Nutrition in childbearing ages

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- Women and girls' health, nutrition, and resilience are the foundation for strong families and communities.

- *Poor nutrition is common among women of reproductive age and adolescents with diets falling short of nutritional needs.*

- Poor maternal nutrition is a major driver of maternal health risks, adverse birth outcomes, newborn morbidity, and mortality as well as poor postnatal growth and cognition.


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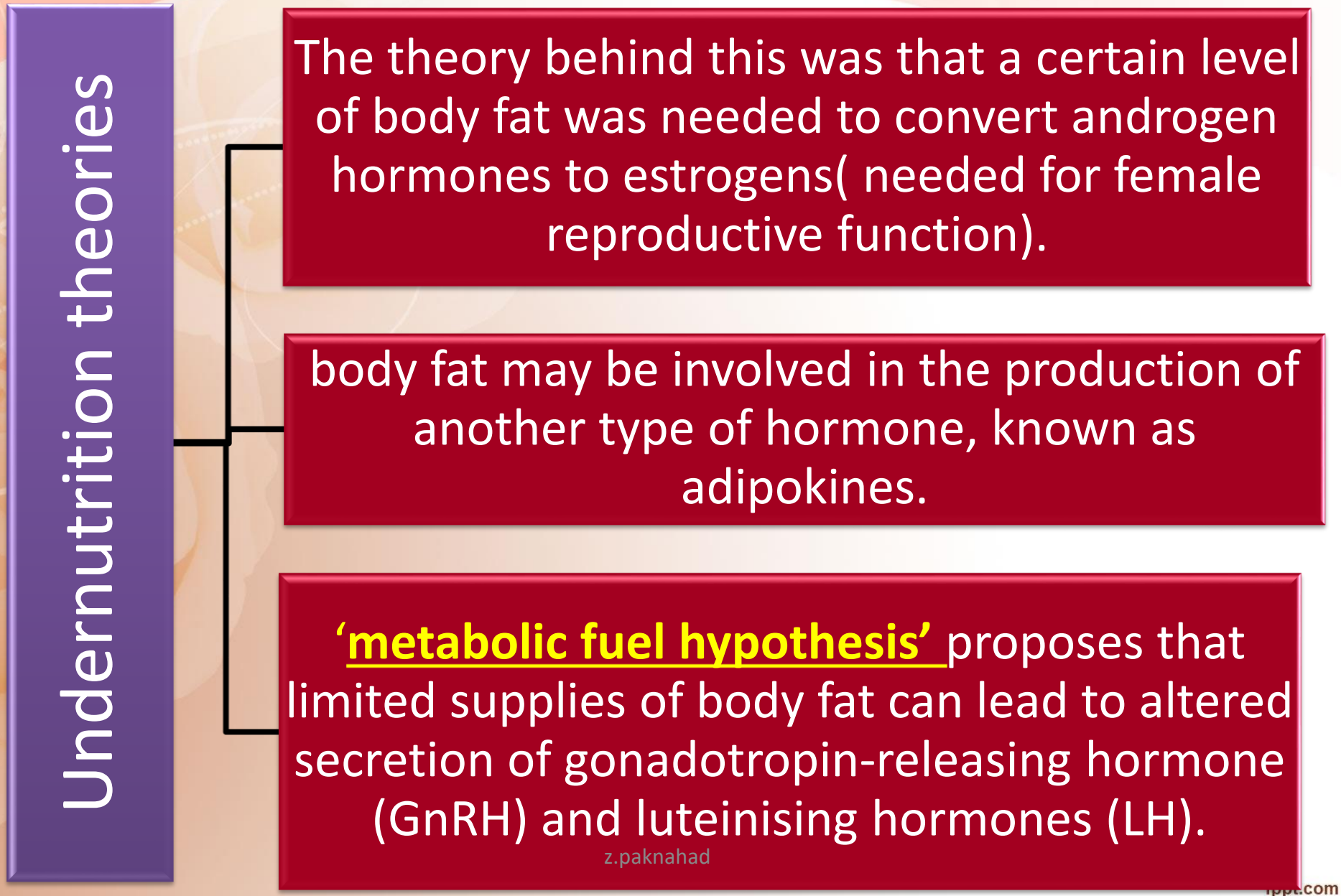
Undernutrition

Reproduction is a costly process requiring significant amounts of energy. When energy intake and expenditure are not in balance, ovulation may be suppressed.

There are several theories linking undernutrition to reduced reproductive potential.

More than 30 years ago, **Rose Frisch**, now a Professor at Harvard School of Public Health, was one of the first scientists to link *low body weight and fat stores to amenorrhea and reduced fertility*.

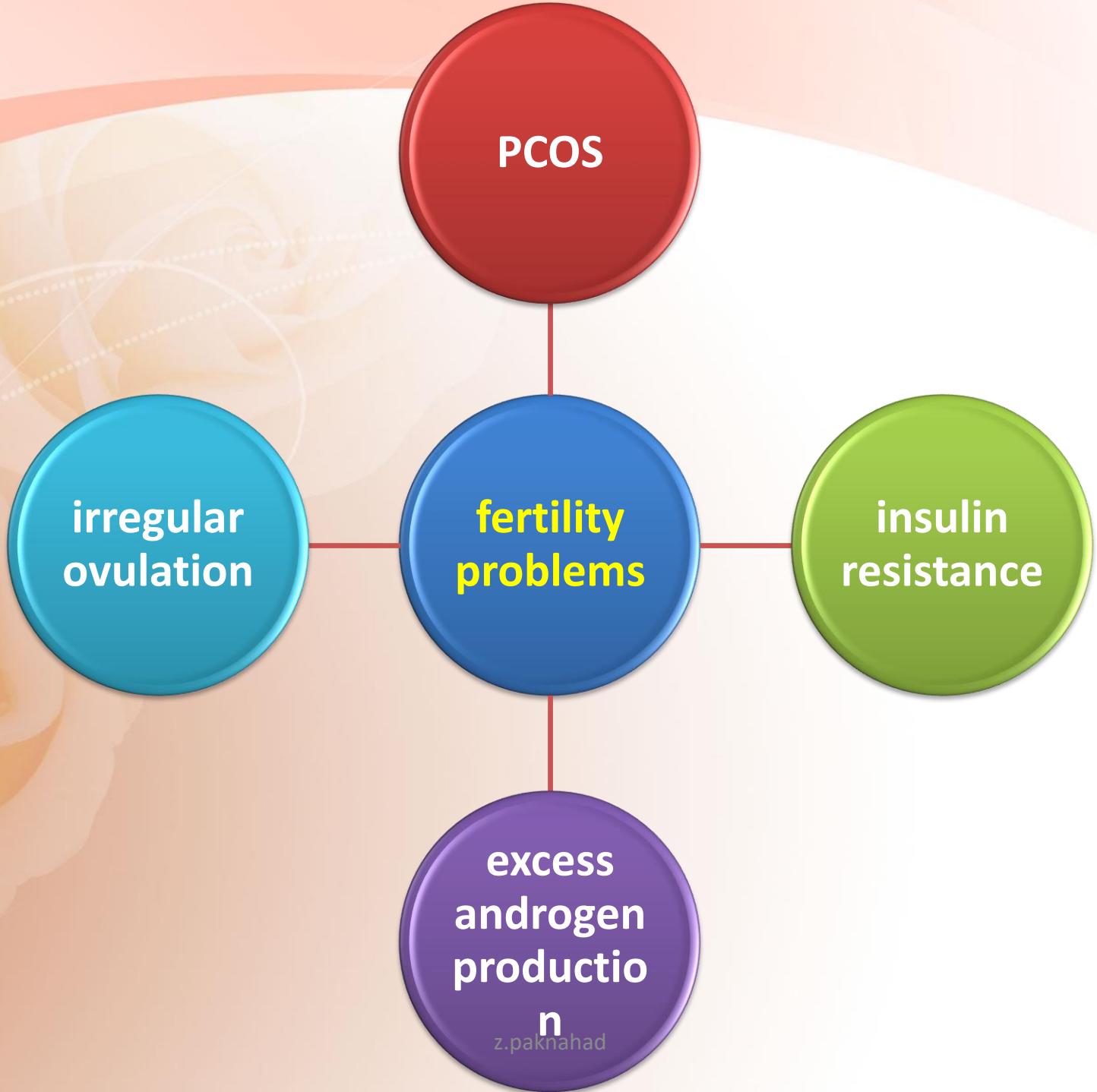
There are several theories linking undernutrition to reduced reproductive potential.



Overnutrition

Overnutrition Obesity is becoming an increasing health concern in both developed and newly industrialized countries.

Overweight/obese women are more likely to have experienced fertility problems than women with a healthy body weight.

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Preparing the Body for Pregnancy

- Women's nutritional status just before pregnancy and/or during early pregnancy (<12 weeks gestation), may *influence* pregnancy outcomes by affecting critical developmental processes that begin **early in pregnancy** as well as the availability of nutrients.

Various aspects of maternal nutrition may influence pregnancy outcomes

- Ideally, the body should be prepared before the physiological demands of pregnancy occur.

- If nutrient reserves are low before pregnancy commences, this may affect the health of the mother and/or child later on.

- Women need to be guided about the importance of eating a healthy diet and getting body weight into recommended ranges before becoming pregnant.

without physical or psychological pathology in the mother or fetus and results in the delivery of a healthy baby.

balanced diet,healthy body weight can go some way to ensuring that women have a pregnancy free from medical complications.

healthy pregnancy

- *Nutrient stores*
- *Pregnancy spacing*
- *Body weight before pregnancy*
- *The importance of a balanced diet*

❖ *Nutrient stores*

- Age may influence the availability of nutrients at the beginning and during early pregnancy.

- Adolescent girls who have not completed their growth and development may be at increased risk of being shorter, lighter, and/or depleted stores of energy and micronutrients such as iron, iodine, and vitamin A.

- Being the right body weight and ensuring the mother has optimal nutrient stores before pregnancy can help to give both the mother and the child the best start once pregnancy begins.

