Nutritional support during pregnancy and breastfeeding

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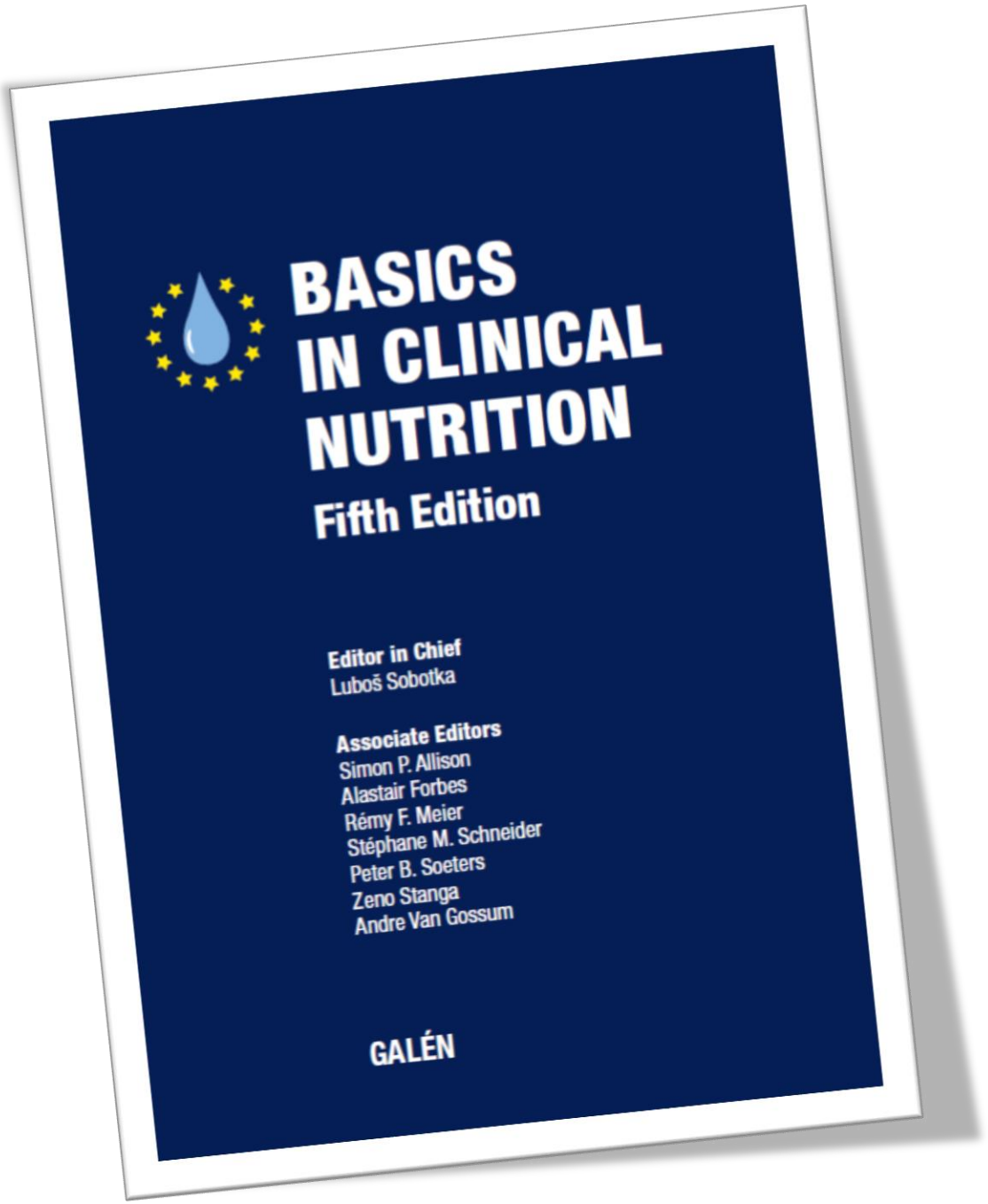
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Learning objectives

- *To recognize the adverse effects of starvation on*

  Pregnancy and foetal outcome

- *To understand the most common indication*

  For nutritional support during pregnancy

- *To learn the principles of artificial nutrition*

  During pregnancy and lactation

Outline

1- Pathophysiology

2- Indications for and aims of nutritional Support

3- Parenteral nutrition in pregnancy and lactation

Pathophysiology

Pathophysiology

It is estimated that **approximately 80,000 kcal** of energy

Are needed *over the course of pregnancy* to ensure

Proper growth of the

Uterus, placenta, and foetus

This corresponds to a **daily increase** of about

150 kcal during trimester I,

And *350 kcal during trimesters II and III*,

Over basal nutritional requirements

Pathophysiology

These requirements are even *greater in twin pregnancy*

The **basal metabolic rate** is also increased, but this is balanced by ***decreasing physical activity***

Metabolically, pregnancy is characterized by several dynamic adjustments including

Increased insulin resistance,

Hyperlipidemia,

And changes in protein and amino acid metabolism

These changes occur in parallel with growth of the foetoplacental unit

And serve to *increase nutrient availability* for the benefit of its development and maturation

