TRUTHS ABOUT INTERMITTENT FASTING

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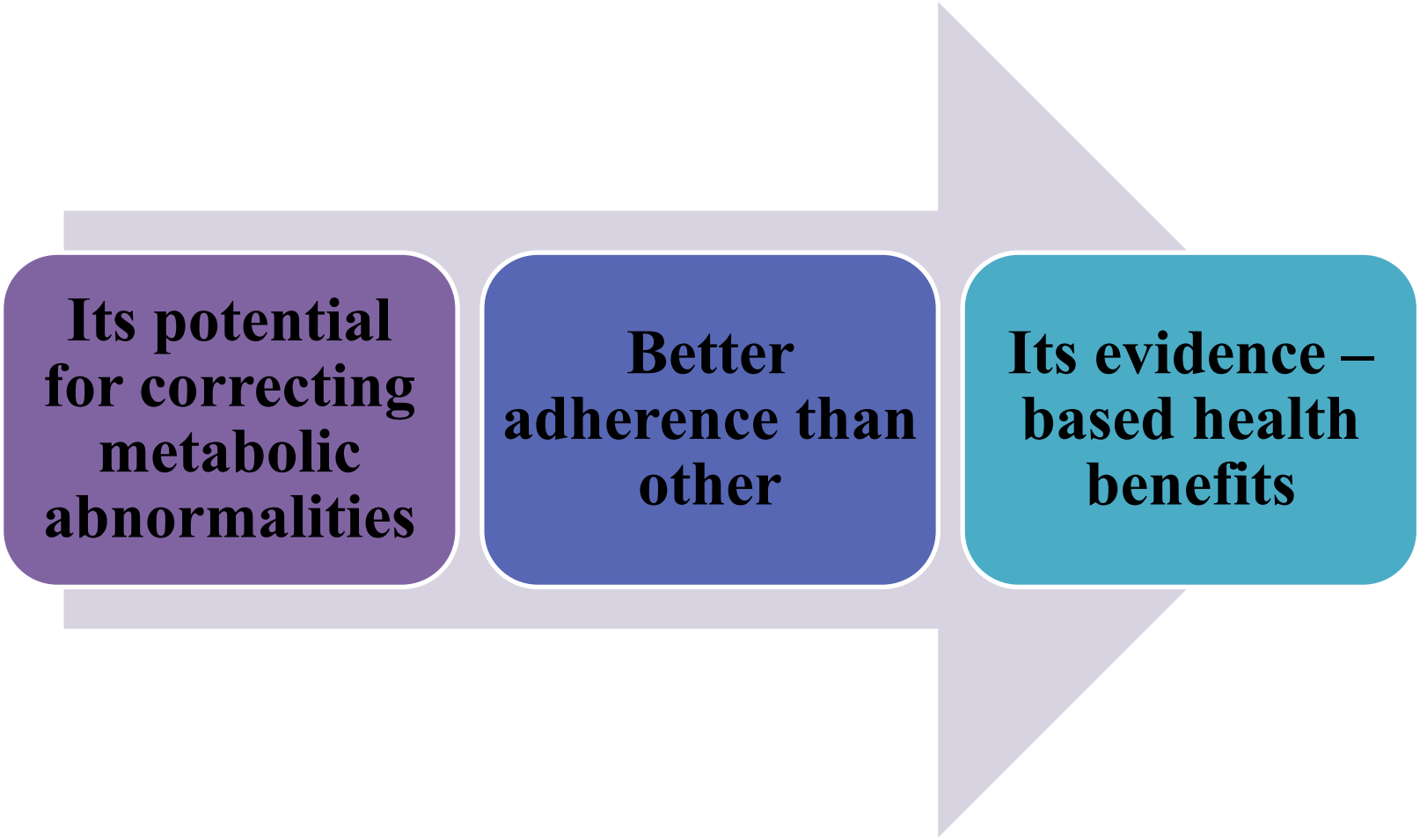
Intermittent fasting

Is a term that is used to describe various eating patterns that cycle between scheduled periods of eating and fasting. IF is scheduled eating, focusing on when and how often eating rather than what eating.

