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Lecture-1

Why are you here?

Lecture-2

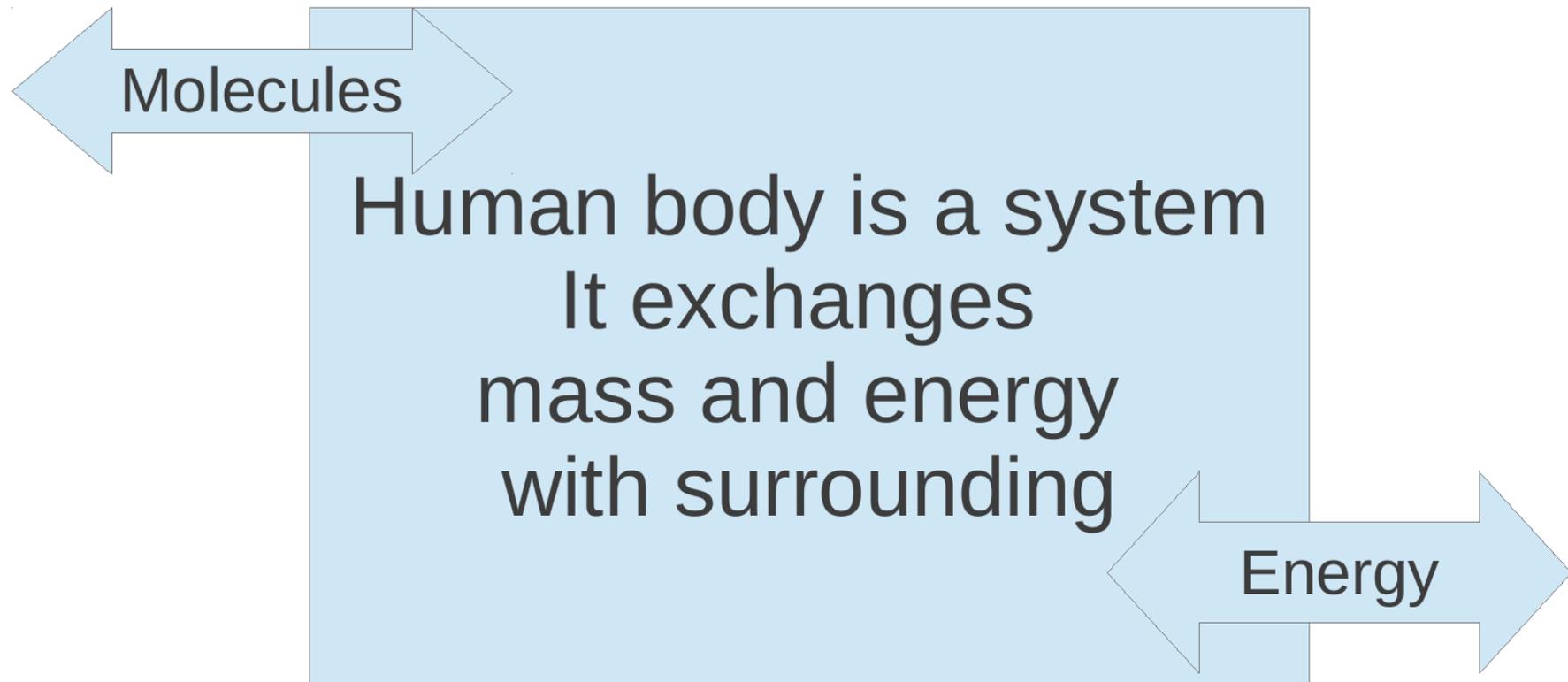
Body is a collection of molecules

Lecture-3 Body as a system

Dr S M Patel

What is a system?