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Pathophysiology

The **principal energy substrates** are **carbohydrates** which provide

60%-75% of energy requirements

Lipids provide 25%-30% of non-protein energy,

And the need for PUFAs is increased substantially,

Their key influence on central nervous system development having been confirmed

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Pathophysiology

Consumption of lipids also

Helps to *avoid high serum glucose concentrations*,

Especially important because ***sustained maternal hyperglycaemia*** results in

High insulin levels

And *increased risks of foetal macrosomia*,

Impaired lung maturation,

Neonatal hypoglycaemia,

And *foetal death*

The average daily **protein requirement** during pregnancy *increases by up to about 30 g*

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Pathophysiology

Maternal nutritional status
And *insufficient weight gain during pregnancy*
Affect birth weight and foetal outcomes

An adverse effect of maternal malnutrition on the foetus
Can be related to several factors, such as

Inadequate blood volume,
Reduced maternal nutrient stores,
Impaired maternofoetal exchange,
And abnormal placental development

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Pathophysiology

Poor maternal nutritional status in the first trimester

May cause premature births

And may increase perinatal mortality

And the incidence of congenital malformations in the central nervous system

Third trimester malnutrition results in

Delivery of a low-birth weight infant,

With increasing risk of neonatal death,

Or the need for prolonged therapy of a premature neonate

Pathophysiology

The problem is aggravated because,

During semi starvation,

Maternal metabolism may preferentially

Maintain its own body stores

Rather than supporting the foetus

According to its needs

This maternocentric priority **continues during refeeding** such that

The mother may *rebuild her own body stores*

Before supplying nutrients required for the growth of foetal tissues

Indications for

and aims of nutritional Support

Hyperemesis gravidarum

Inflammatory bowel disease

Short bowel syndrome

Indications for and aims of nutritional support

Nutritional status influences fertility:

Severe malnutrition results in *lack of ovulation* and *secondary amenorrhoea*

This may be observed in patients with chronic intestinal failure due to

Inflammatory bowel disease,

Short bowel syndrome,

And anorexia nervosa

Indications for and aims of nutritional support

In these patients,

Artificial nutrition is the only way

To improve and maintain nutritional status

And, consequently,

Offer the chance for conception and gestation

Indications for and aims of nutritional support

Nutritional deficits may also occur

During pregnancy in women who were healthy before conception.

The most important cause is

Hyperemesis gravidarum with intractable nausea and vomiting.

Less frequent aetiologies of **pregnancy-induced malnutrition** include:

Coma caused by head injury or intracranial haemorrhage, bowel obstruction,

Abdominal surgery with an extended fasting period, cancer, diabetic gastroparesis, and pancreatitis

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Hyperemesis gravidarum

Hyperemesis gravidarum occurs

In *0.1 %-2.0% of pregnant women*,

And in *5%-10% of them* it is so *severe*

That hospitalisation and intravenous fluid and electrolyte replacement become necessary,

After rehydration and stabilization, an attempt can be made to begin normal nutrition,

Starting with oral fluids and advancing through liquid to regular diet

Hyperemesis gravidarum

When this regimen is unsuccessful, **enteral nutrition** via a nasoenteric tube may be tried,

Although this can be problematic,

Especially in patients suffering from severe vomiting,

Which creates the additional risk of pulmonary aspiration

If enteral feeding proves unsuccessful **parenteral nutrition (PN)** should be considered

Hyperemesis gravidarum

This can be given *initially* via a peripheral vein since

The *hyperemesis often subsides after two or three weeks*,

Especially when it occurs ***near the end of the first trimester***.

In a few, very severe, cases it may be

Necessary to feed via a central vein

For longer periods

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Hyperemesis gravidarum

It should be noted, that in about 60% of these cases,

Substantial deficits of thiamine, riboflavin, and vitamin A are observed,

And *delayed nutritional intervention* in these cases may result in irreversible complications such as

Wernicke's encephalopathy in the ***mother***,

And irreparable damage to, or loss, of the ***foetus***

Inflammatory bowel disease

The *risk* of malnutrition in women with inflammatory bowel disease

Is high,

And the course of pregnancy in these cases depends on

Disease history,

Its current activity,

And the degree of intestinal failure

Inflammatory bowel disease

Artificial nutrition seems to be

An *important means of maintaining normal nutritional status*,

As well as a

Safe and effective treatment option

In the event of disease exacerbation during gestation

Short bowel syndrome

In the female patient with **SBS**

Dependent on parenteral nutrition,

Previous treatment should be modified,

To take into account the

Increased requirements during pregnancy

Short bowel syndrome

It is of particular importance to ensure that vitamin and micronutrient accumulation and deficiencies are

Identified and treated prior to conception.

Equally, it is critical to avoid overfeeding

Interestingly, in patients with remaining bowel longer than 50 cm,

Some beneficial effects of gestation on intestinal absorption may be observed.

In these cases the

Increase in PN protein - energy supplementation

Should be lower than predicted by ordinary calculations.