Several factors can affect women's levels of nutrients in the body before pregnancy

- level of education
- socio-economic status
- body weight before pregnancy
- intervals between pregnancy (to help recover nutrient stores)
- physical activity level
- diet quality
- supplement use


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❖ Pregnancy spacing

- Some studies have researched whether the interval of pregnancies can affect the chances of having a healthy baby.

- women with short inter-pregnancy intervals may also be at increased risk of nutrient deficiencies .

It is reported that the relationship between pregnancy spacing and unfavourable pregnancy outcomes generally follows a J-shaped curve, meaning that both very short and long time periods between pregnancies could affect infant health.

It has been concluded that a birth interval of 18–23 months appeared to be most favourable :

- ↓↓ risk of low birth weight deliveries
- ↓↓ risk of preterm birth
- ↓↓ risk of(SGA) infants

- If women start pregnancy with inadequate nutrient supplies, a state of biological competition can co-exist between the mother and her fetus.
- Although the body can adapt to increased nutrient demands to some extent, this is not always sufficient.

- It was, however, found that short pregnancy intervals of less than 6 months could increase the chances of anemia in pregnancy.

❖ Body weight before pregnancy

- Women living in resource-poor settings are often malnourished before pregnancy; they may be short as a result of early childhood malnutrition, and underweight and anemic due to inadequate food intake and infections.

- In some settings, overweight and obesity are also emerging concerns due to poor diet.

Pre-pregnancy underweight is associated with poor fetal growth and pregnancy loss

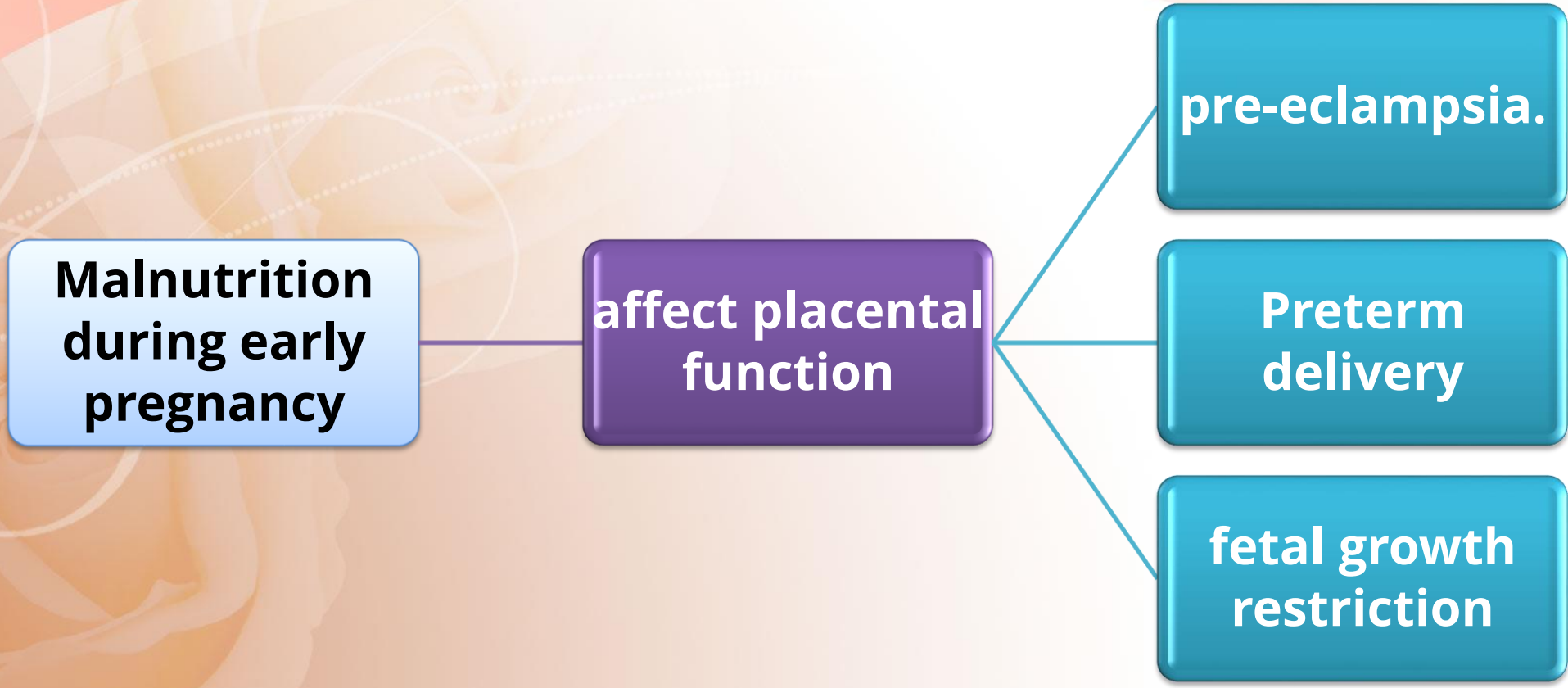

overweight
overweight is linked to the development of miscarriage, stillbirth and high birth weight
main adverse consequence of obesity is metabolic syndrome
affect the growth of the fetus and increase the chances of obesity and glucose intolerance of the offspring in adulthood

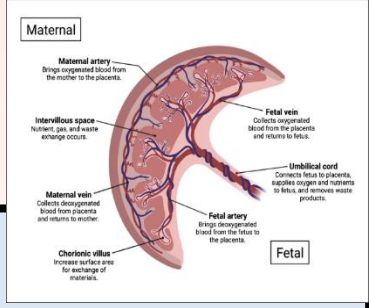
healthy body weight before pregnancy can markedly reduce the risk of complications in pregnancy

Categorizing body weight before pregnancy

BMI category	Prepregnancy BMI
Underweight	<18.5
Normal weight	18.5–24.9
Overweight	25.0–29.9
Obese	≥30.0

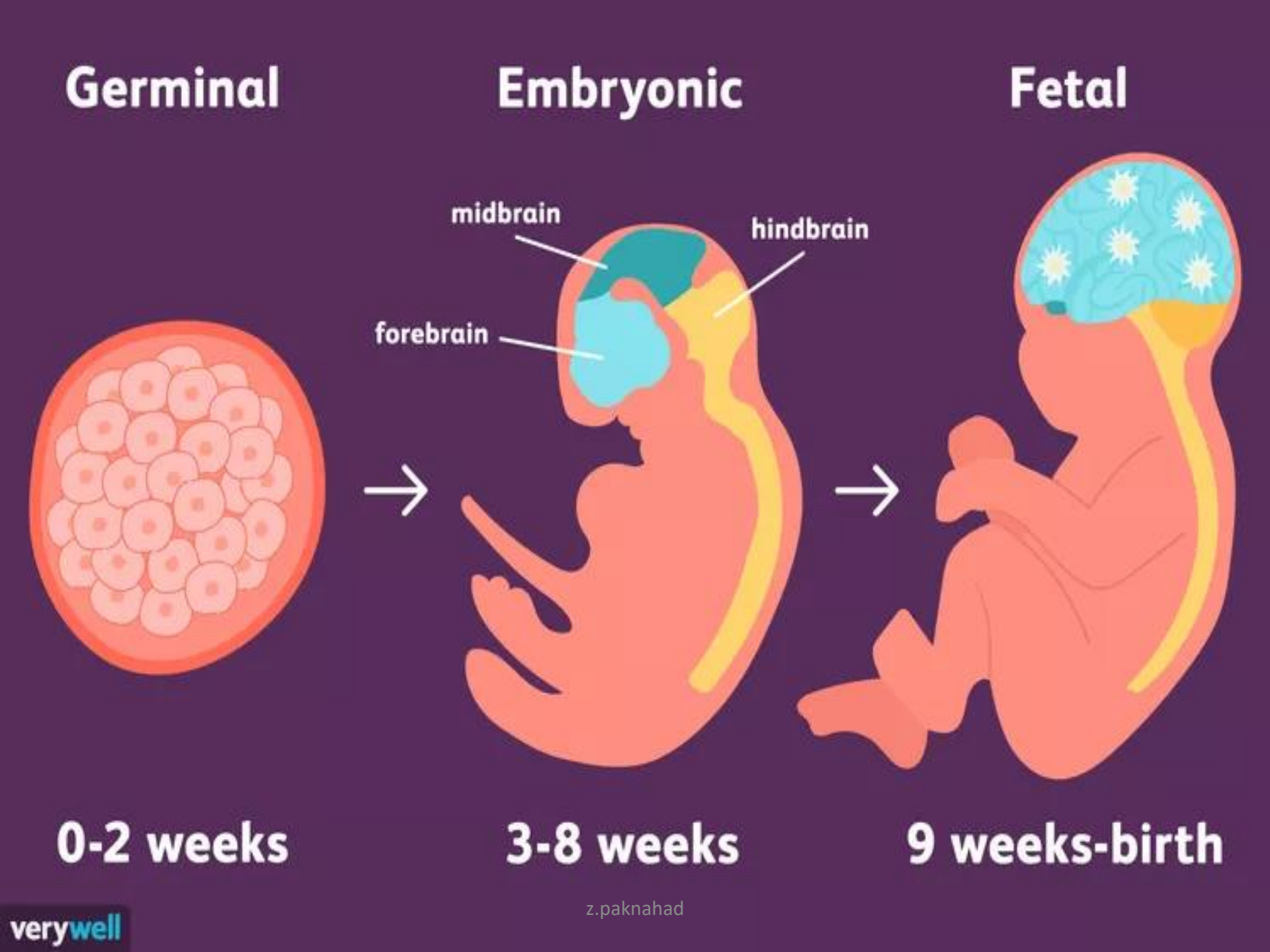
❖ THE IMPORTANCE OF A BALANCED DIET


Malnutrition during early pregnancy
affect placental function
pre-eclampsia.
Preterm delivery
fetal growth restriction

