

NUTRITION SUPPORT IN CRITICALLY ILL PATIENTS

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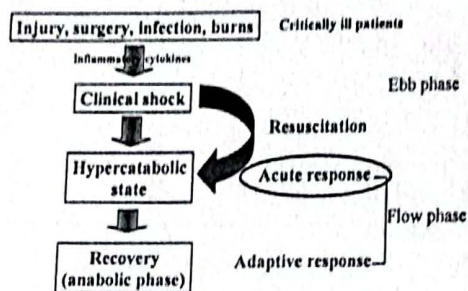
Nutrition Support in Critically Ill Patients

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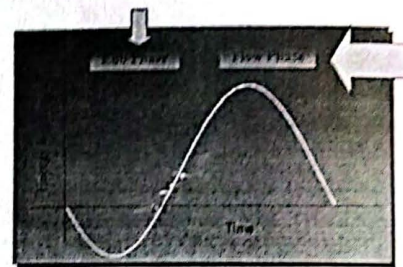
Objectives

- Metabolic changes in critically ill patients
- Phase of metabolic status in condition related to critically illness
- Strategy in nutrition support :
 - Assessment of nutrition status
 - Substrate management
 - Monitoring of nutrition support

Metabolic responses in critically ill patients



Metabolic alteration in response stress



Cuthbertson DP, et al. *Adv Clin Chem* 1969;12:1-55

Ebb Phase

- Characterized by hypovolemic shock
- Priority is to maintain life/homeostasis
 - ↓ Cardiac output
 - ↓ Oxygen consumption
 - ↓ Blood pressure
 - ↓ Tissue perfusion
 - ↓ Body temperature
 - ↓ Metabolic rate

Cuthbertson DP, et al. *Adv Clin Chem* 1969;12:1-55
Welborn MB. In: Rombeau JL, Rolandelli RH, eds. *Enteral and Tube Feeding*. 3rd ed. 1997

Flow Phase

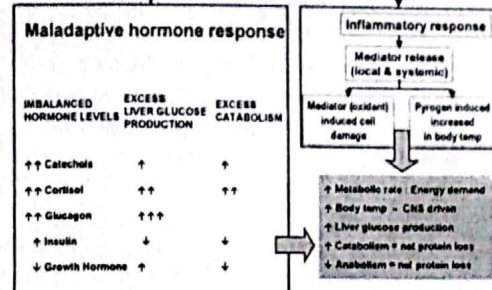
- ↑ Catecholamines
- ↑ Glucocorticoids
- ↑ Glucagon
- Release of cytokines, lipid mediators
- Acute phase protein production

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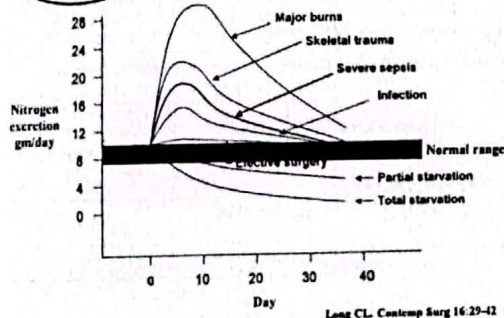
Adaptive response

- Anabolic phase
- Cytokines reduction
- Hormonal response gradually diminishes
 - ↓ gluconeogenesis
 - ↓ catecholamines
 - ↓ aldosterone and ADH
 - Salt and water loss
 - ↑ insulin and ↓ glucagon
 - protein anabolism

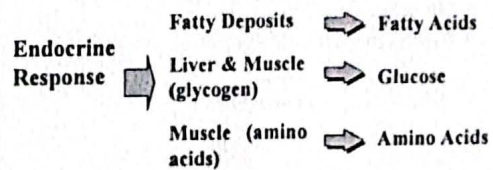
The stress response



Catabolic Response in Critically Ill Patients



Metabolic alteration



strategy of nutrition support in critically ill patients

Why nutrition in critically ill patients is important?

Critically ill patients mostly hypermetabolic and anorexic

The goals for nutrition support:

- Meet increased metabolic needs
- Maintain body cell mass (muscles, gut mucosa and other organs)
- Prevention/correction of specific nutrient deficiencies
- Promote wound healing
- Support immune system to fight infection
- Avoid complications related to technique and delivery

- Nutritional support should consider:
 - demands of hypermetabolic phase
 - pre-stress nutritional state
- Nitrogen loss max 4 – 8 days may be more
- Nutrition is crucial in helping patients through hypermetabolic phase and preparing for anabolic recovery

Metabolic Response in hypercatabolic state

- Hyperglycemia
- Hypertriglyceridemia
- Hypercapnia
- Fatty liver
- Hypophosphatemia, hypomagnesemia, hypokalemia

Appropriate substrate composition → very important

Barton RG. Nutr Clin Pract 1994;9:127-139

Determining Calorie Requirements

- Indirect calorimetry
- Harris-Benedict x stress factor x activity factor
- 25-30 kcal/kg body weight/day

↓
More acceptable and easier



Substrat nutrisi	Jumlah
Air cc/kgBB/hari	25 – 30 (kritis) 30 – 50
Energi Kcal/kgBB/hari	25 – 30 (kritis) 30 – 50
As.Amino/prot Gr/kgBB/hari	1,2 – 1,5
Na meq/kgBB/hari	1 -2
K meq/kgBB/hari	1
Glukosa : lemak	3 : 1 - 1 ; 1

Macronutrients requirements in critically ill patients

1. Carbohydrate

- At least 100 g/day needed to prevent ketosis
- Carbohydrate intake during stress should be between 30%-40% of total calories
- Glucose intake should not exceed 5 mg/kg/min

Barton RG. Nutr Clin Pract 1994;9:127-139
ASPEN Board of Directors. JPEN 2002; 26 Suppl 1:22SA

2. Fat

- Provide 20%-35% of total calories
- Maximum recommendation for intravenous lipid infusion: 1.0 -1.5 g/kg/day
- Monitor triglyceride level to ensure adequate lipid clearance

3. Protein

- Requirements range from 1.2-2.0 g/kg/day during stress
- Comprise 20%-30% of total calories during stress

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ASPEN Board of Directors. JPEN 2002;26 Suppl 1:22SA