Short bowel syndrome

Another important problem is

Estimation of water and electrolyte requirements

Given the *tendency to fluid accumulation and oedema*

Frequent clinical assessment of mother and foetus

Is needed with

Subsequent modification of PN volume

And composition as appropriate

Parenteral nutrition in Pregnancy and lactation

Parenteral nutrition
In pregnancy and lactation

If PN Is needed during pregnancy

For a week or so,

It is usually *free of problems*

When longer therapy is needed,

A precise evaluation of nutrient needs is difficult

Because of the dearth of scientific data

Concerning PN requirements during pregnancy

Parenteral nutrition
In pregnancy and lactation

In patients fed for long periods, subclinical deficiencies of

Magnesium, **zinc**, **phosphate**, **iron**, **folate**, and **vitamin B12** have been reported,

And additional supplies of **vitamin D** and **calcium** may be necessary

The requirements for micronutrients also depend on

the *primary disorder* adversely affecting alimentary tract function

Parenteral nutrition
In pregnancy and lactation

The **main goal of treatment** is to obtain optimal weight gain comparable to that of

The physiologically fed pregnant woman (depending on BMI), i.e.,

Approximately 4 kg by 20 weeks

And 8 kg by 30 weeks of gestation

(And where thinner women should gain more and obese women should gain less weight),

As well as appropriate foetal growth, which may be evaluated by *ultrasonography*

Both methods should be used to monitor the efficacy of nutritional support

Parenteral nutrition
In pregnancy and lactation

Earlier reports suggested that side effects were related to

Low quality of fat emulsions or to *over rapid infusion,* and it has been suggested that

Some fat emulsions are contraindicated during pregnancy

The **present consensus** view is that *fat should be given*,

But administered *over 20-24 hours*,

As part of an *all-in-one mixture*,

To provide *25%-30% of total calories*

And the *sufficient amount of essential fatty acids*

Parenteral nutrition
In pregnancy and lactation

PN was first used during pregnancy by Lakoff and Feldman in **1972**

Now, well over *100 cases of prolonged parenteral feeding*

During pregnancy have been reported,

Most of them during the *second and third trimesters*,

And there are **fifteen** published reports

Of dependence on *home parenteral nutrition (HPN)*

From conception to delivery

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Parenteral nutrition
In pregnancy and lactation

In Poland, 10 patients became pregnant while receiving

HPN for 7-10 years

Secondary to severe short bowel syndrome,

And the mothers delivered two healthy boys and three healthy girls at term.

Although some parenteral nutrition has been given via peripheral vein,

Most centers use central venous catheterization

For periods of *PN longer than 2-3 weeks*

Parenteral nutrition
In pregnancy and lactation

All nutritional guidelines for physiologic pregnancy

Are valid for parenterally-fed pregnant women

Daily requirements for nutrients

Differ in subsequent trimesters

And lactation

Strategy of parenteral nutrition in pregnancy

Period	Strategy of parenteral nutrition
Prior to conception	– Treat malnutrition effectively to full correction – Correct electrolyte and mineral deficiencies – Replete vitamins and trace elements – Adjust individualized nutritional regimen
First trimester	Monitor maternal weight gain and foetal growth parameters monthly throughout pregnancy and adjust formula to maintain foetus within optimal growing curve – No change in the parenteral regimen or slightly adjust ca. 150 kcal daily if maternal BMI is low
Second trimester	– Maternal weight gain appropriate during the first trimester (i.e., 1–3 kg total) → no change in the regimen – Maternal weight gain suboptimal during the first trimester → add 300kcal and 10–14g protein daily to the regimen
Second and Third trimester	– Maternal weight gain 250–500g weekly → no change – Maternal weight < 250–500g weekly → add 300kcal and 10–14g protein daily to the regimen
Postpartum – Lactation	– Standard regimen, but additional 6g amino acid/day – Extra fluids may be needed during breast feeding

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Parenteral nutrition
In pregnancy and lactation

However, *increases in amounts of macronutrients* are discussed,
The **principal aim** being to

Monitor and follow
The curves for maternal weight gain
And ultrasound estimated foetal growth parameters

Women with lower BMI (especially less than 18)
Require greater increases in macronutrients in the nutritional formulas

Keep in mind that

Fetal overgrowth is deleterious as well
And leads to several health problems in future life

Parenteral nutrition
In pregnancy and lactation

HPN-dependent women have a higher risk of development of liver disease during pregnancy compared with age-matched controls.

Two of 16 pregnant women described in the literature

Developed cholestasis *in the third trimester*.

This is an increase of 12.5%, compared with 1 % in the usual healthy population

It is very likely that

excessive energy administration,

or perhaps an *imperfect lipid emulsion composition* or *quantity*,

was responsible for this complication.

Summary

Outline

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2- Indications for and aims of nutritional Support

3- Parenteral nutrition in pregnancy and lactation

Summary

In summary,

Pregnancy constitutes *a special situation*, in which

Adequate nutrition is vital for both mother and child

Delay in adequate nutritional support to

Starving or semi starving pregnant women

Adversely affects the foetus and may result in

Increased foetal mortality and morbidity

Summary

Nutritional support should be implemented

Early and adequately in all such cases

To insure the most favourable outcomes.


Thank you…
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