IF recently attracted attention



Types of intermittent fasting

Alternate Day Fasting	Modified Alternate Day Fasting	The twice a week 2:5
Time-restricted eating	Whole-Day Fasting	Over night Fasting

- Consists of a day of ad libitum eating often referred to as the “feed day,” followed by a day with no caloric consumption called the “fast day.

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Eat normally	**24 hr fast** **Zero calories**	**Eat normally**	**24 hr fast** **Zero calories**	**Eat normally**	**24 hr fast** **Zero calories**	**Eat normally**

Modified

- Consuming 25% to 40% of energy needs on the fast day and ad libitum food intake on the following day.
- It has allowed the greatest weight loss and decreases in insulin resistance among overweight individuals.

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Eat normally	**Eat few hundred calories**	**Eat normally**	**Eat few hundred calories**	**Eat normally**	**Eat few hundred calories**	**Eat normally**

- During 2 days of the week, eat only about 500–600 calories

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Eat normally	Women 500 calories Man 600 calories	Eat normally	Eat normally	Women 500 calories Man 600 calories	Eat normally	Eat normally

- This regimen restricts the eating time period on a daily basis. It is based on 16:8 (fasting: eating), 18:6, 20:4 pattern

- The Eat-Stop-Eat method is a 24-hour fast, practiced once or twice a week. It is most often practiced by fasting after dinner one day until dinner the next day. In this case, the time of dinner must be consistent.
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Energy sources

CHO are broken down to glucose which is used for energy . The biggest consumers of glucose are our brain and muscles – our brain alone uses around 120g of glucose a day just to function.

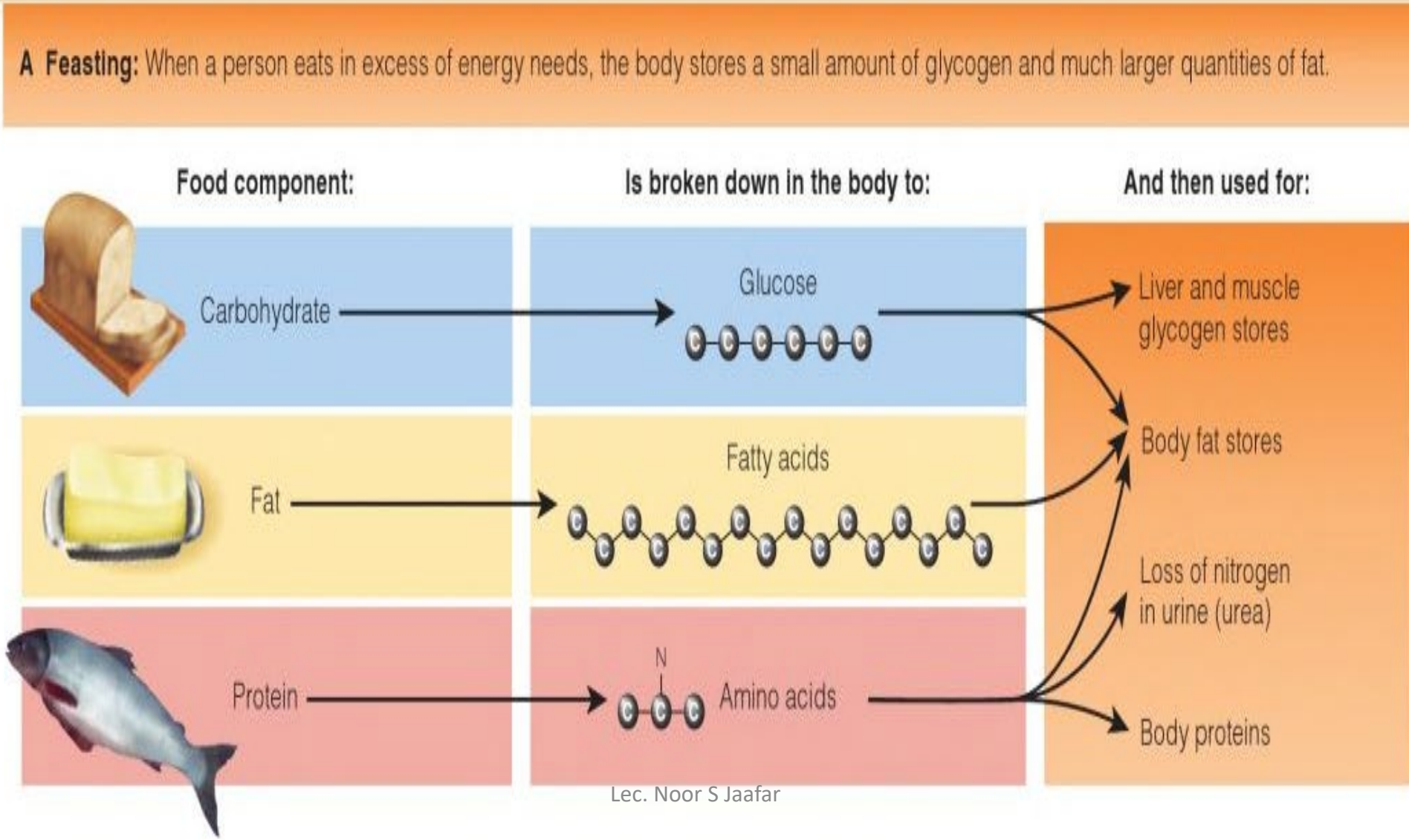
is conserved for tissue maintenance, repair, and growth