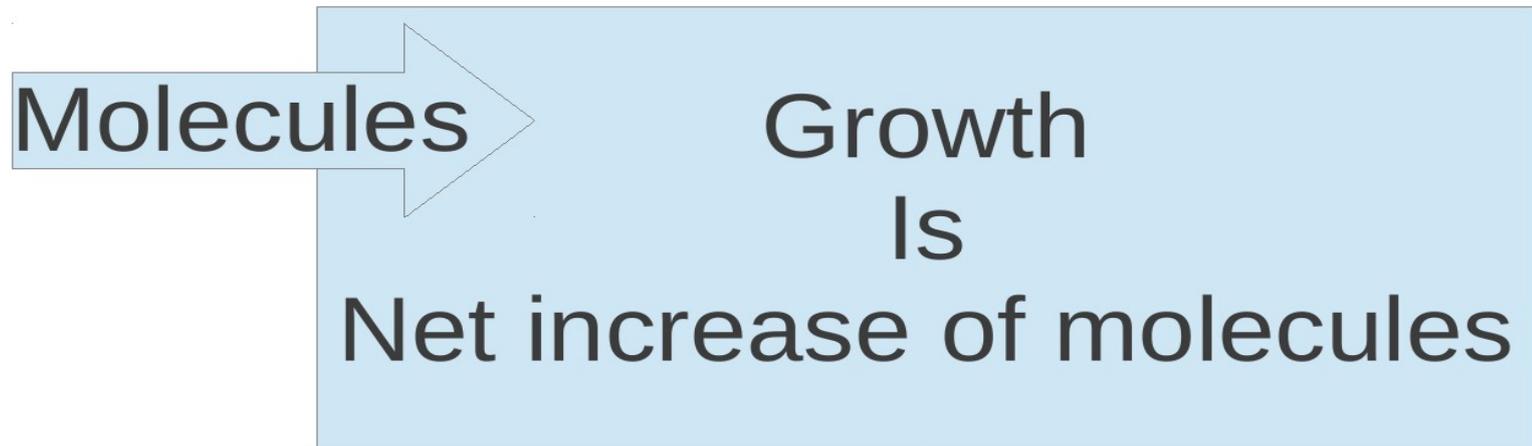
Body is a system



**When does the system mass
increase?**

Growth

Molecules



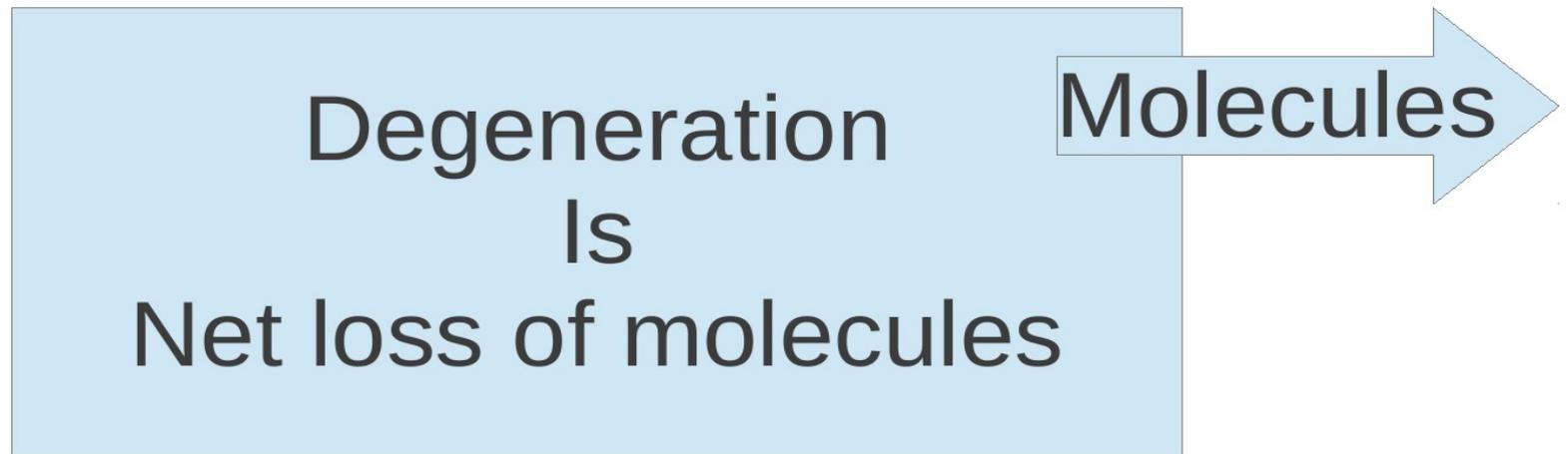
Growth
Is

Net increase of molecules

Embryo, Growing Child,
Body Building,
recovery from illness

