Thyroid and Pregnancy

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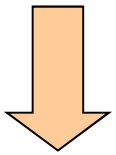
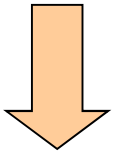
Diseases of the Thyroid

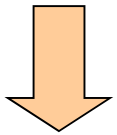
Impaired function

Impaired morphology/structure



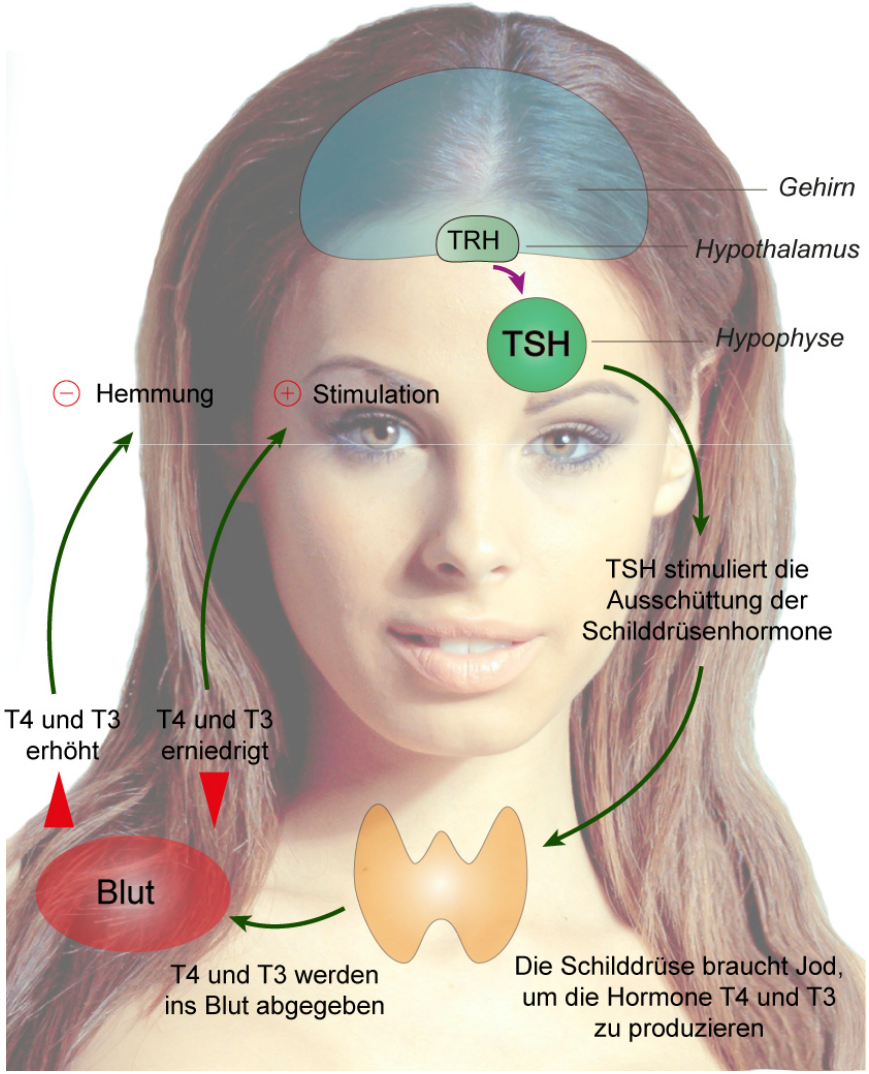


DIAGNOSIS
of the underlying disease



Therapy

Hypothalamic-Pituitary Control Loop



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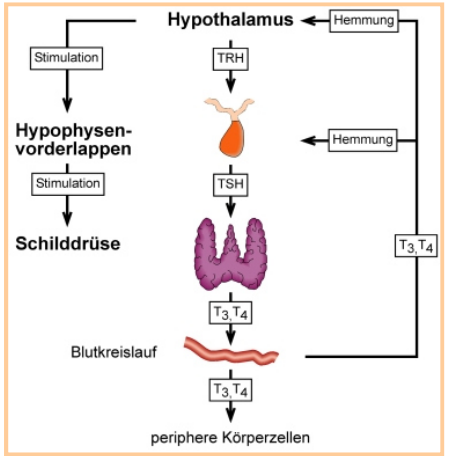
Function of the Thyroid Gland