Dietary fats are digested to fatty acids and absorbed into the body.
They may be used for a variety of processes or used immediately for energy.

What is the result of overeating

Overweight and obesity

Feasting and fasting



How dose the glucose we eat convert to fat

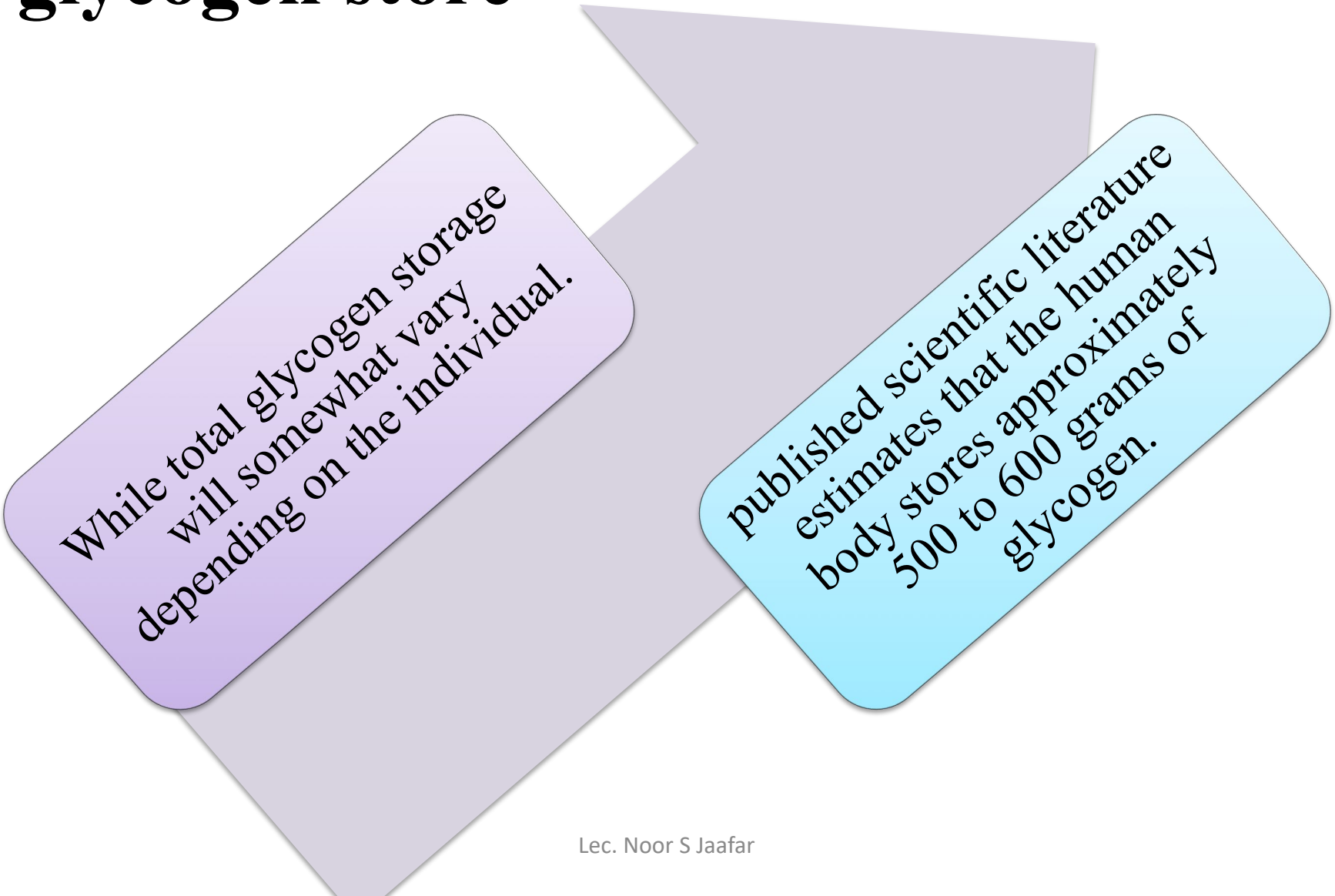
What happen to the excess glucose

If you eat enough food there will be likely excess of glucose that your body dose not need

Excess glucose will be converted in to glycogen and stored in the liver and muscle