**When does the system mass
decreases?**

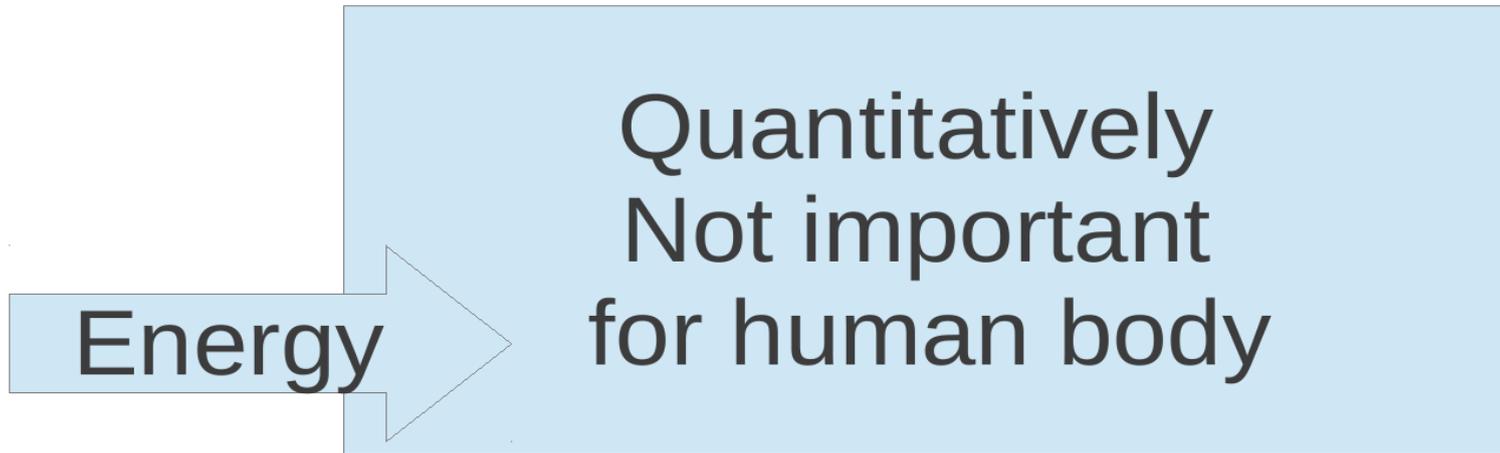
Degeneration



Aging
Illness

**When does the system energy
increase?**

Photons are used by human body



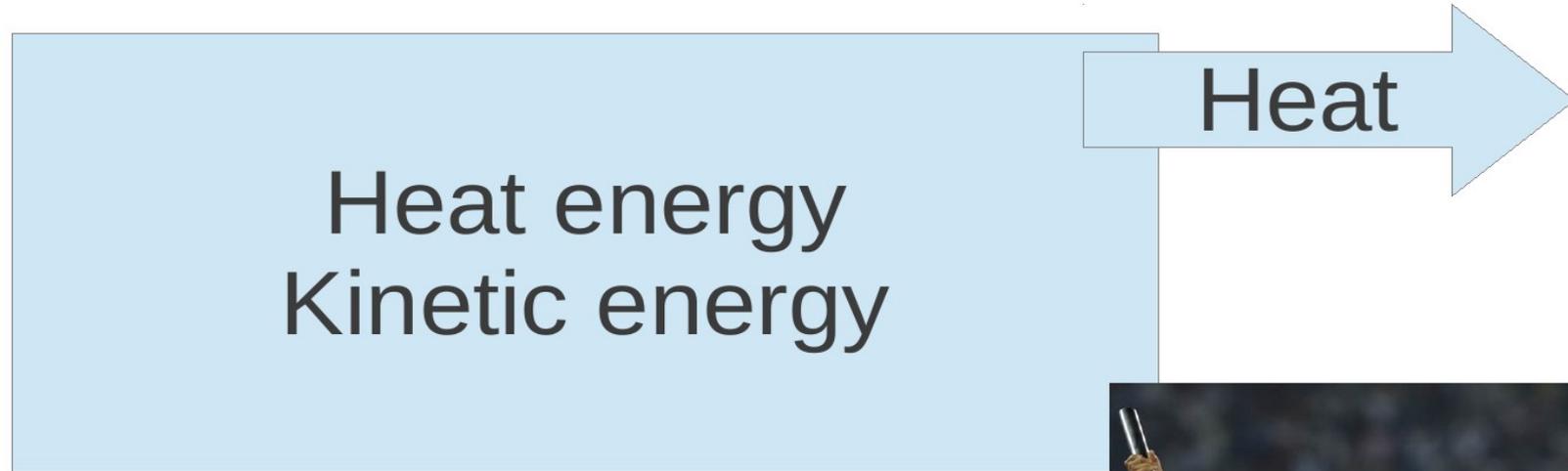
Synthesis of Vitamin D

Retina absorbing light