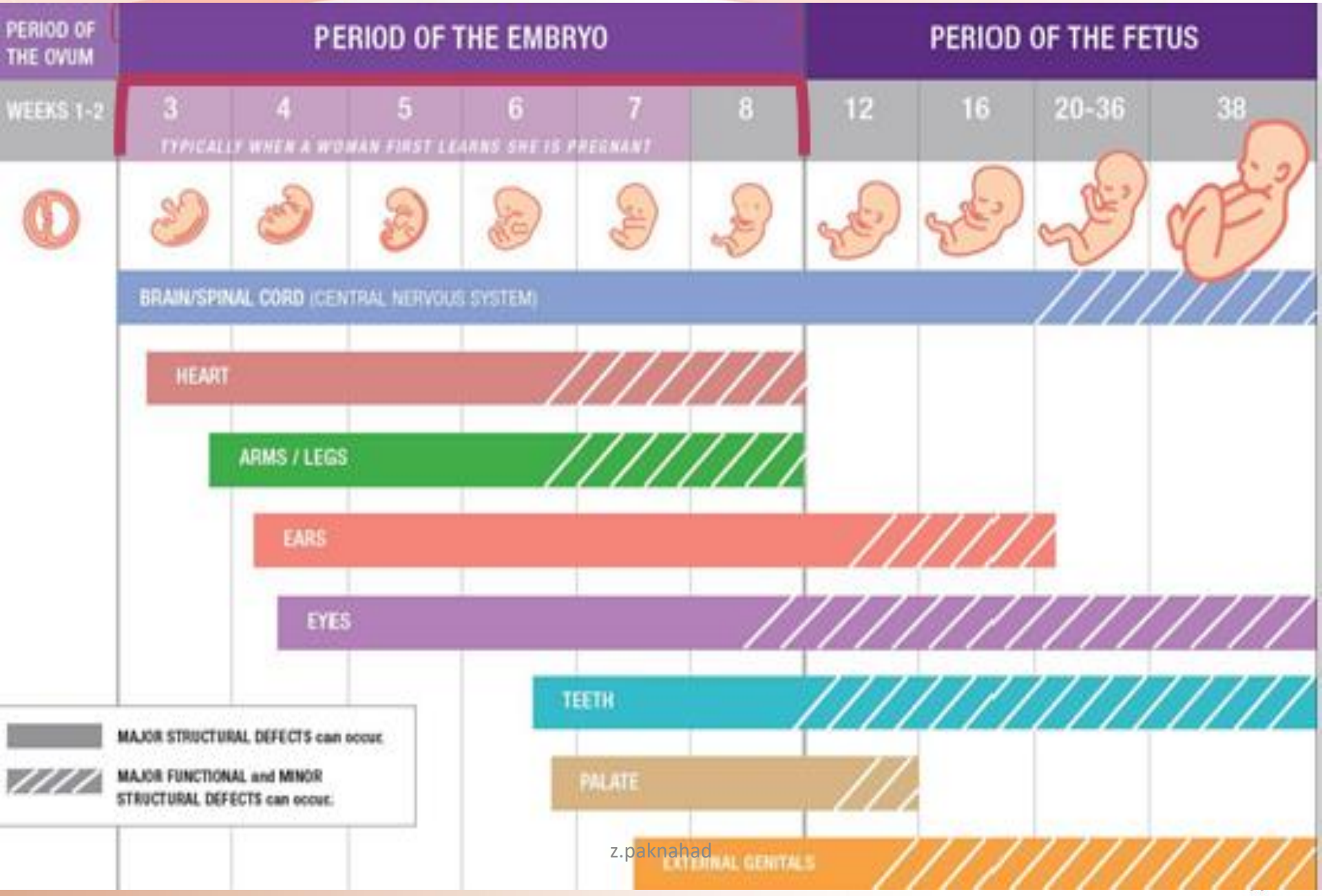


- ***Proposed mechanisms*** include : lowered number and surface area of arterioles in tertiary villi due to oxidative stress and/or inflammation.

- LCPUFA and iron status during early pregnancy are inversely associated with placental weight and surface area of capillaries involved in gas exchange, respectively.



The most sensitive times of a baby development



Various nutrients may influence pregnancy outcomes by altering both *maternal and fetal metabolism* due to their roles during the pregnancy:

- Several micronutrients can also influence inflammation and oxidative stress *early in pregnancy*;

vitamins A and D, zinc, and fatty acids may influence immune function whereas vitamins C, E, B6, B12, and folic acid may reduce oxidative damage to the

- Nutrients such as vitamins A, B6, B12 and folic acid and zinc also affect embryogenesis that occurs early in pregnancy and may be related to pregnancy loss and fetal malformations.

- The most well-studied effect of periconceptional nutrition is the protective effect of folic acid in the first 28 days of pregnancy in reducing the risk of delivering infants with neural tube defect (NTD),

If nutrient needs are not met during pregnancy, an increased maternal risk for transient disease risk exists during pregnancy, and risk for adverse birth outcomes for the offspring (e.g., low birth weight, preterm birth, congenital anomalies), as well as delays in developmental milestones, including delays in neurocognitive development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Nutrition During Pregnancy

The key components of a healthy lifestyle during pregnancy:

- Appropriate weight gain
- A balanced diet
- Regular exercise
- vitamin and mineral supplementation

1 TRIMESTER

No recommended calorie increase. Honour personal hunger & fullness cues!

2 TRIMESTER

340 calories

EXAMPLES:

¾ cup Greek yogurt

1 cup frozen berries

½ cup granola

1 hardboiled egg

2 Babybel cheeses

an apple

3 TRIMESTER

450 calories

add these portions to the 2 trimester snack examples

+

½ ounce (12) almonds

+

13 crackers


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Healthy eating for women

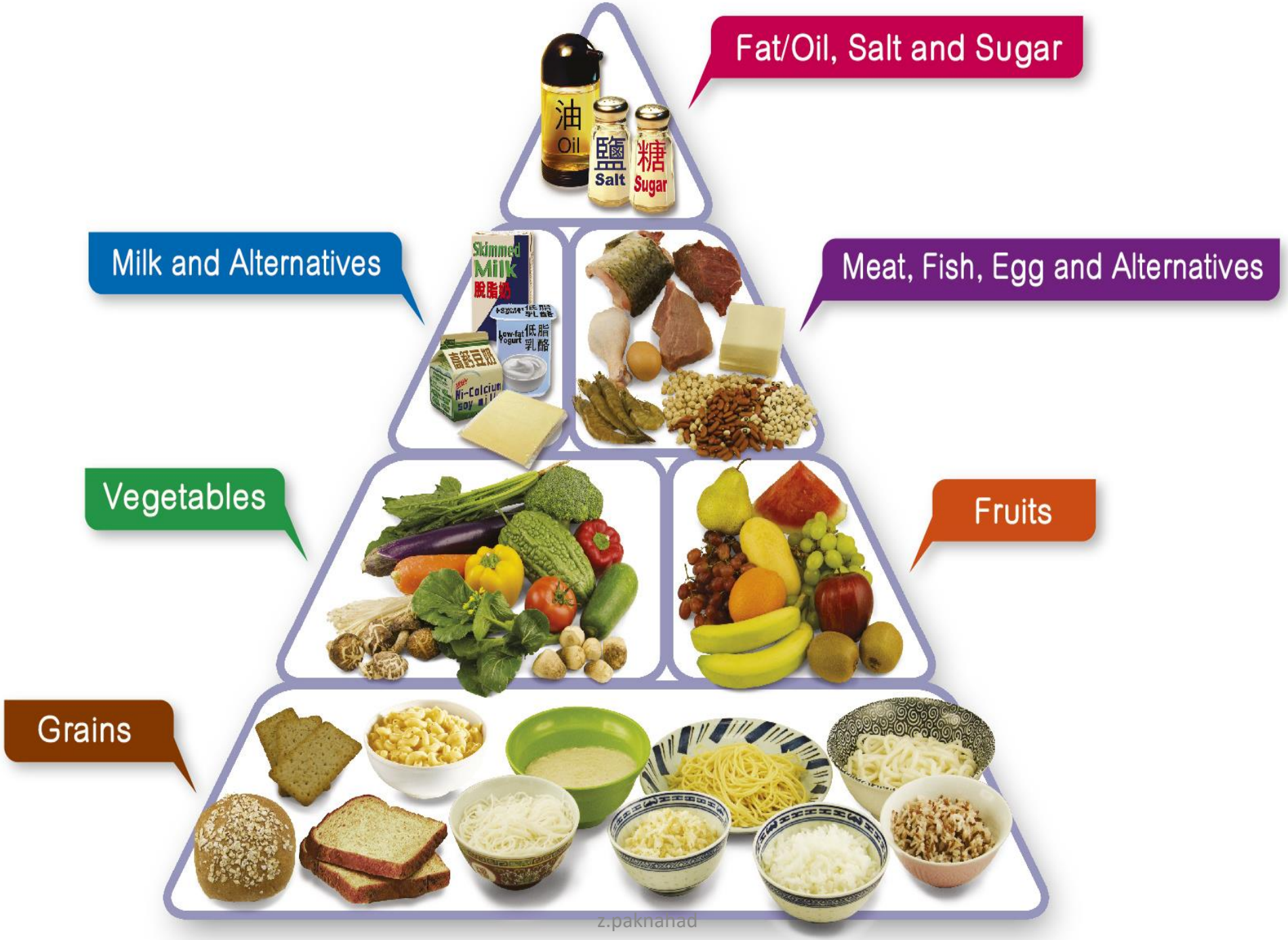
The food and drink choices you make every day affect your health now and later in life.

❖ Eat the Right Food

Since different foods have different nutritional values, it is not possible to obtain all the nutrients we need from a single food. According to the Healthy Eating Food Pyramid, we have to eat a variety of foods among all food groups as well as within each group in order to get different nutrients and meet our daily needs.

❖ Eat the Right Amount

Neither eating too much nor too little is good for our health. Every day, we need a specific amount of nutrients to maintain optimal health. If we do not eat enough, malnutrition or symptoms of nutrient deficiency are likely to develop. In contrast, excessive intake can result in over-nutrition and obesity. Therefore, we have to eat the right amount of food to stay healthy.