If there is glycogen the rest is stored as fat

What is the approximate body glycogen store



How dose the proteins we eat convert to fat

When a person overeats proteins the body uses the surplus by replacing normal daily losses.

Then increasing protein oxidation, an increase in protein oxidation uses some excess proteins

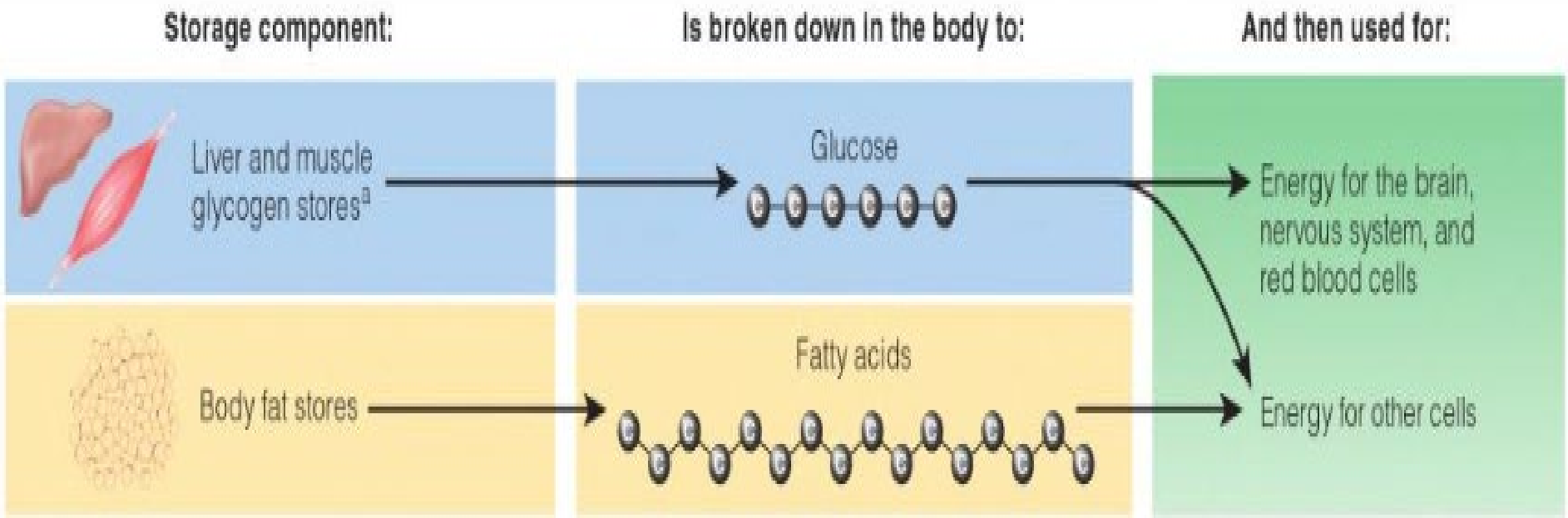
If protein is still available the amino acids are deaminated and the remaining carbon skeleton are used to make fatty acids which are stored as triglycerides in adipose tissues