Plant uses energy to form Glucose

**When does the system energy
decreases?**

Body makes net energy output



energy output we can not do



Electric fish



Firefly

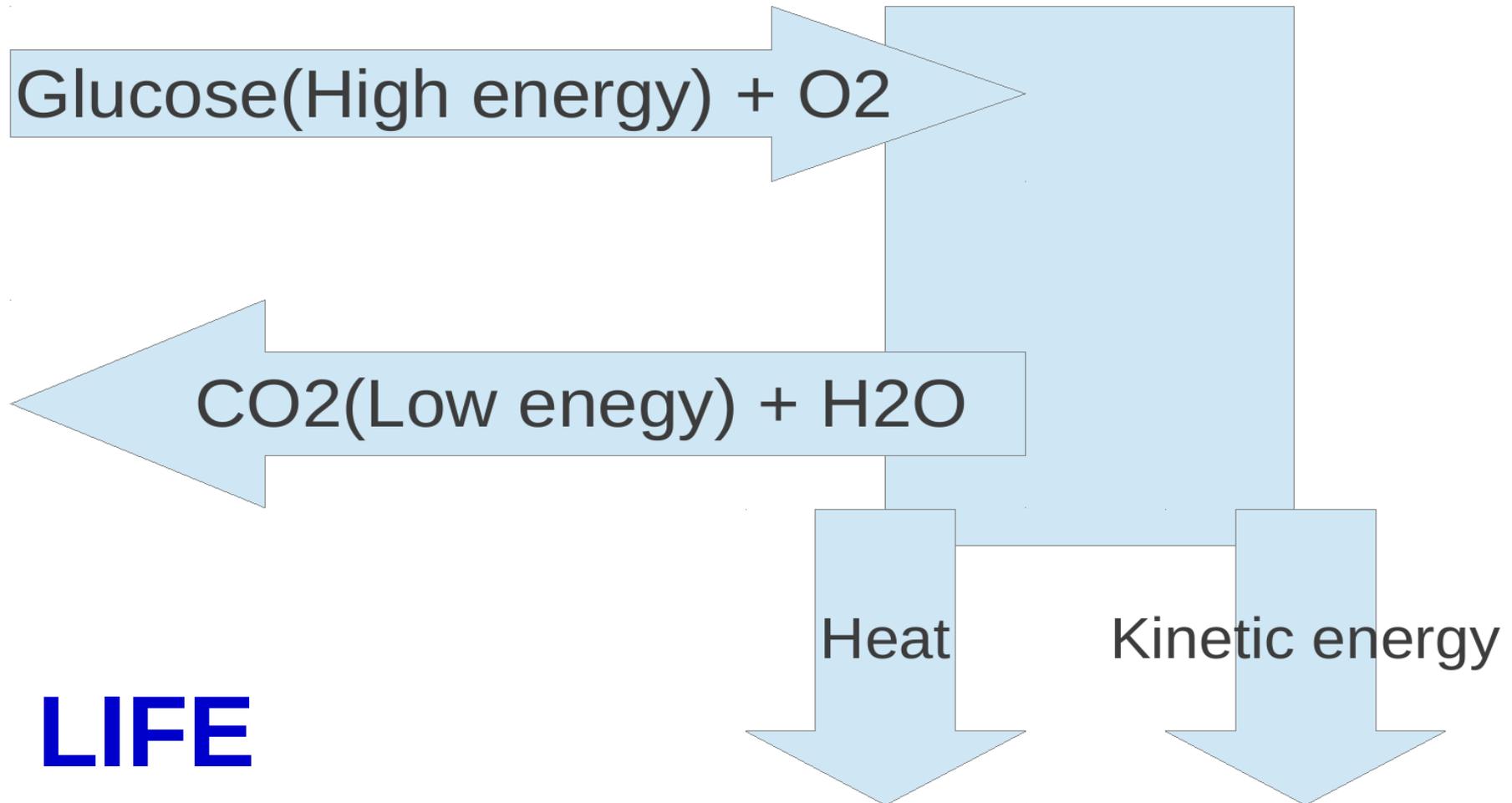
**What is difference between
live-system
and
dead-system?**