Fat/Oil, Salt and Sugar
油
Oil
鹽
Salt
糖
Sugar
Milk and Alternatives
Skimmed Milk
脫脂奶
Low-fat Yogurt
低脂乳酪
高鈣豆奶
Ni-Calcium
soy
Meat, Fish, Egg and Alternatives
Vegetables
Fruits
Grains

Healthy Eating Food Pyramid

- Eat Most - Grains
- Eat More - Vegetables and fruits
- Eat Moderately - Meat, fish, egg and alternatives (including dry beans) and milk and alternatives
- Eat Less - Fat/ oil, salt and sugar
- Drink adequate amount of fluid (including water, tea, clear soup, etc) every day

Dietary Considerations for Postmenopausal Women

- **Changes in estrogen level**

- **Dietary strategies to minimize the consequent health outcomes of menopause**
- **A. Balanced Nutrition Recommendation**

A.1. Nutritional Status during Perimenopause

A.2. Maintaining and Achieving a Healthy Nutritional Status

A.3. Fluid Intake in Menopause

A.4. Bone Metabolism Changes in Menopause

A.5. Common deficiencies

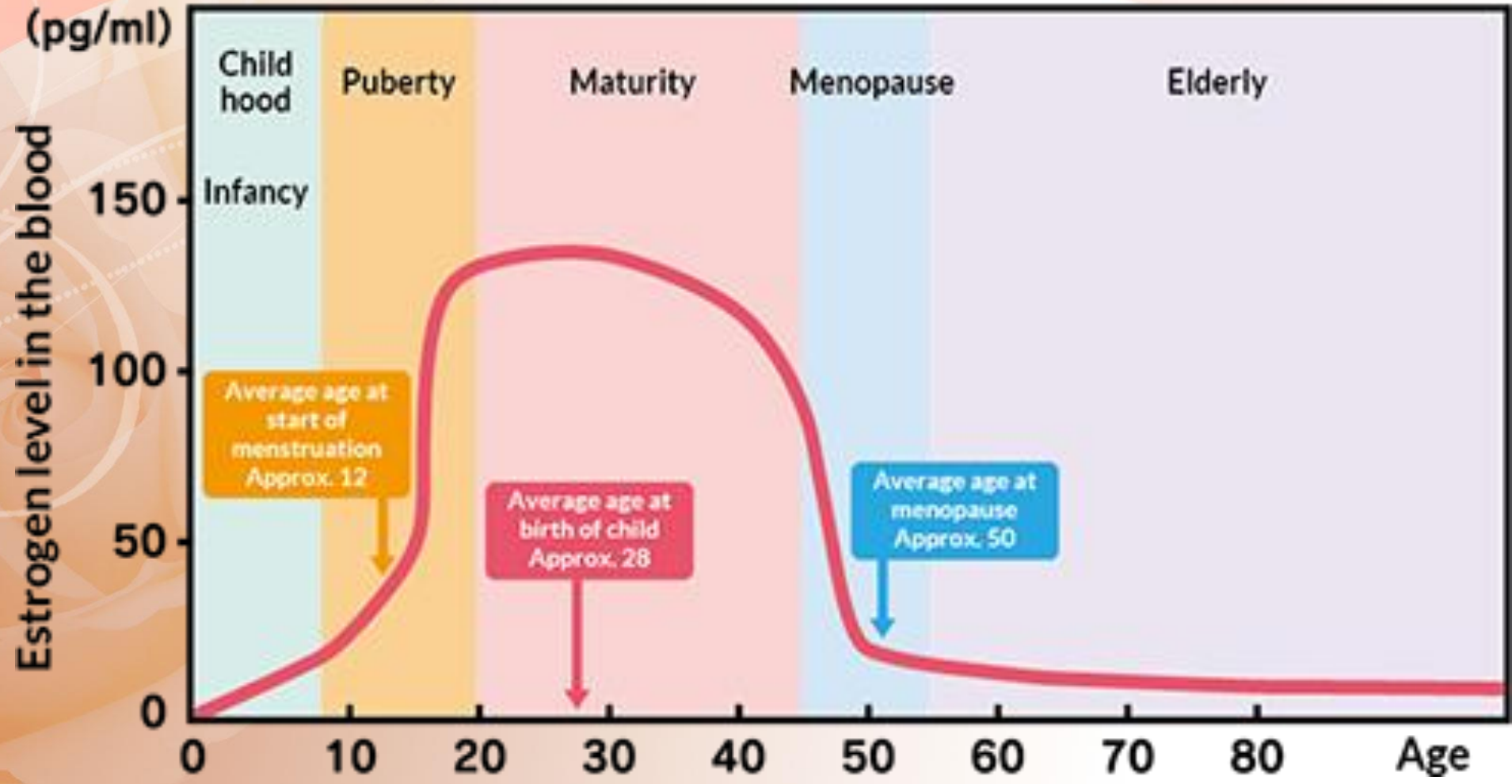
A.6.Role of Micronutrients in Menopause

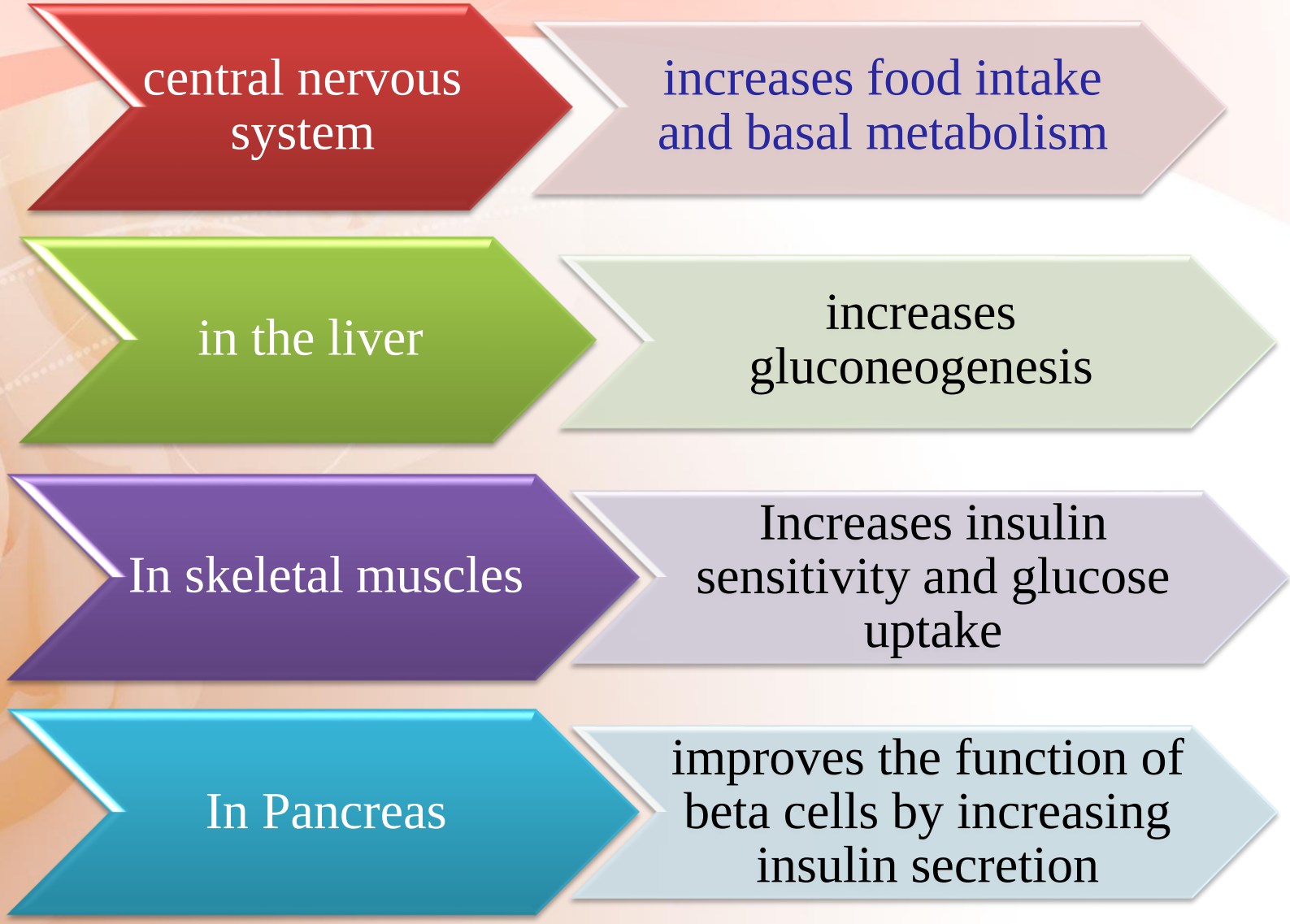
A.7. Soy and Phytoestrogens and Menopause

A.8. The Role of Microbiome in Menopause

A.9. Sleep and Menopause

Changes in estrogen levels




central nervous system
increases food intake and basal metabolism
in the liver
increases gluconeogenesis
In skeletal muscles
Increases insulin sensitivity and glucose uptake
In Pancreas
improves the function of beta cells by increasing insulin secretion

