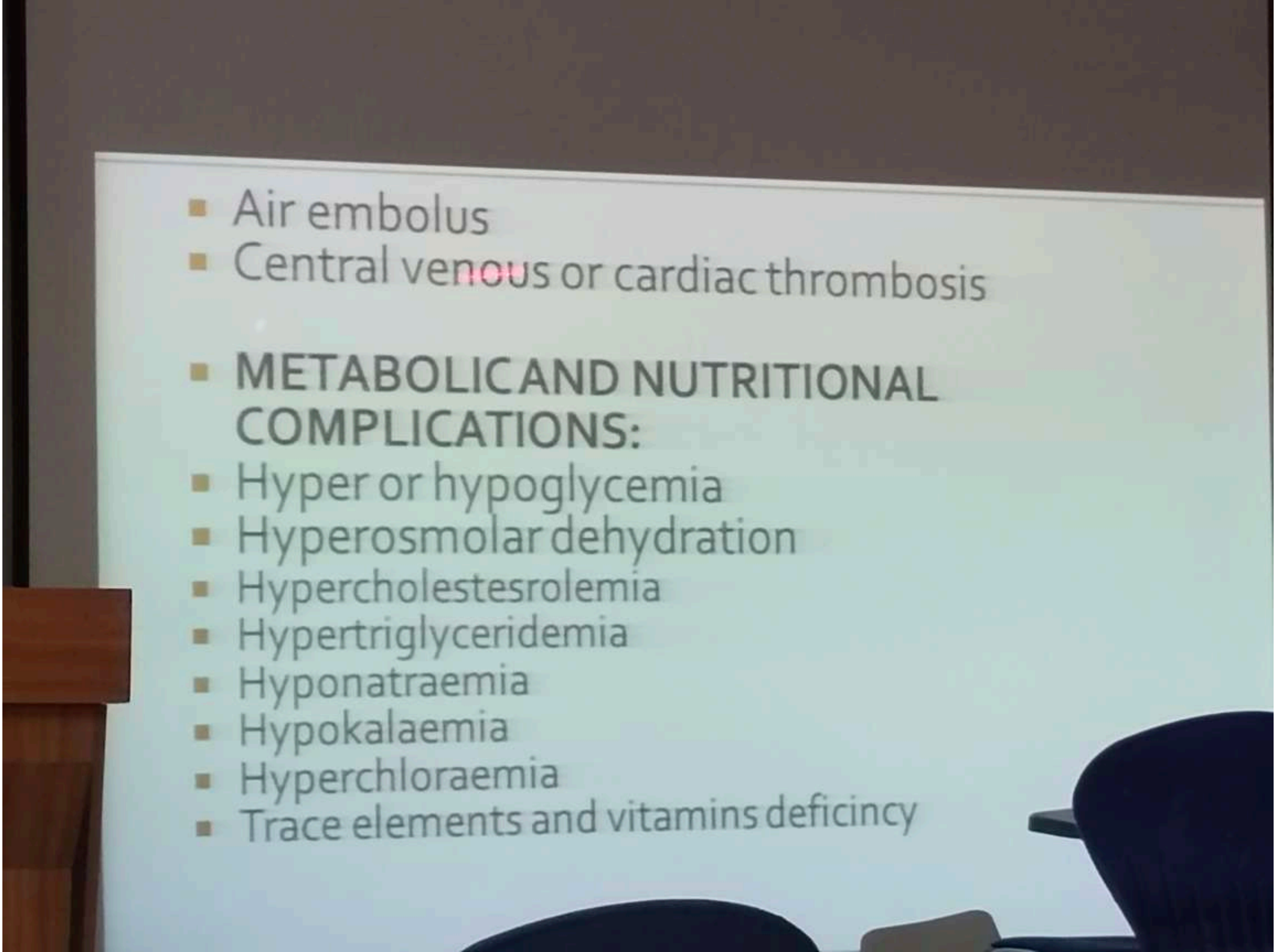

LFT'S
Calcium
Phosphate
Magnasium
MONTHLY:
Selenium
Zinc
Copper
Urinary electrolytes