Life is chemical disequilibrium

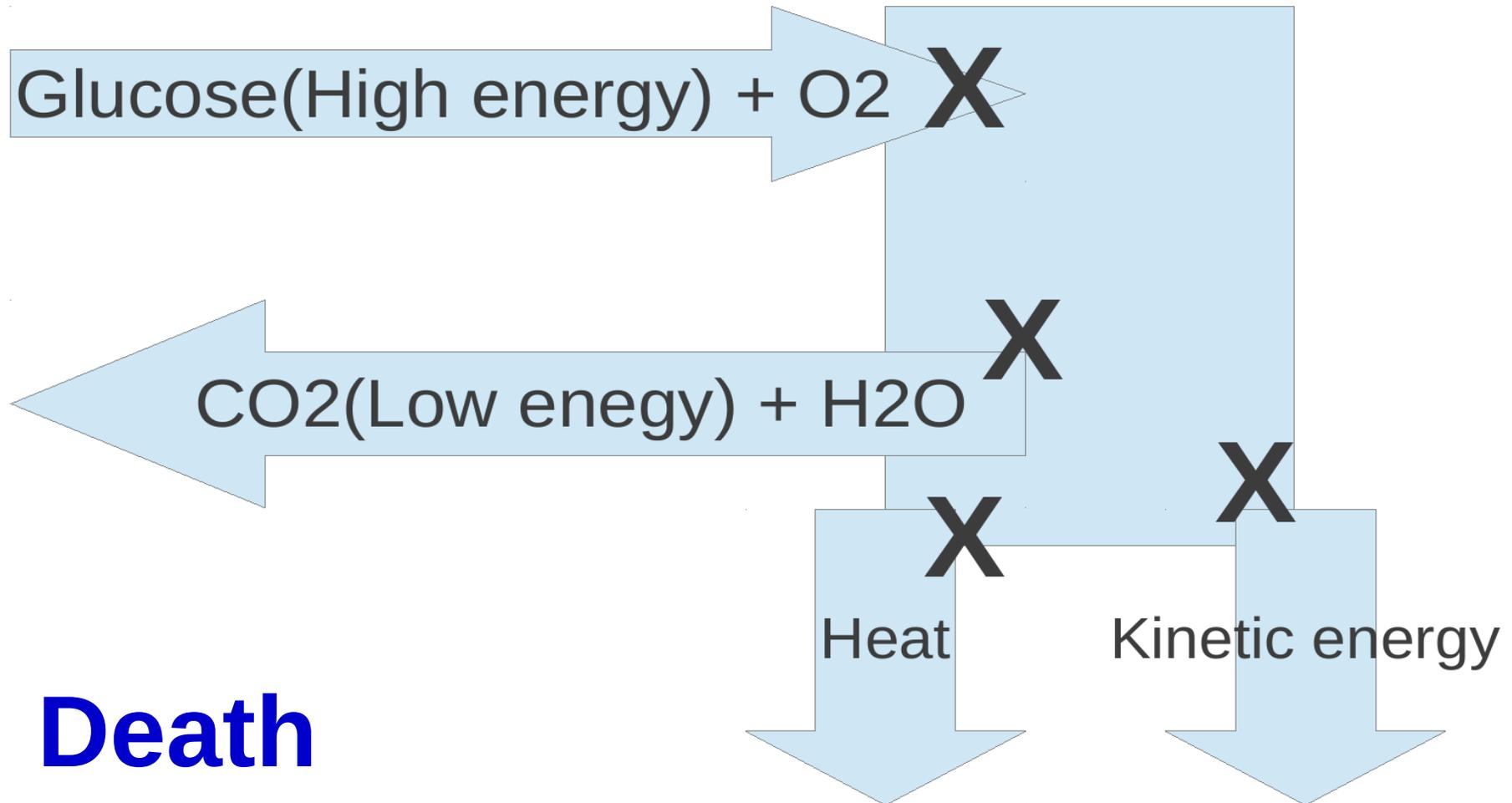


Death = equilibrium has reached

Life is chemical disequilibrium



Death is chemical equilibrium



molecules required by body

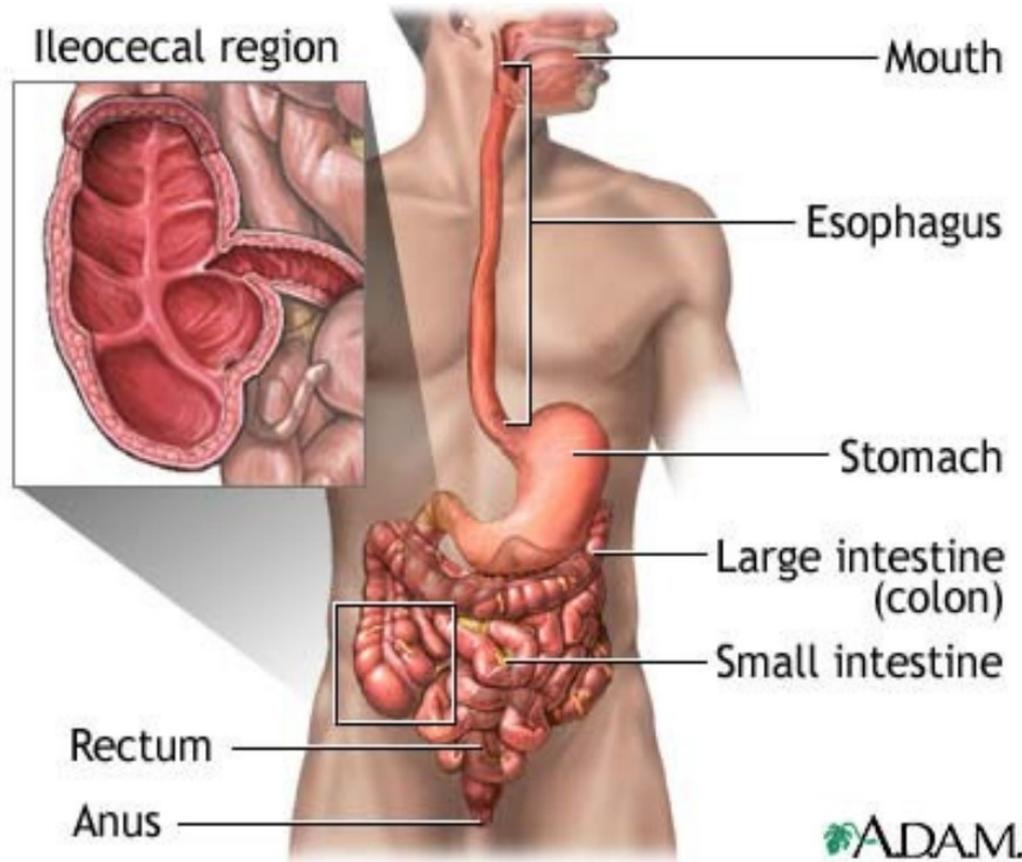


Humans take many many type of molecules in food

Which of them are really essential?

Why?