Menopausal and postmenopausal hormonal levels

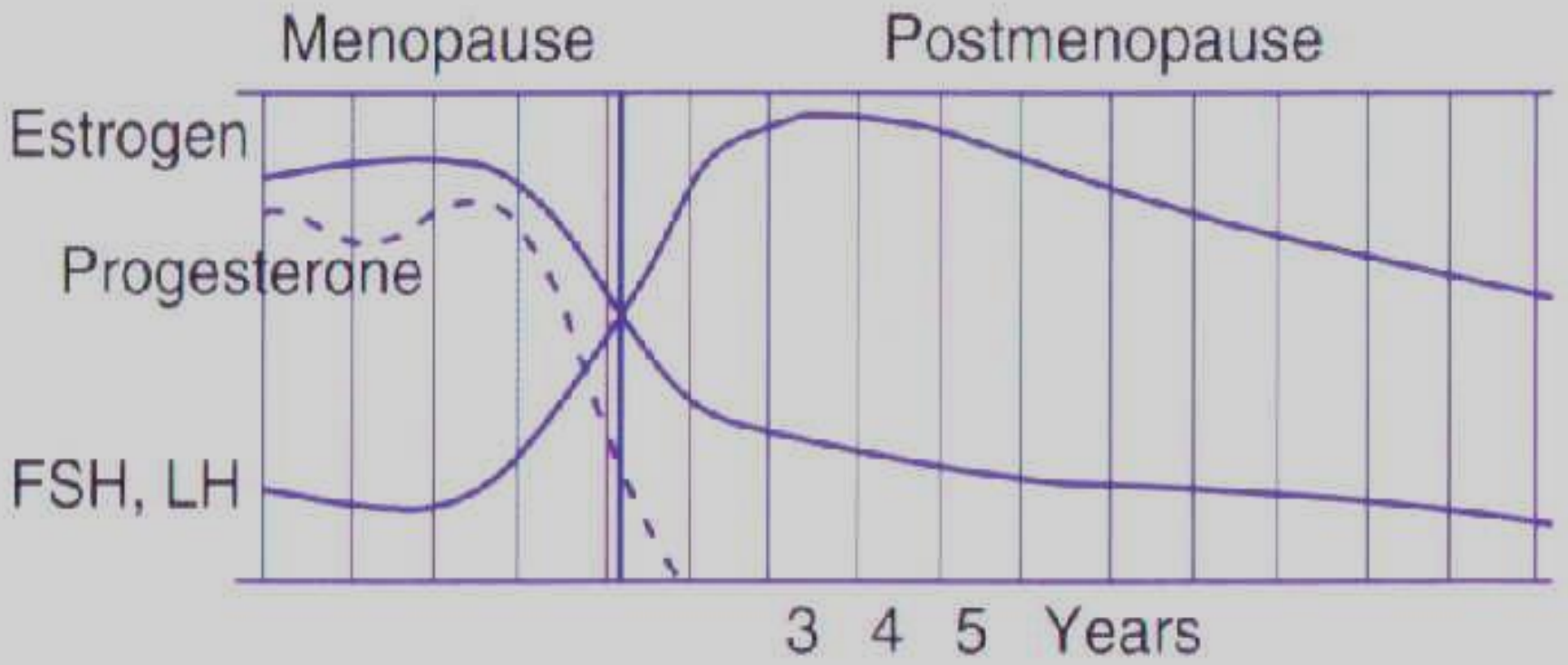


Fig. 2.9. *Decline in estrogen, progesterone, FSH and LH levels with age and menopausal status.*

- As life expectancy increases, the number of menopausal women worldwide is increasing, with an estimated 1.2 billion worldwide by 2030.

- In a woman's life, ***menopause*** can be said when menstruation no longer occurs within a year after the last period. This usually happens between 45 and 55 years of age.

- Menstrual irregularities, including amenorrhoea, can even last for years; such period is called perimenopause.

- Hormonal changes, which cause both somatic and psychological changes, begin even earlier.

In the female body, estradiol is a hormone with extensive metabolic effects, so ***the absence of the cycle and the lack of periodic exposure to estrogen and progesterone*** cause ***changes in the target tissues of sex hormones, as well as the reproductive system***.

Bone, heart, and brain health are affected.

The decrease in circulating estrogen limits the body's ability to remodel bones, resulting in a decrease in bone mass.

affect blood lipid levels, increasing total cholesterol and low-density lipoprotein (LDL) cholesterol levels and decreasing high-density lipoprotein (HDL) levels.

Brain function, particularly memory, also is affected, but the memory loss associated with menopause is often temporary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Dietary strategies to minimize the consequent health outcomes of menopause

During menopause, the risk and occurrence of several chronic diseases increases : These are cardiovascular diseases, insulin resistance, type 2 diabetes (T2DM), and osteoporosis,….
the risk of which can be reduced by lifestyle modification.

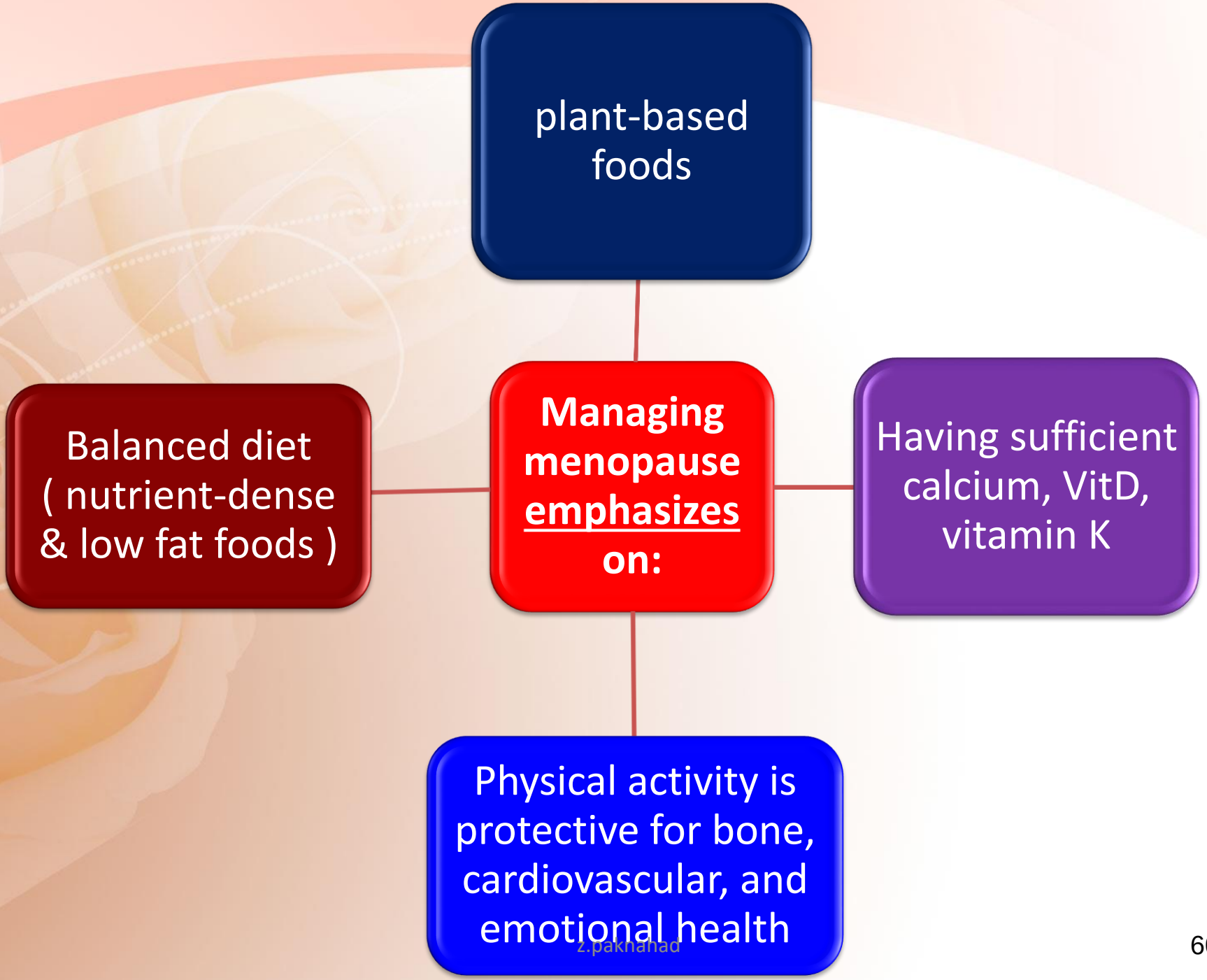
Hormonal changes during perimenopause and menopause cause several characteristic symptoms. *The strength, frequency, and tolerability* of the symptoms can also be ***influenced by lifestyle.***

These symptoms can be of different intensity and frequency but all of them can be said to be ***influenced by lifestyle***.

In this period of life, the change of lifestyle, even if it does not eliminate the symptoms and associated diseases, delays their development, makes them more bearable, and at the same time, makes everyday life easier .

In the case of obesity or overweight, losing just 5 kg of weight improves the tolerability of hot flashes by 30%.


physical activity
vit D, calcium & protein
smoking &alcohol consumption
Important points of lifestyle.
sleep
regular exercise
fluid intake
balanced diet

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A. Balanced Nutrition Recommendation

- many diets have a positive effect on chronic diseases and weight management

- Low-calorie diets of less than 1200 kcal/day may yield micronutrient deficiencies which could negatively affect the nutritional status and weight management outcome.

- ***The Mediterranean diet*** is characterized by foods with anti-inflammatory and antioxidant action.

- There is evidence that the Mediterranean diet affects weight management, blood sugar control, and cardiovascular diseases.

Summarizing ***the healthy, balanced diet*** is achievable in the long term, therefore it is preferred.

A.1. Nutritional Status during Perimenopause

BMR of the female body decreases of up to 250–300 kcal/ day.

In the case of an unchanged lifestyle, it may result in an annual weight gain of 2 kg.