How dose the fat we eat convert to fat

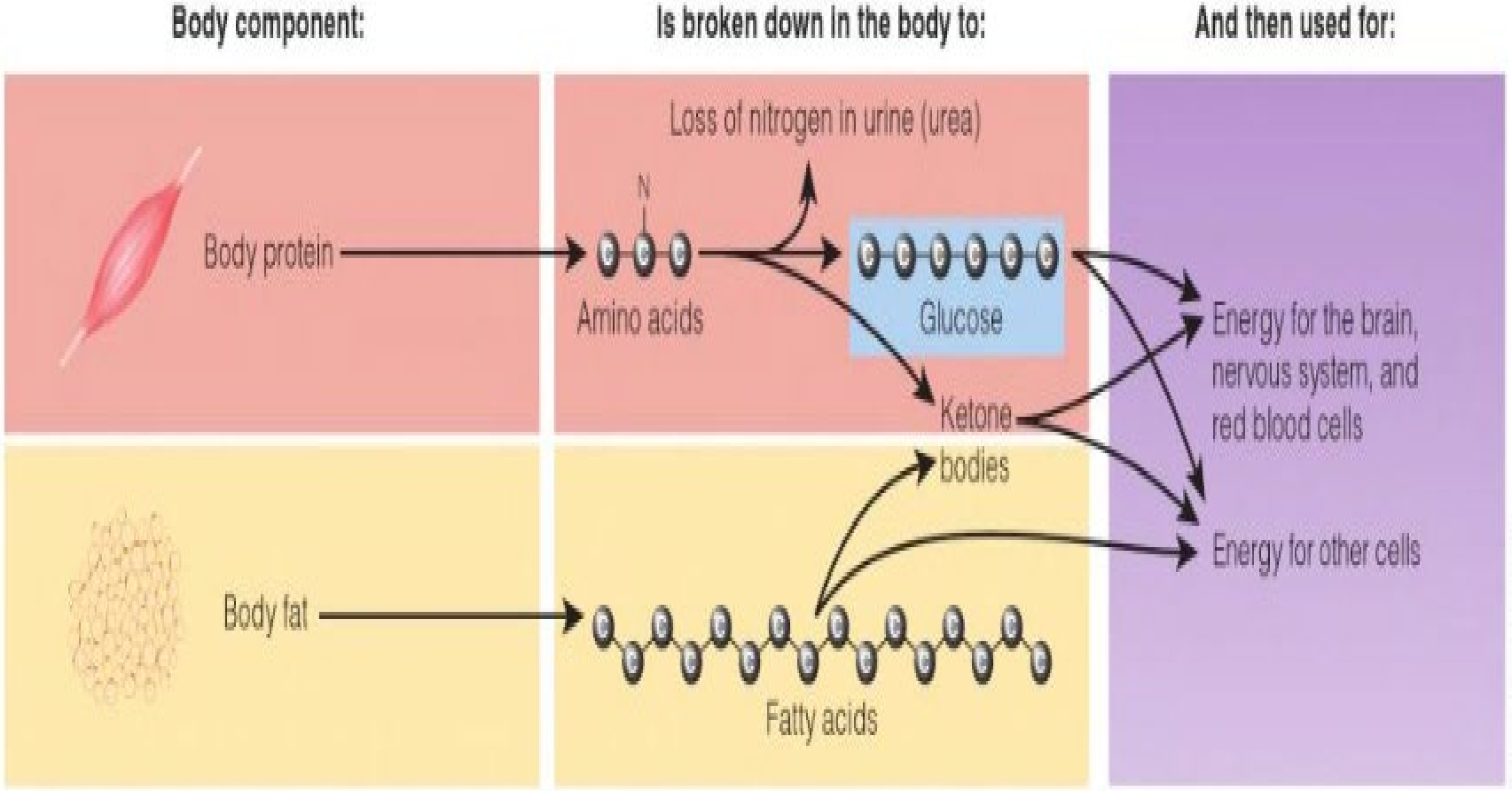
Eating too much fat dose not stimulate fat oxidation