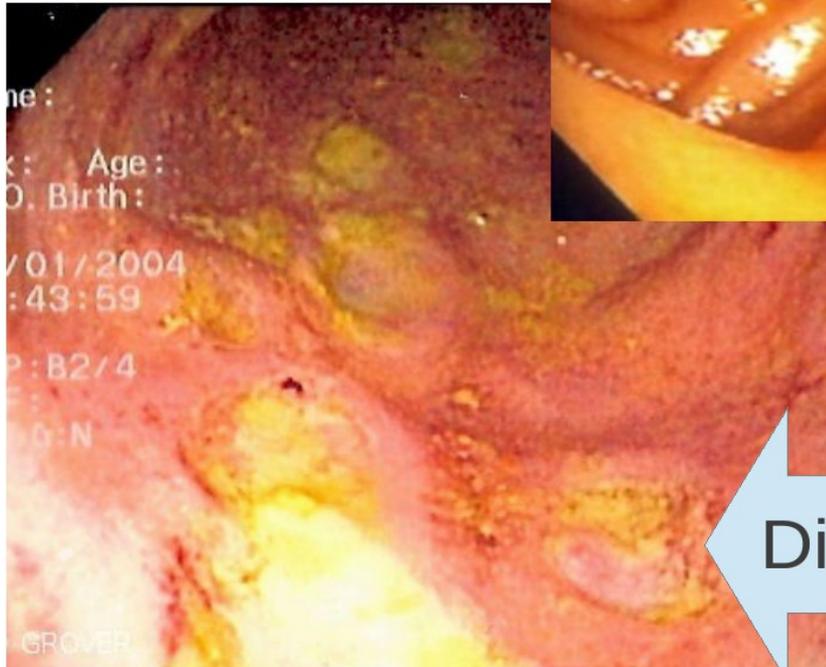
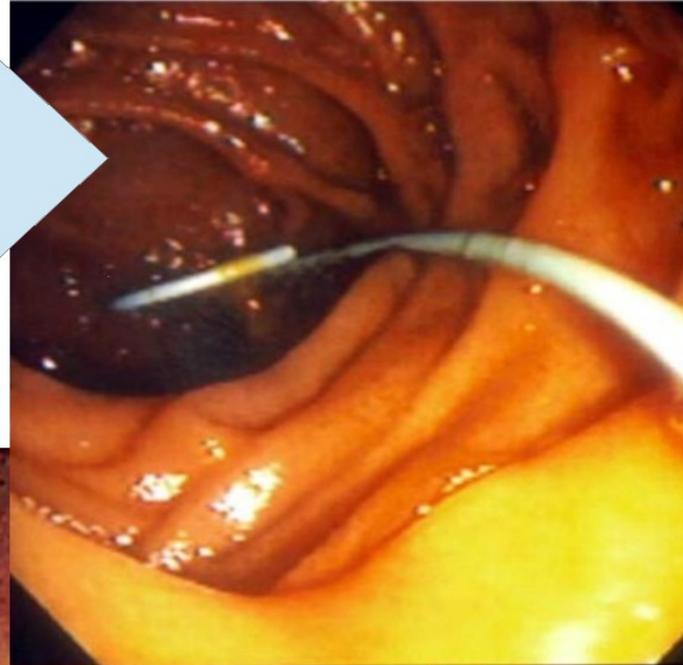
Let us study a disease to understand molecules required