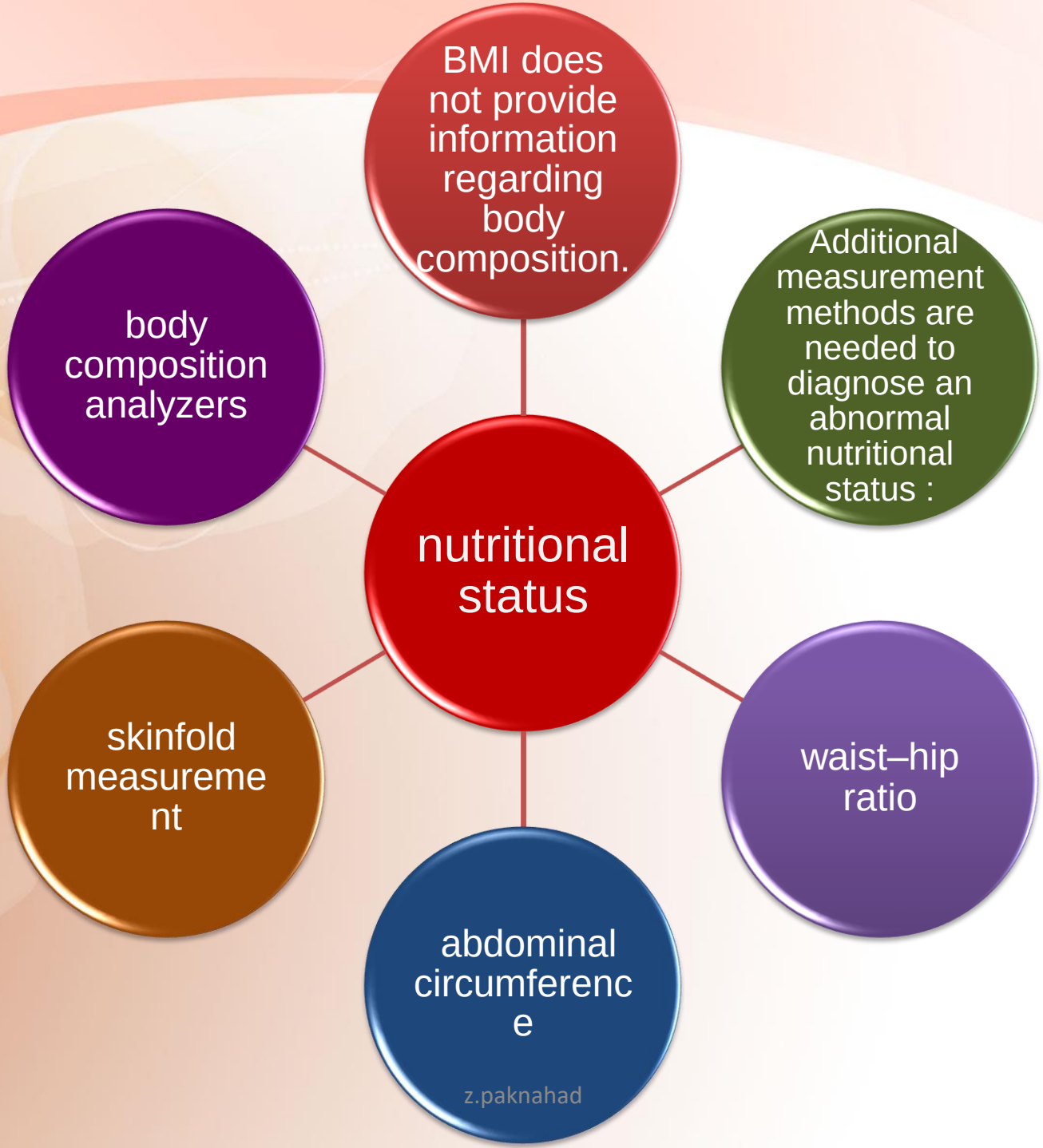
Body composition changes parallel to the decrease in basal metabolism.

During this period, the most common abnormal nutritional conditions are overweight and obesity.

Weight gain, typically, means an increase in abdominal (visceral) fat mass .

In addition, due to the hormonal changes, fat-free mass (FFM) and skeletal muscle mass (SMM) are characterized by a decrease which can lead sarcopenia

two pathological body composition changes: sarcopenic obesity,, abnormal fat mass ▽**muscle function and muscle mass decrease**


BMI does not provide information regarding body composition.
body composition analyzers
Additional measurement methods are needed to diagnose an abnormal nutritional status :
nutritional status
skinfold measurement
waist–hip ratio
abdominal circumference

A.2. Maintaining and Achieving a Healthy Nutritional Status

- During the dietary treatment of obesity, achieving a negative energy balance is of greatest importance.

- The ideal rate of weight loss is 0.5–1 kg of body weight loss per week, which occurs from fat body mass while maintaining muscle mass.

- It approximately corresponds to an energy intake of 25 kcal/kg/day.
- The actual energy requirement is always calculated based on the current body weight.
- To maintain or increase fat-free body weight and skeletal muscle mass, the daily protein intake should be 1–1.2 g/kg (20% of energy).