- TSH is the most sensitive parameter to diagnose dysfunction of the thyroid
- A normal TSH during the screening process practically excludes dysfunction of the thyroid
- Previously: TRH stimulation test: TSH measured after administration of a small amount of TRH intravenously
- Thyroid hormones: fT4 und fT3
- Thyroid antibodies: TPOAb, TgAb, TRAb

Diseases of the Thyroid

Impaired function

Impaired morphology/structure

DIAGNOSIS
of the underlying disease

Therapy

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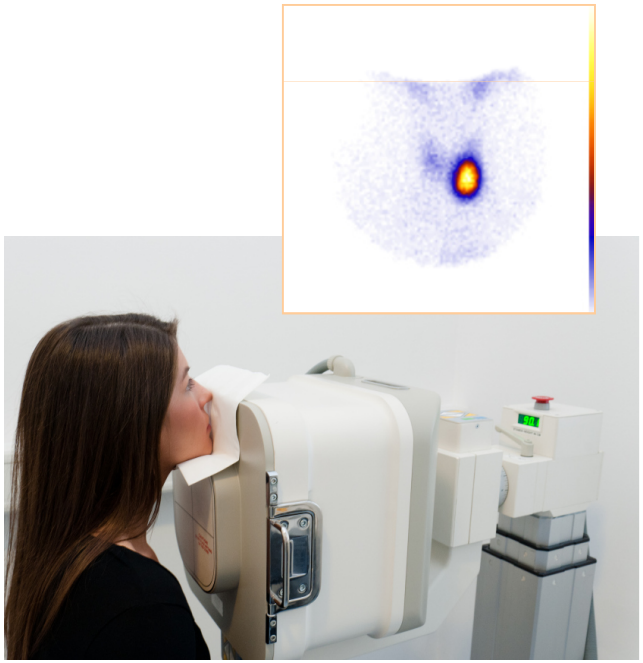
Morphology of the Thyroid

- Screening method: Sonography
  - Total volume
  - Focal findings (nodules, cysts)
  - Echo structure (autoimmune disorder)
  - Perfusion
  - Lymph nodes, parathyroid glands

Morphology of the Thyroid

- Next diagnostic step: Scintigraphy
- Definition of the regional metabolism of individual focal findings and/or the total parenchyma



- Ultrasound-guided fine needle aspiration

Diseases of the Thyroid

Common Diseases of the Thyroid in Young Women - 1

- Thyroiditis
  - Chronic autoimmune thyroiditis
  - Other types of thyroiditis:
    - subacute thyroiditis de Quervain
    - silent thyroiditis,
    - drug-induced thyroiditis (e.g., after interferon)
    - Graves' disease

Common Diseases of the Thyroid in Young Women - 2

- Nodular goiter, diffuse goiter
- History of thyroidectomy or subtotal resection
- History of thyroid carcinoma
- History of radioiodine therapy
- Iatrogenic hyperthyroidism due to overtreatment

Common Diseases of the Thyroid in Young Women - 3

- History of radiotherapy of the neck during childhood or adolescence
- Thyropathy caused by lithium treatment
- Congenital hypothyroidism

Thyroid and Pregnancy

Aspects

- Desire to have children
- Pregnancy
- Post-partum period

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Thyroid and the Desire to have Children

- Primary parameter: thyroid function
- Women of child-bearing age: TSH in general <2,5
- Infertile women: It is sensible to aim for *lower* TSH levels

Assessment of Thyroid Disease before Planned Pregnancy – general 1

- TSH > 2.5
- Anamnestic evidence of hypothyroidism, hyperthyreosis, or surgery of the thyroid
- Symptoms or clinical evidence of hypothyroidism
- Family history in regard to thyroid disorders
- Goiter

Management of thyroid dysfunction during pregnancy and postpartum: an Endocrine Society Clinical Practice Guideline. J Clin Endocrinol Metab 2007; 92: S1–47.