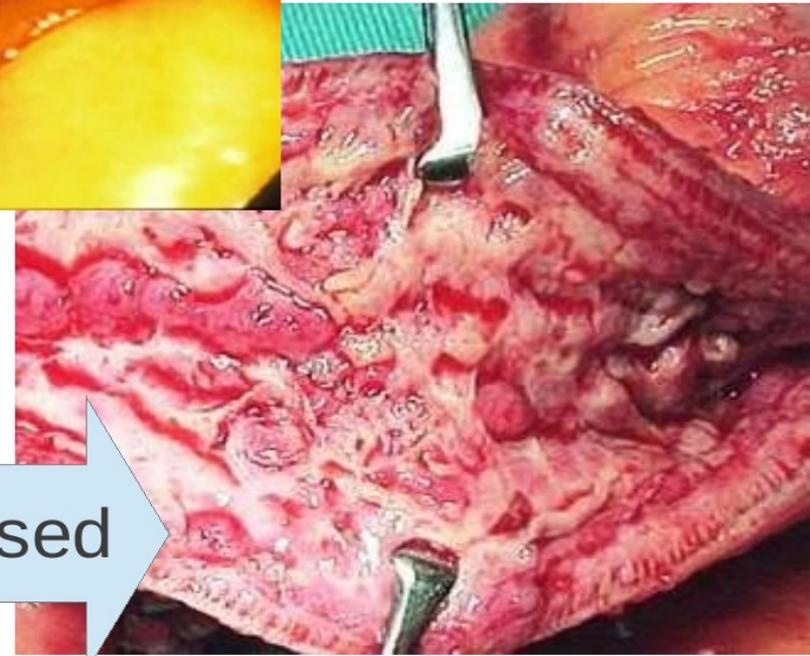
Crohn's disease

Intestine lumen in Crohn's Disease

Normal



Diseased

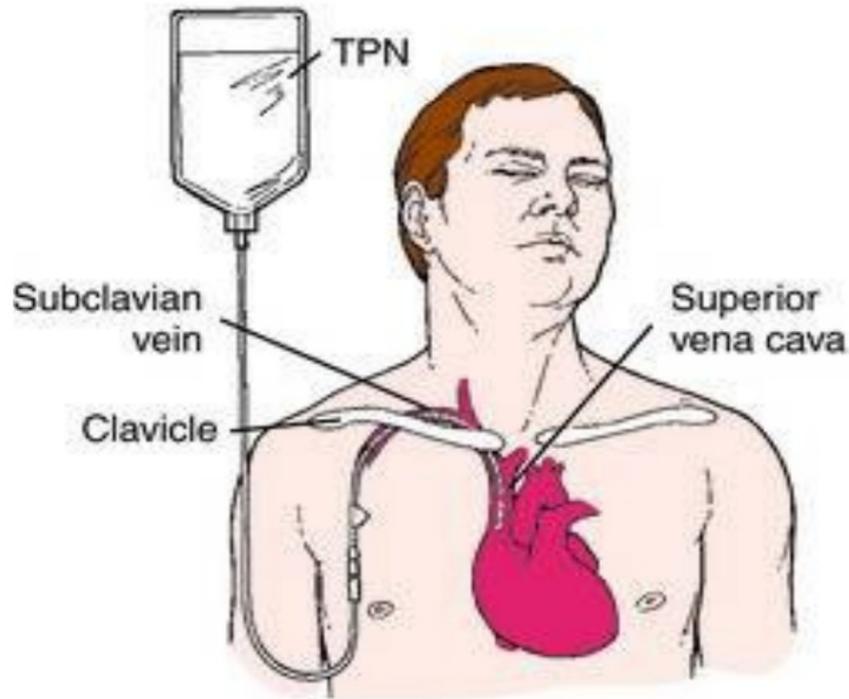


Crohn's Disease leads to blocked intestine

No food can be taken by mouth

Can we inject Rice+Dal+Roti+sabji, all mixed with a blender in to patient's vein?

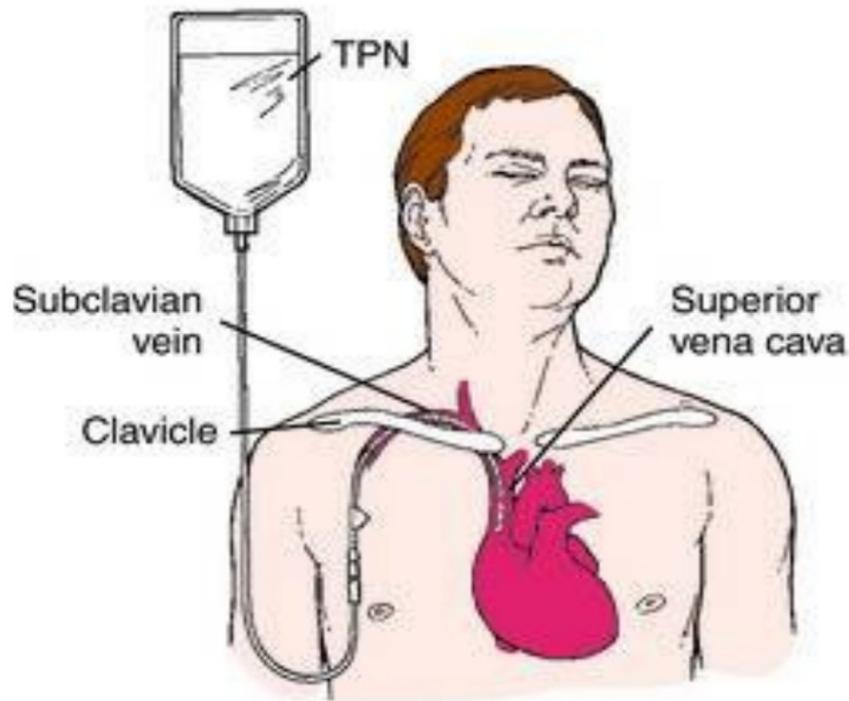
Nutrition in Crohn's Disease



Blanded food contain Starch, Protein, Triglycerides, DNA, RNA, cellulose, water, Ca^{2+} , Vitamins etc.

Starch, Protein, cellulose, Triglycerides in blood are useless to body. In fact, such blanded food will block capillaries.