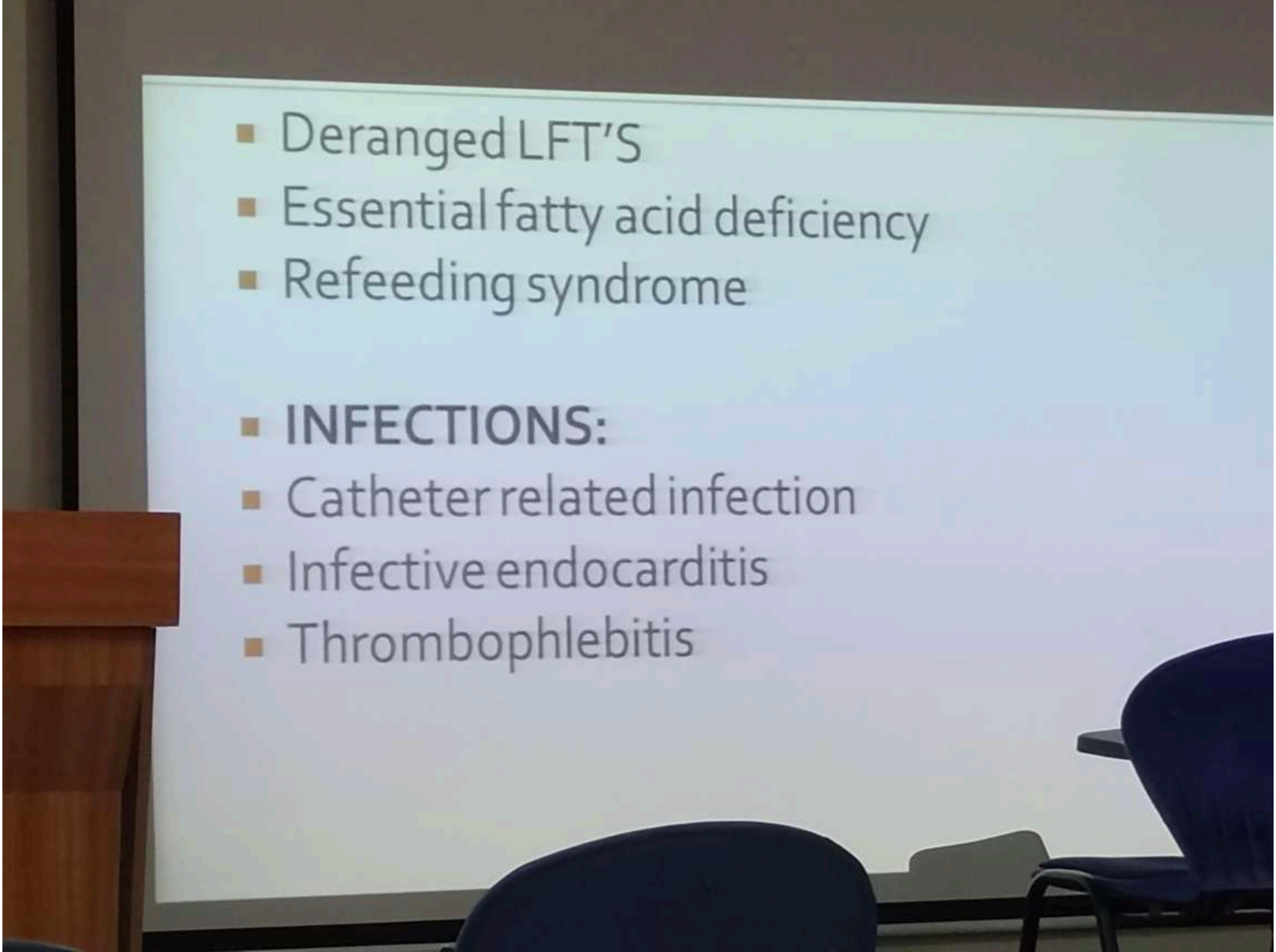
ADVANTAGES AND DISADVANTAGES OF TPN

Total Parenteral Nutrition

- Advantages
  - Dextrose solution of 20% to 70% can be administered
  - Beneficial for long-term use
  - Useful for patients with large caloric and nutrient needs
  - Provides calories; restores nitrogen balance; replaces essential vitamins, electrolytes, and minerals
  - Promotes tissue synthesis
  - Allows bowel to rest and heal
  - Improves tolerance to surgery
- Disadvantages
  - May require a minor surgical procedure for insertion of central line
  - May cause metabolic complications
  - Risk for pneumothorax during insertion
  - Radiographic verification of tip placement of central line needed
  - Full barrier precautions when inserting catheter


MECHANICAL AND TECHNICAL COMPLICATIONS:
Failure to cannulate
Pneumothorex
Haemothorex
Cardiac perforation
Pleural effusion
Brachial plexus injury
Thoracic duct injury
Arterial puncture