G. Zettinig, W. Buchinger: Schilddrüse und Schwangerschaft. J Klin Endokrinol. Metabol. 2009 12-16

Assessment of Thyroid Disease before Planned Pregnancy – general 2

- Thyroid antibodies
- Typ 1 diabetes
- Other autoimmune diseases
- In case of infertility, TSH should be determined as part of the search for the causes of infertility
- Radiotherapy of the head or neck as part of the anamnesis
- Miscarriage as part of the medical history

Thyroid and the Unfulfilled Desire to have Children

- Screening of the thyroid by the gynecologist:
  - TSH
  - TRH test
  - TPOAb
  - free T4
- To the nuclear medicine specialist / endocrinologist if:
  - TSH > 2
  - TRH test > 20
  - TPOAb pos.

Algorithm for assessment of thyroid disease, Kinderwunschzentrum Goldenes Kreuz, Vienna, Austria

Thyroid and the Unfulfilled Desire to have Children

- To the nuclear medicine specialist /endo if:
  - TSH repeatedly > 2, documented by various laboratory results
  - (Former) intake of thyroid hormones or (former) thyreostatic therapy
  - History of surgery of the thyroid
  - History of radioiodine therapy
  - Diseases of the thyroid in next of kin
  - Autoimmune diseases (vitiligo, diabetes mellitus I, rheumatoid arthritis, etc.)

Mild TSH Increase

- Therapy with Levothyroxin
- Intake in the morning at least 30 min before breakfast
- TSH is only meaningful after more than 6 weeks of intake of the same T4-dosis
- It is *essential* that the therapy is continued if a pregnancy occurs
- First check-up around the 8th week of pregnancy

Aspects

- Desire to have children
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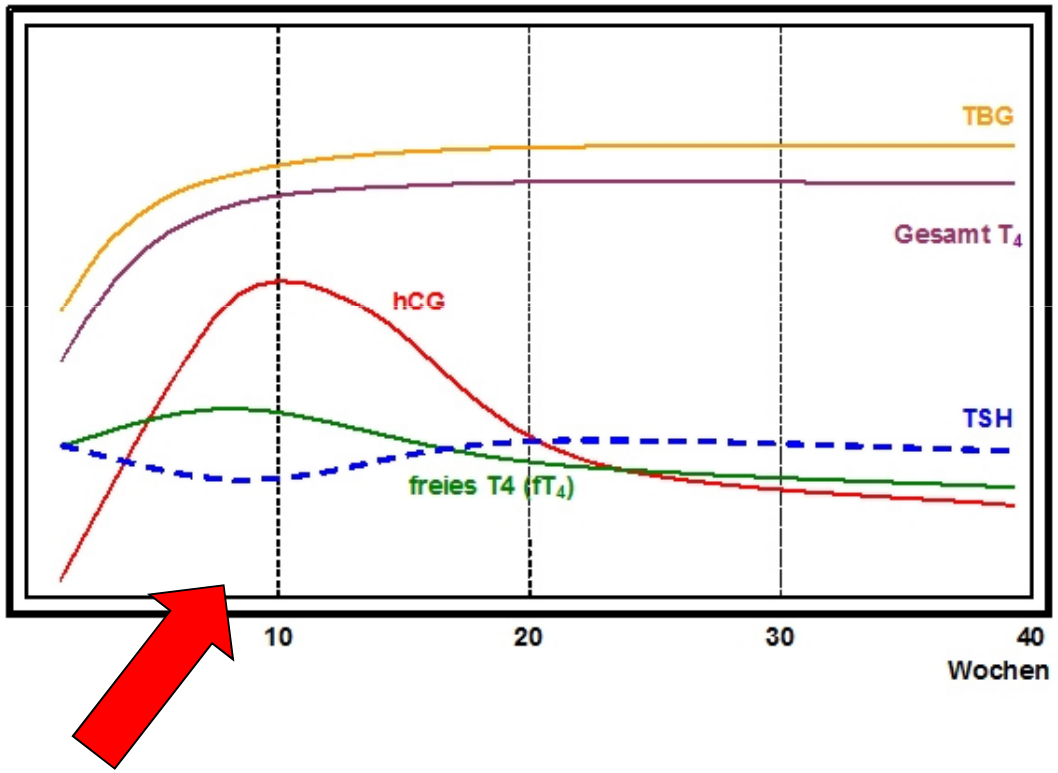
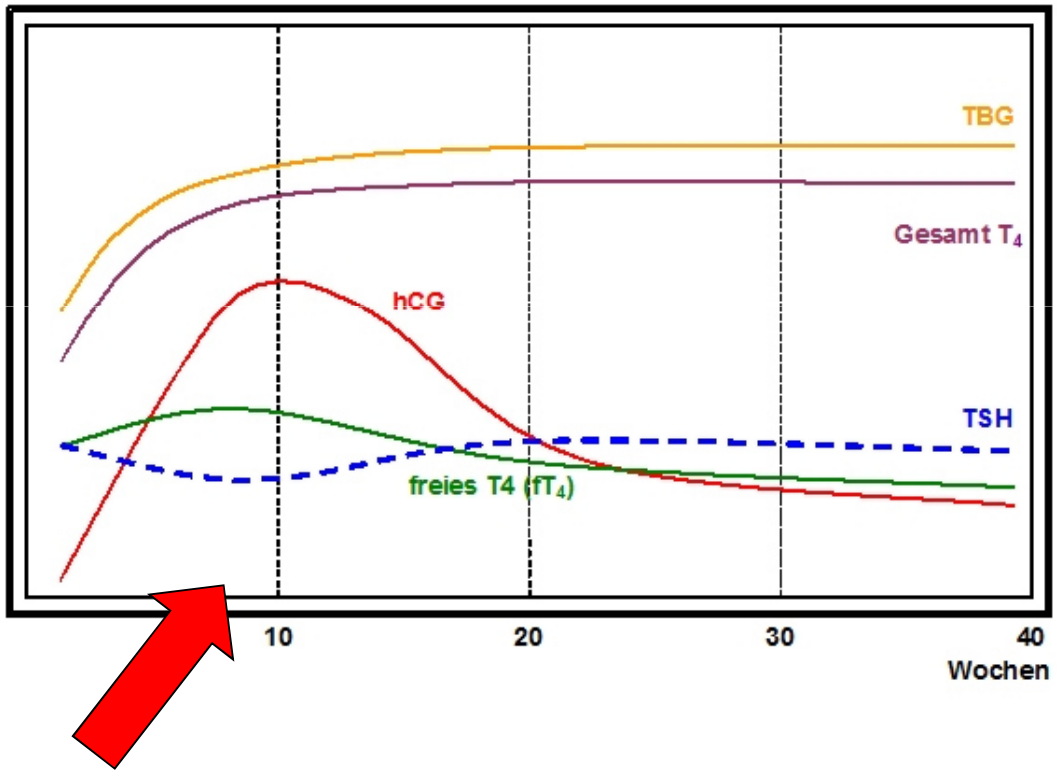
Thyroid and Pregnancy