Total Parenteral Nutrition

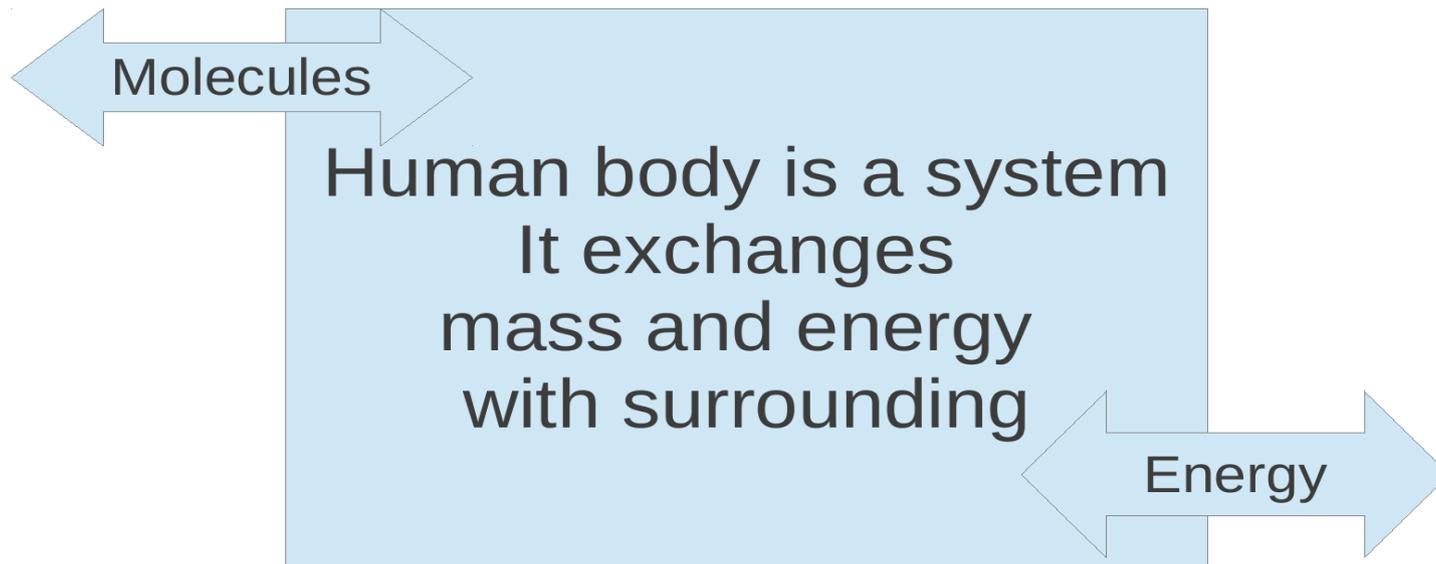


Body cells can use glucose, amino acids, TG from blood

Liquid containing such essential molecules is called TPN solution. It is injected in vein.

List Molecules which must enter body system

Body is a system



molecules required by body

Water

O₂

Essential amino acids (10)

Essential fatty acids (2)

Vitamins

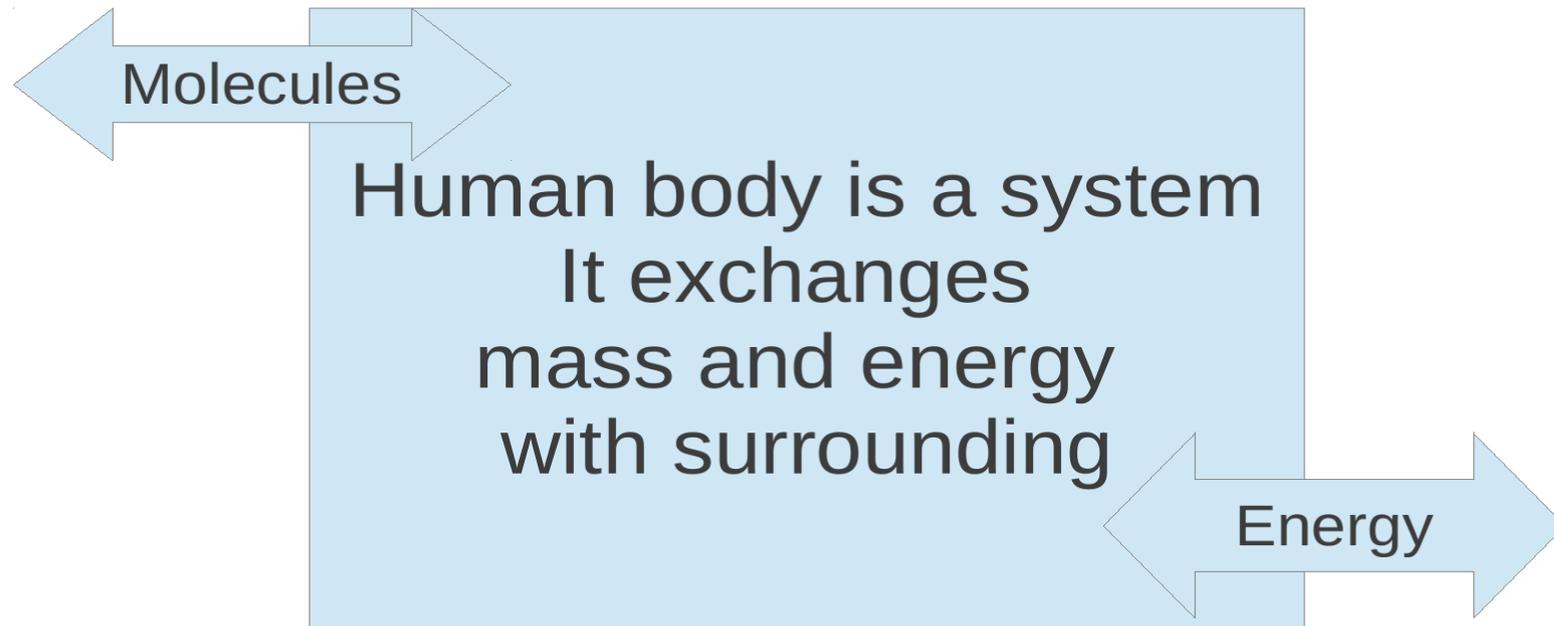
Minerals

Energy yielding molecules(C,L,P)

Glucose???

List Molecules which must leave body system

Body is a system



“Must” Outputs from body

Water

CO₂

Urea, Creatinine,

Uric acid,

b-alanine, b-aminoisobutyrate

Minerals

Vitamins metabolites

“Must” Outputs from body

Water

CO₂

Urea, Creatinine,

Uric acid,

b-alanine, b-aminoisobutyrate

Minerals

Vitamins metabolites