Instead excess fat moves efficiently in to body fat stores, almost all excess fats are stores

B Fasting: When nutrients from a meal are no longer available to provide energy (about 2 to 3 hours after a meal), the body draws on its glycogen and fat stores for energy.

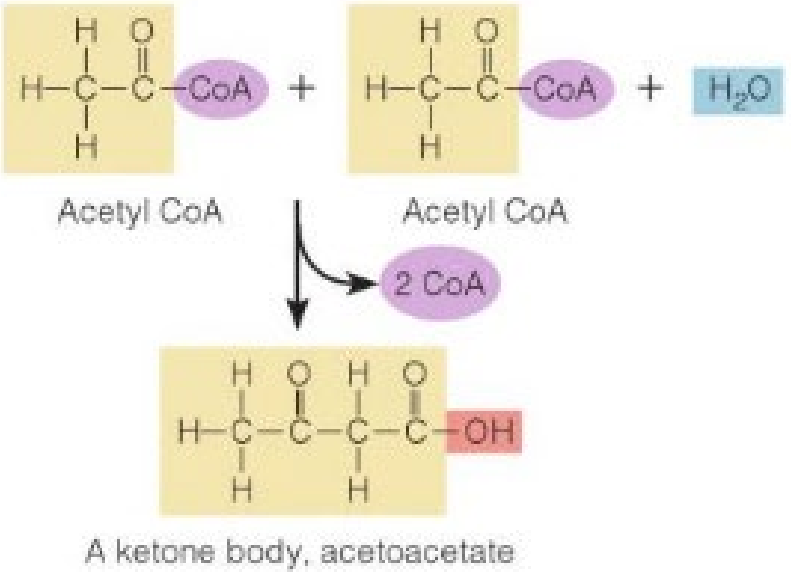


C Fasting beyond glycogen depletion: As glycogen stores dwindle (after about 24 hours of starvation), the body begins to break down its protein (muscle and lean tissue) to amino acids to synthesize glucose needed for brain and nervous system energy. In addition, the liver converts fats to ketone bodies, which serve as an alternative energy source for the brain, thus slowing the breakdown of body protein.



KETONE BODIES FORMATION

1. The first step in the formation of ketone bodies is the condensation of two molecules of acetyl CoA and the removal of the CoA to form a compound that is converted to the first ketone body, acetoacetate.