Laboratory Parameter during Pregnancy

- Increased production of TBG (thyroxine-binding globulin)
- Consequently, only the evaluation of the free hormones is meaningful
- Beta HCG is similar in its action to TSH
- Decline of TSH, rise of fT4 during the first trimester is normal


TBG
Gesamt T_4
hCG
TSH
freies T4 (fT_4)
10
20
30
40
Wochen

Hypothyroidism and Pregnancy

- Hypothyroidsm disturbs the intellectual and physical development of the fetus
- Aim for euthyroidism already before conception (TSH < 2.5)
- During the 4th to 6th week of pregnancy it is often necessary to increase the dosis of T4 about 30-50%
- Controls at regular intervals are necessary (TSH, free hormones)

Routine check-ups
8th week of pregnancy, all women

TSH 0.2 - 2.5 TPOAb neg (sono normal)	TSH 0.2 - 2.5 TPOAb pos sono most often hypoechoic	TSH < 0.1 TPOAb pos sono hypoechoic	TSH < 0.1 TPOAb neg sono normal
	fT4		fT4, fT3, TRAb
		fT4, fT3, TRAb	
	Chronic immunthyroiditis		
No further check-ups necessary – healthy thyroid			
	Post-partum thyroiditis	Graves‘ Disease	Beta HCG ind.