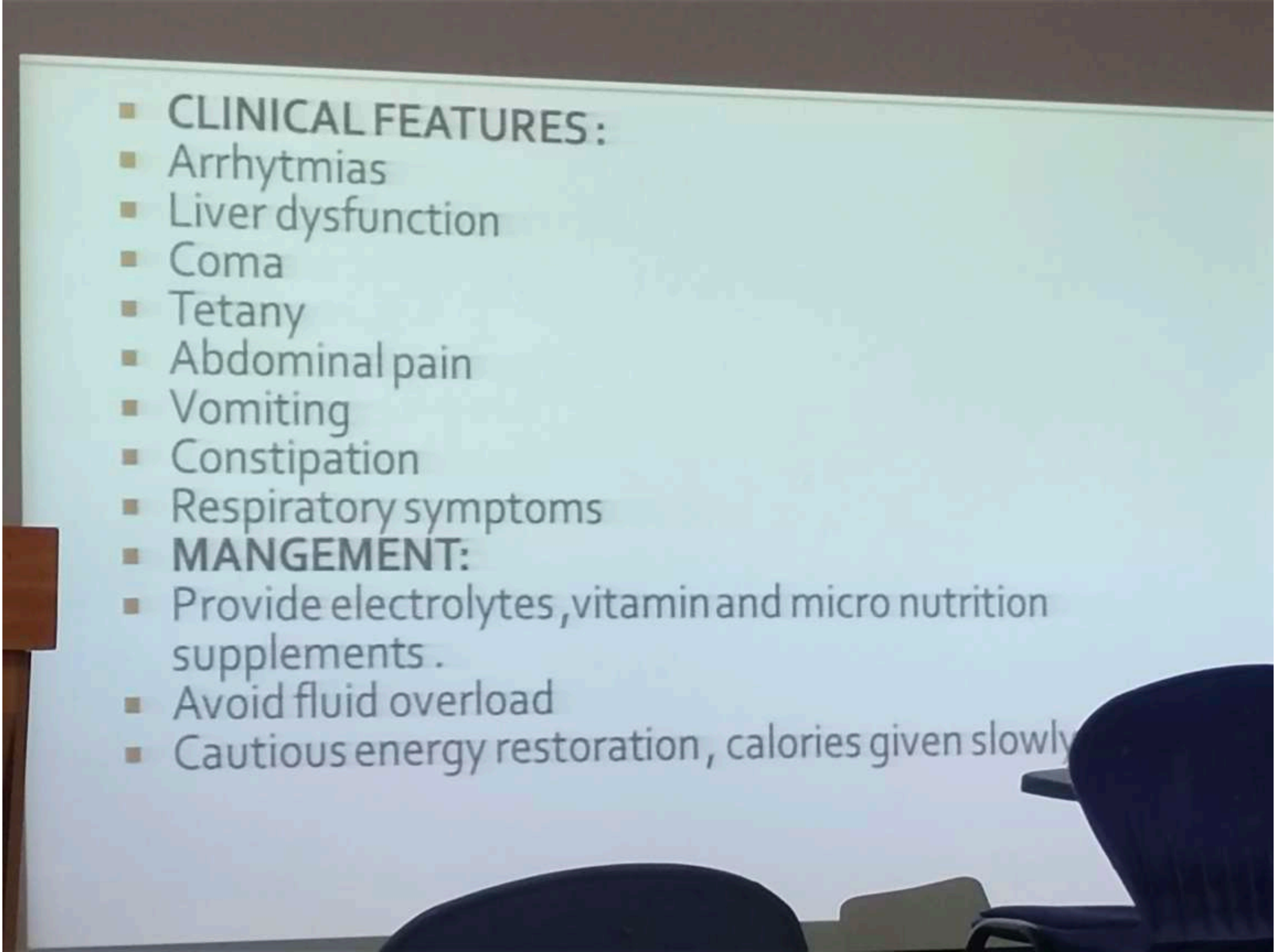

Air embolus
Central venous or cardiac thrombosis
METABOLIC AND NUTRITIONAL COMPLICATIONS:
Hyper or hypoglycemia
Hyperosmolar dehydration
Hypercholestesrolemia
Hypertriglyceridemia
Hyponatraemia
Hypokalaemia
Hyperchloraemia
Trace elements and vitamins deficincy


Deranged LFT'S
Essential fatty acid deficiency
Refeeding syndrome
INFECTIONS:
Catheter related infection
Infective endocarditis
Thrombophlebitis

REFEEDING SYNDROME

- **DEFINITION:**
- It is called severe hypophosphatemia develpos in malnourished pt and caused by high supplementation of high calories, high carbohydrates .

- It results in hypophosphatemia, hypocalcemia, hypomagnesemia.


CLINICAL FEATURES :
Arrhytmias
Liver dysfunction
Coma
Tetany
Abdominal pain
Vomiting
Constipation
Respiratory symptoms
MANGEMENT:
Provide electrolytes ,vitamin and micro nutrition supplements .
Avoid fluid overload
Cautious energy restoration , calories given slowly