2. Acetoacetate may lose a molecule of carbon dioxide to become another ketone body, acetone.

3. Or, acetoacetate may add two hydrogens, becoming another ketone body (beta-hydroxybutyrate)

DIFFERENCE BETWEEN CR AND IF

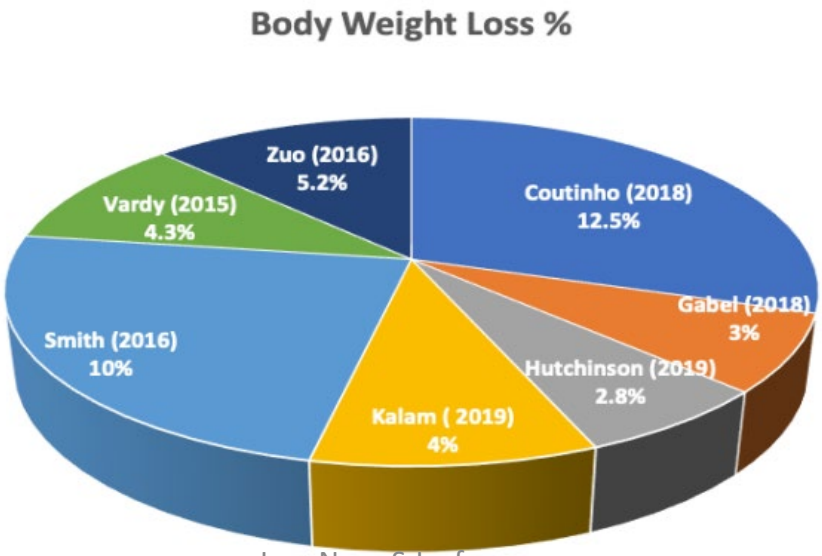
Calories restriction	Fasting
severe calorie restriction is associated with persistent hunger, fatigue, irritability, apathy, and loss of sex drive.	Individuals undergoing short-term fasts frequently report a lack of hunger, which may be proportional to the level of ketosis achieved, as well as improvements in energy, mood, self-confidence, and quality of life
The human body adapts to a chronic 20%–40% reduction in calorie intake by lowering its resting metabolic rate to roughly the same degree due to reduction in overall sympathetic activity	fasting stimulates a 5%–15% increase in the resting metabolic rate it via the activation of "counter-regulatory" hormones such as GH, cortisol, and catecholamines

Both IF and short-term calorie-restricted diets produce similar weight loss in people with obesity and people with type 2 diabetes . There are few long-term clinical trials, but these have revealed the superiority of IF over caloric restriction in reducing waist circumference and central fat distribution.

The Effects of Intermittent Fasting

- **Alterations in Weight and Body Composition**

Nearly all IF studies have resulted in some degree of weight loss, ranging from 2.5–9.9% and associated fat mass loss



Weight reduction through

- **Automatic reduction in food intake.**
- **Normalize or reduced ghrelin (the hunger hormone) so less appetite.**
- **Change hormones level to facilitate weight loss.**
- **Lowering insulin and increase growth hormone level.**
- **Increase release of fat burning protein as norepinephrine.**

In one trial, 16 healthy participants assigned to a regimen of alternate day fasting for 22 days lost 2.5% of their initial weight and 4% of fat mass, with a 57% decrease in fasting insulin levels.

- A weight loss of 1 kg reduces the risk of diabetes by as much as 16%.

EFFECT ON TYPE II DM

Reduced body weight, LDL and TG levels after fasting.

Decreased HbA1c

lowered pro-inflammatory mediators such as TNF-α and IL-6.

In religious fasting

Effect on type II diabetes mellitus

Overall, reviews of the evidence show that insufficient human data exist presently to recommend the use of intermittent fasting or low-calorie diets to prevent diabetes or, among people with diabetes, to prevent its sequelae.

Risk of IF in DM

Immediate risk: risk of hypoglycemia in patient taking insulin, sulfonylurea and related antidiabetics.

Long term risk : risk of protein deficiency if individual fail to maintain adequate protein intake.

Minerals and vitamins deficiency

EFFECT ON BLOOD PRESSURE

IF decreases the blood pressure by reducing the activity of the sympathetic nervous system

decreased production of catecholamines (norepinephrine and epinephrine) as IF decrease the level of dopamine beta-hydroxylase (the enzyme required for the production of catecholamines

Effect on brain and on neurological disorders

Improved cognitive functioning.	
Parkinson's disease	Greater retention of motor skills and less dopaminergic neuronal loss in the substantia nigra (rodents).
Multiple sclerosis	Reversed disease progression.
Epilepsy	Improved seizure control in children
Mood- and anxiety disorders	Worsened schizophrenia symptoms, Relapse in bipolar disorder (Ramadan fasting) antidepressant effects (rodents)

EFFECT ON CANCER

Cancer cells are glucose loving as they have more insulin trans-membrane receptor sites to increase the uptake of glucose; however normal body cells are flexible to use other available energy sources like fat and proteins during fasting when glucose is not available.