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Intellectual development – Haddow (1999)

- Pregnant hypothyroid mothers - grades / IQ of the children
- Manifest hypothyroid mothers: IQ of the children 7 points lower
- Possibly, a subclinical hypothyroidism already affects the intellectual development

Hyperthyroidism

Hyperthyroidism and Pregnancy

- Beta HCG is similar in its action to TSH
- During the first trimester increased production of thyroid hormones
- As a result TSH declines
- Only rarely subclinical/manifest hyperthyroidism

Differential diagnosis of low TSH

- Hyperthyroidism:
  - Graves‘ Disease
  - Temporary hyperthyroidism caused by thyroiditis
  - Autonomously functioning thyroid nodules
  - iatrogenic hyperthyroidism due to overtreatment
  - Beta HCG
  - Hyperemesis gravidarum

Thyreostatic Therapy

- New introduction / Continuation in case of manifest hyperfunction
- Free T4 in the upper normal range of non-pregnant women
- Subclinical hyperthyroidism does not require therapy
  - No evidence in regard to better outcomes under therapy
  - Potential side effects of the thyreostatic drugs

TRAb

- Passes freely through the placenta
- Are able to stimulate the fetus
- In case of autoimmune disease during the third trimester, control of TRAb to exclude the possibility of a fetal hyperthyroidism

Rule of Thumb

- Hyperthyroidism complicates pregnancy
- Pregnancy complicates the treatment of hyperthyroidism

Aspects

- Desire to have children
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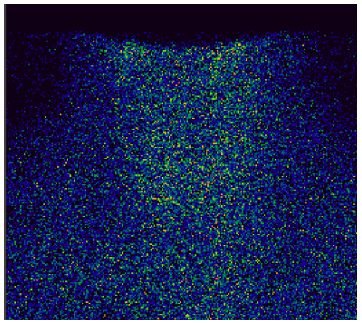
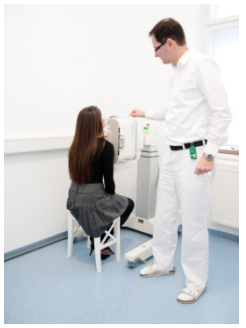
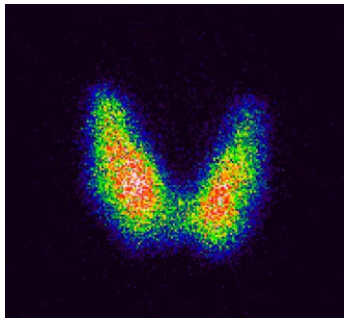
Post-partum Thyroiditis

- In the beginning most often temporary hyperthyroid phase (cell destruction, usually no symptoms)
  - thyreostatic therapy contraindicated
  - possibly symptomatic treatment with beta-blockers
- After weeks/months euthyroidism; later often hypothyroidism
- Two years after delivery withdrawal; remission possible