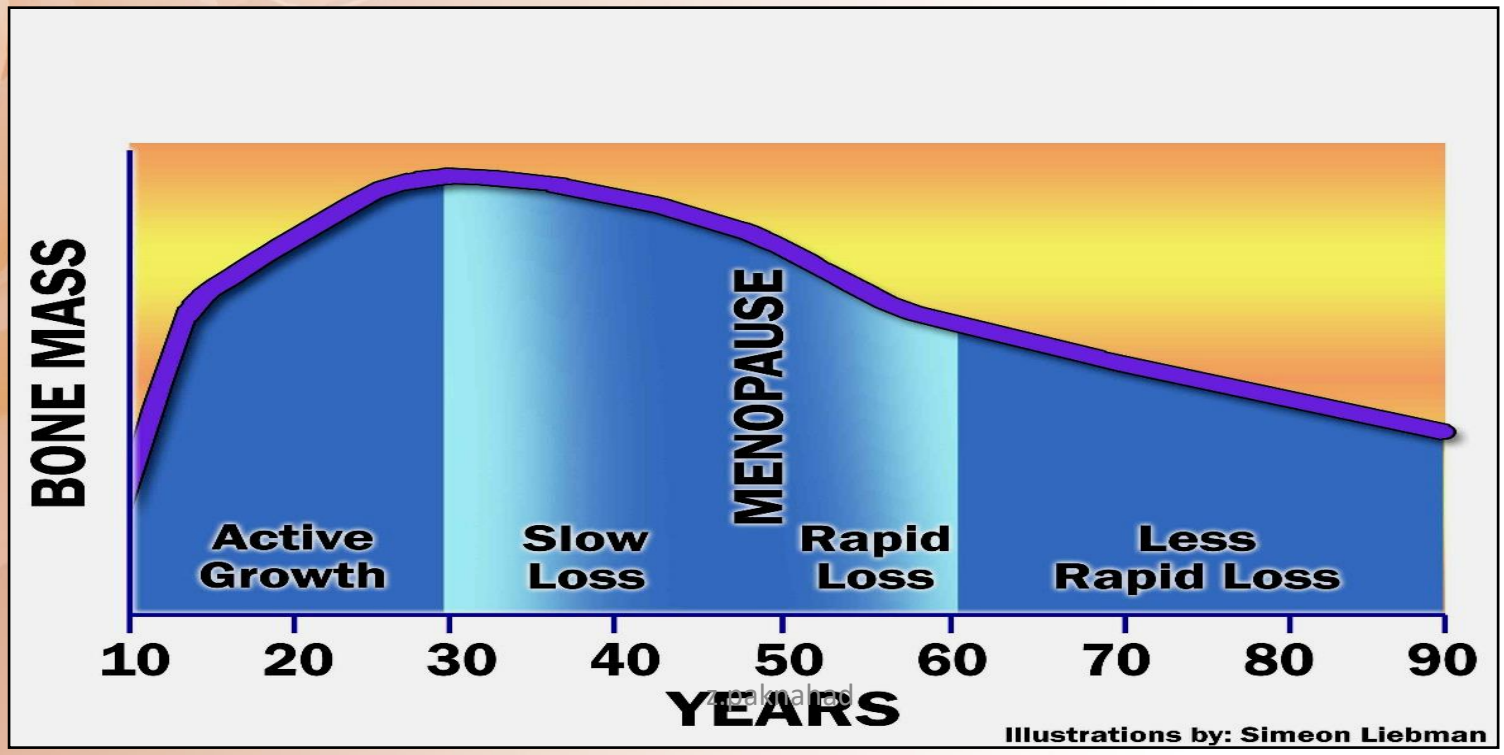
A.3. Fluid Intake in Menopause

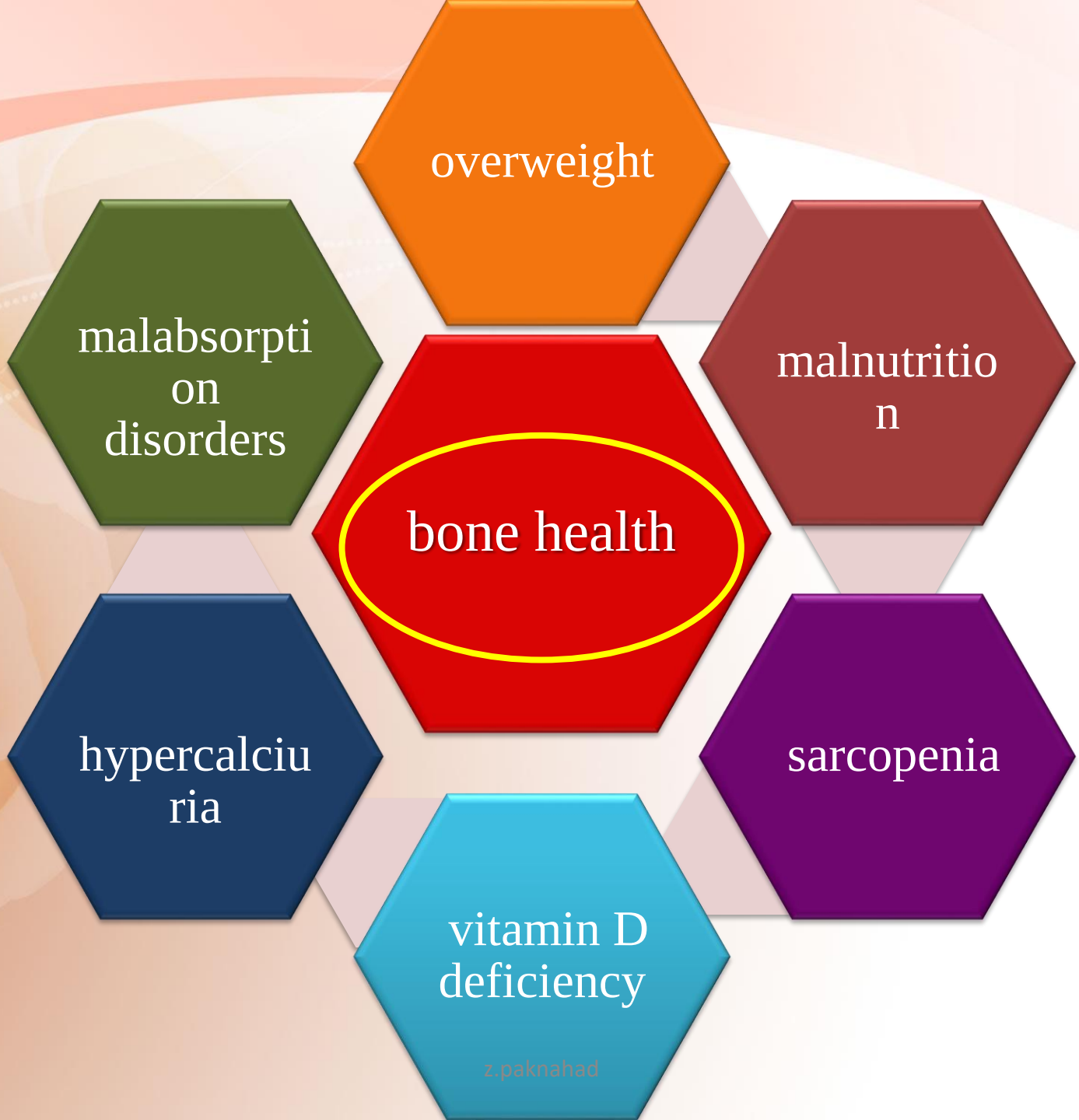
- Adequate fluid intake is also essential during menopause, especially concerning cellular metabolism and maintaining the optimal functioning of hemostasis.
- Estrogen and progesterone significantly affect not only the cardiovascular system but also fluid and electrolyte balance.
- During menopause, hormonal changes affect the thirst as well, which may result in a significant decrease in fluid intake.
- ***The individualized, appropriate amount of fluid intake is 33 mL/kg/day, which is recommended to be evenly distributed over the day .***

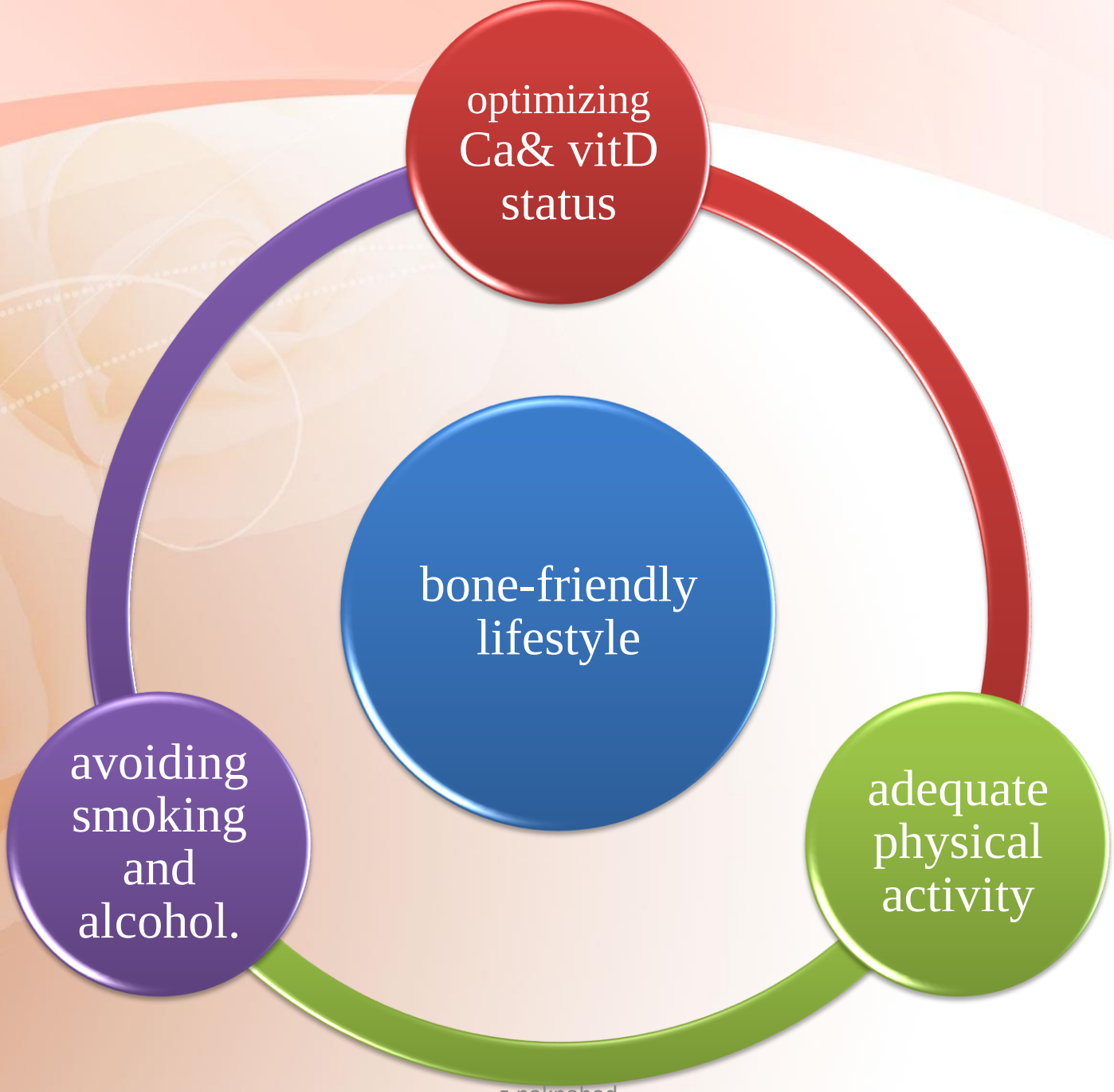
A. 4. Bone Metabolism Changes in Menopause

Osteoporosis is a chronic, progressive health problem that affects most women during menopause and has serious consequences.

Osteoporosis is particularly common during this period in those with low serum vitamin D levels.




overweight
malabsorption disorders
malnutrition
bone health
hypercalciuria
sarcopenia
vitamin D deficiency


optimizing Ca& vitD status
bone-friendly lifestyle
avoiding smoking and alcohol.
adequate physical activity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A.5. Common Deficiencies

- **Vitamin B12 :**intrinsic factor, hydrochloric acid

- **Folic Acid :** increased risk with high intakes of folic acid, which contradicts older studies showing a protective effect of folic acid

- **Vitamin D**:When serum vitamin D levels are maintained well above the standard cut-off for deficiency, there is the potential to ↓*disease risk*, *improve mood*, ↓ *sarcopenia*, and ↓ *the rate of* falls associated with aging.

Vitamin D is a fat-soluble vitamin that is stored in body fat and therefore toxicity is a risk.

Vitamin E

Vitamin E is a powerful antioxidant.

→ ↓ the risk of cataracts and macular degeneration

help to prevent dry skin associated with menopause.

Vitamin E has many potential benefits; however, it is often low in women's diets *when dietary fat is restricted*.

Plant-based, fat-rich foods, such as almonds, peanuts, canola oil, hazelnuts, sunflower seeds improve vitamin E status.

Calcium

- Calcium is crucial for preventing or treating osteoporosis and may reduce hypertension.

- Dietary supplements may be necessary to provide calcium; however, there are concerns relating to the side effects of calcium supplements:

- *Calcium carbonate* increases *bloating & constipation* .
- certain brands may be contaminated with lead. *Calcium citrate is more tolerable.*

- Drug-nutrient and nutrient-nutrient interactions are also concerns. Calcium interacts with multiple medications and other nutrients.

Potassium

- Potassium is related to *blood pressure regulation*. Insufficient potassium contributes to hypertension.

- Potassium is widespread in plant foods; however, many women are not meeting daily recommendations for potassium.

- Recommend an abundance of vegetables, fruits, and legumes to encourage adequate intake of potassium.

Magnesium and Zinc are two critical minerals that may be low in women's diets.

Magnesium is involved in:

- *bone development*
- *preventing osteoporosis*
- *regulating mood* and *muscle relaxation*

Zinc is important for:

- *strengthening the immune system*
- *building strong bones*
- *healing wounds*

Deficiencies in zinc → → reduced appetite and decreased sense of smell.

- Multivitamin and mineral formulas may not have adequate magnesium and zinc to enhance bone health, mood, and the immune system,and may additional supplements when needed.

Omega-3 Fatty Acids

- reduce inflammation
- help to regulate cellular function(including neurological function)

many women do not get enough→→ *low-grade, chronic inflammation & increases the risk for chronic disease, particularly cancer, heart disease, and diabetes*.

- consume oily fish twice
- dietary supplements (for those who do not and/or cannot meet their omega-3 fat needs through food).


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A.6. Role of Micronutrients in Menopause

When there is not enough UV-B radiation, dietary vitamin D intake is also important:

- Someone who does not spend enough time outdoors
- uses sun protection creams
- wears clothing that fully covers the skin
- With aging, the rate of hydroxylation of vitamin D precursors in the body decreases
- The protein intake should be 0.8 g/kg body weight/day following a balanced diet, (1–1.2 g/kg body weight/day protein intake is recommended for those who exercise regularly and in case of weight loss).

- Vitamin C is necessary for bone formation

- Phytoestrogens(including isoflavonoids) can only have a mild effect on estrogen deficiency
- B vitamins also play an important role in menopause
- Adequate B vitamin intake significantly reduces the serum homocysteine level. High homocysteine levels have also been associated with osteoporosis and increased risk of bone fractures
- In the prevention and treatment of cognitive dysfunction and cognitive decline, which are common complaints in menopause, an adequate supply of B vitamins is vital
- A balanced B-vitamin intake, therefore, plays an important g role in menopause.
- A microbiome with the appropriate biodiversity and composition also contributes to this.