Effect on cancer

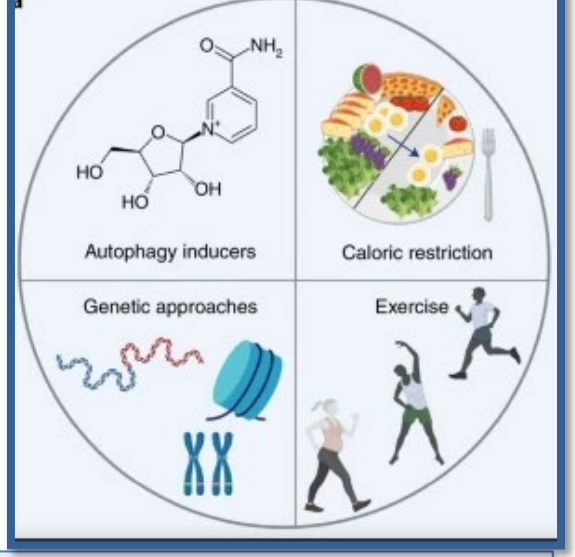
(FDA) recommends IF as necessary therapy to mitigate the atrocious risks of cancer

IF is suggested to suppress the inflammatory response cascades.

Mitochondrial DNA mutation cause defective inner membrane and ultimately affect ion movement and ATP production .

Stimulation of autophagy.

EFFECT ON AUTOPHAGY AND AGING



Autophagy is a self-digesting mechanism responsible for removal of damaged organelles,

malformed proteins during biosynthesis, and nonfunctional long-lived proteins by lysosome.

Autophagy occurs at basal levels under physiological conditions and can also be upregulated in response to stressful stimuli such as hypoxia, nutritional deprivation, DNA damage, and cytotoxic agents

studies demonstrate that a gradual decline in the abundance of autophagy-related proteins and reduced delivery of cargo to lysosomes occur with age, implicating compromised autophagy as a cardinal feature of organismal aging.

IF reduce the production of IGF-1, this hormone exacerbate aging and involved in development of many diseases.

a mild increase in autophagy extends lifespan, whereas strongly increasing autophagy shortens lifespan

Effects of Intermittent Fasting on Health and Aging

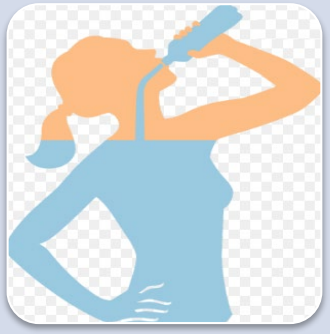
Reduced food intake robustly increases the life span.

Good rick and colleagues reported that the average life span of rats is increased by up to 80% when they are maintained on a regimen of alternate-day feeding, started when they are young adults.

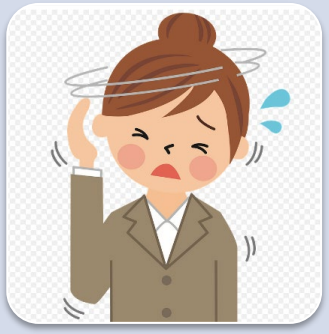
Side effects of intermittent fasting

Increased Hunger/

Risk of Overeating



Dehydration



Headaches, increased fatigue

Could Cause Constipa-tion

fear of malnutrition .

People at high risk of malnutrition

Renal stones

Gout

Potential contraindication

Extremes of age (children, the very old)	People of low body weight	Breast feeding or pregnant women	Type 1 diabetes

- **Intermittent fasting during pregnancy is not recommended and is associated with a higher incidence of gestational diabetes mellitus and induction of labour**

CONCLUSION

IF has a proved health effects specially on body weight.

Conflicting data regarded the effects of IF specially on DM.

Most researches on human included small number of volunteers, and for short term. long term studies are required.

It is not suitable for special age groups.

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