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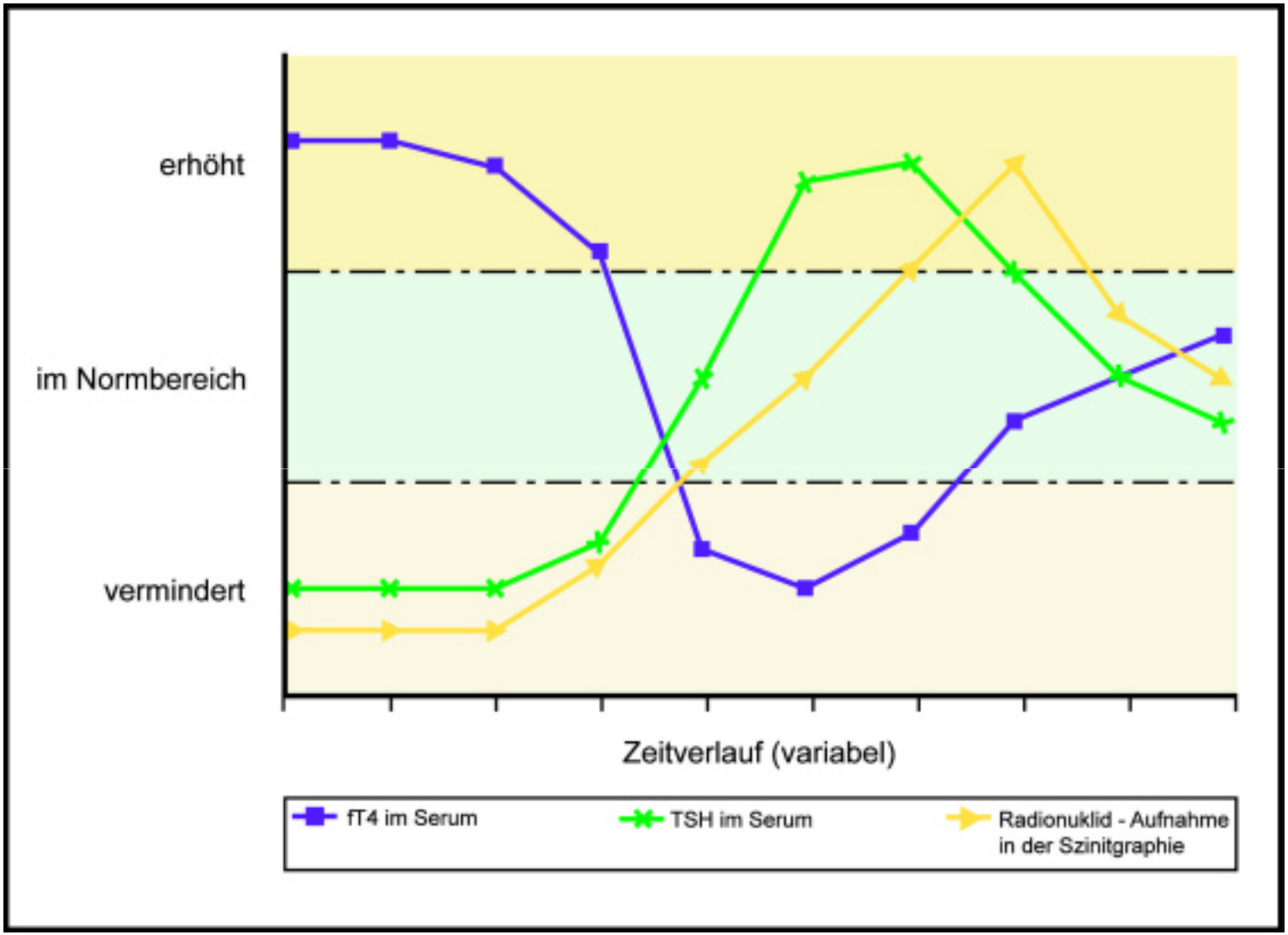

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from: Zettinig, Buchinger.
Schilddrüse - kurz und bündig.
3. Edition 2015

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Screening

- TSH check-up for all women with elevated antibodies 3 and 6 months after delivery

- TSH check-up for all women with diabetes mellitus 3 and 6 Monate after delivery

Diaplacental Transportation

- Maternal thyroid hormones:
  Only a small amount passes through the placenta
- Starting at week 12th, the thyroid of the fetus is able to absorb iodine and produce hormones
- Pass freely through the placenta:
  - TPOAb, TgAb, TRAb
  - Thyreostatic drugs
  - Beta-blocker

Iodine

- In Austria for centuries scarcity of iodine
- Salt has been iodinated since 1963
- Thus, the incidents of goiter declined steadily
- And, as a result, a change in the biological behavior of thyroid carcinomas occured (substantial better prognosis)

BUNDESGESETZBLATT

FÜR DIE REPUBLIK ÖSTERREICH

Jahrgang 1999	Ausgegeben am 22. Juli 1999	Teil I

115. Bundesgesetz: Änderung des Bundesgesetzes über den Verkehr mit Speisesalz (NR: GP XX RV 1774 AB 1981 S. 174. BR: AB 5982 S. 656.)

115. Bundesgesetz, mit dem das Bundesgesetz über den Verkehr mit Speisesalz geändert wird

Thyroid and the Demand for Iodine

- Legal Prophylaxis:
  - 1963 10 mg/kg
  - 1990 increase to 20 mg/kg
  - 1999 modification 15-20 mg/kg

- Daily Iodine requirements:
  - Newborn: 40 – 90 µg
  - Children/Youths: 90 – 120 µg
  - Starting at age 15: 150 µg
  - Pregnancy and lactation period: 200-250 µg

Thyroid and Iodine - 2

- This trace mineral is essential for the health of the thyroid
- In case of autoimmune diseases Iodine should be avoided
- Absolute Iodine abstinence in case of autonomously functioning thyroid nodules, thyroid carcinomas and before radioiodine therapy
- Blockade of the thyroid with perchlorate in case of increased risk of iodine-induced hyperthyroidism before iodine exposure

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