A.7. Soy and Phytoestrogens and Menopause

Menopausal hot flashes are rarer in countries where regular soy consumption is a part of the diet.

The isoflavone content of soy foods may be effective in reducing menopausal symptoms.

It is important to point out that the above safe intake applies only to soy foods included in the diet and *not* soy isoflavones taken as dietary supplements

A.8.The Role of Microbiome in Menopause

Perimenopause and menopause are often associated with dysbiosis and gastrointestinal tract complaints.

It is suggested that the composition of the microbiota could determine the *onset or progression of some menopause-related clinical conditions*.

Newest studies suggest that supplementation with probiotics improves cardiometabolic risk factors in postmenopausal women.

A.9. Sleep and Menopause

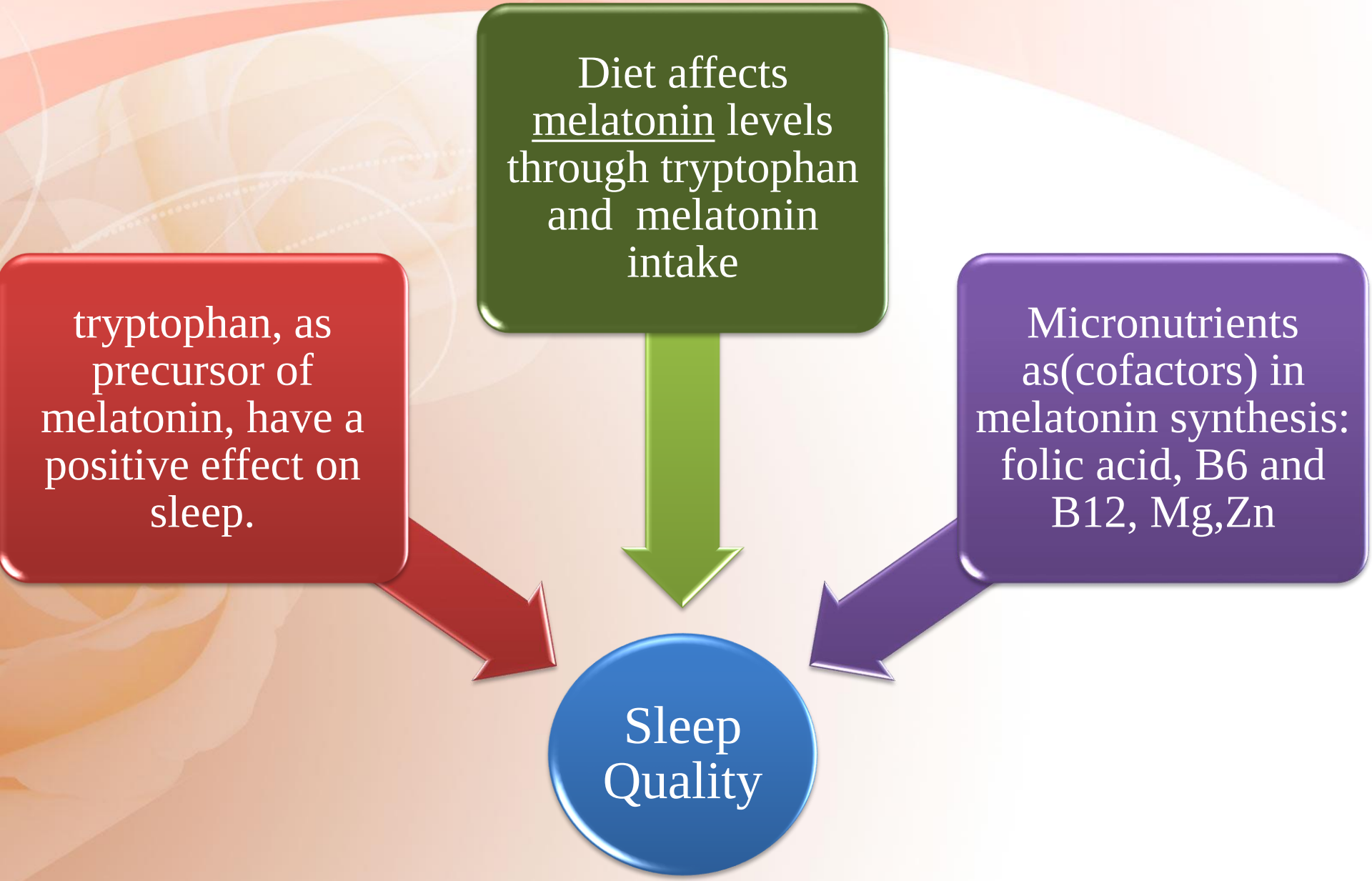
Sleep difficulties are more likely to occur during menopause, with a self-reported rate of between 40% and 56%.

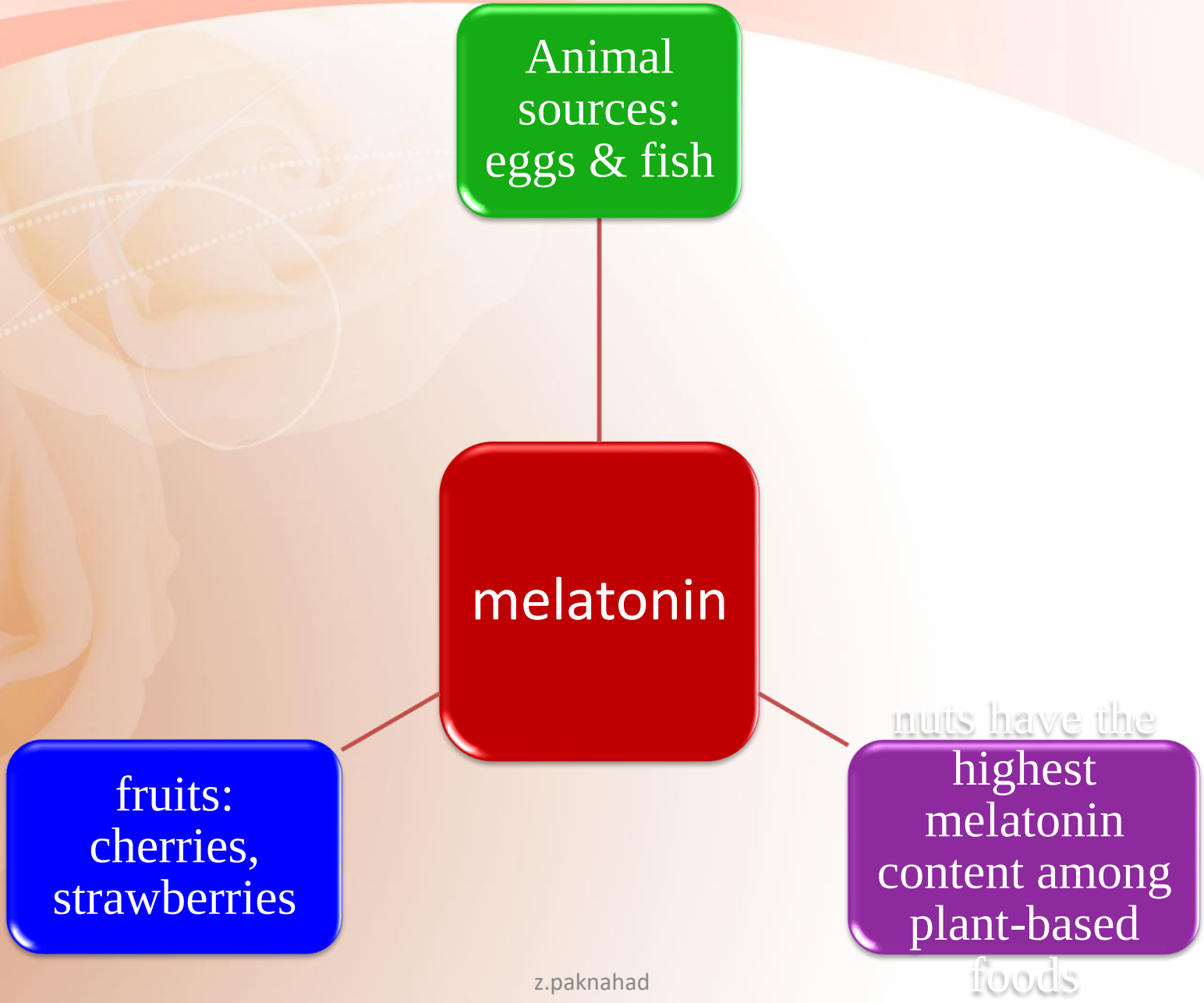
leading to chronic fatigue, affecting quality of life, and can have long-term consequences for mental and physical health.

Deviation from the recommended 7–8 h of sleep in adults is associated with a higher risk of mortality and cardiovascular events.

The circadian rhythm plays an important role in the regulation of metabolic processes

Disturbances in sleep and circadian rhythms can also worsen digestive disorders


Diet affects melatonin levels through tryptophan and melatonin intake
tryptophan, as precursor of melatonin, have a positive effect on sleep.
Micronutrients as(cofactors) in melatonin synthesis: folic acid, B6 and B12, Mg,Zn
Sleep Quality


Animal sources: eggs & fish
melatonin
fruits: cherries, strawberries
nuts have the highest melatonin content among plant-based foods

Tryptophan content of foods

Food/Raw Material	Tryptophan Content (mg/100 g)
Cheddar cheese	574
Tuna	313
Salmon	285
Oat flakes	234
Buckwheat	192
Tofu	235
Kidney beans	104
Pumpkin seeds	576
Sunflower seeds	295
Almond	209
Peanut	193
Lamb (shoulders)	415
Chicken breast	404
Ground pork, lean	326
Turkey breast	287
Egg, whole	167