Principles of Endocrinology

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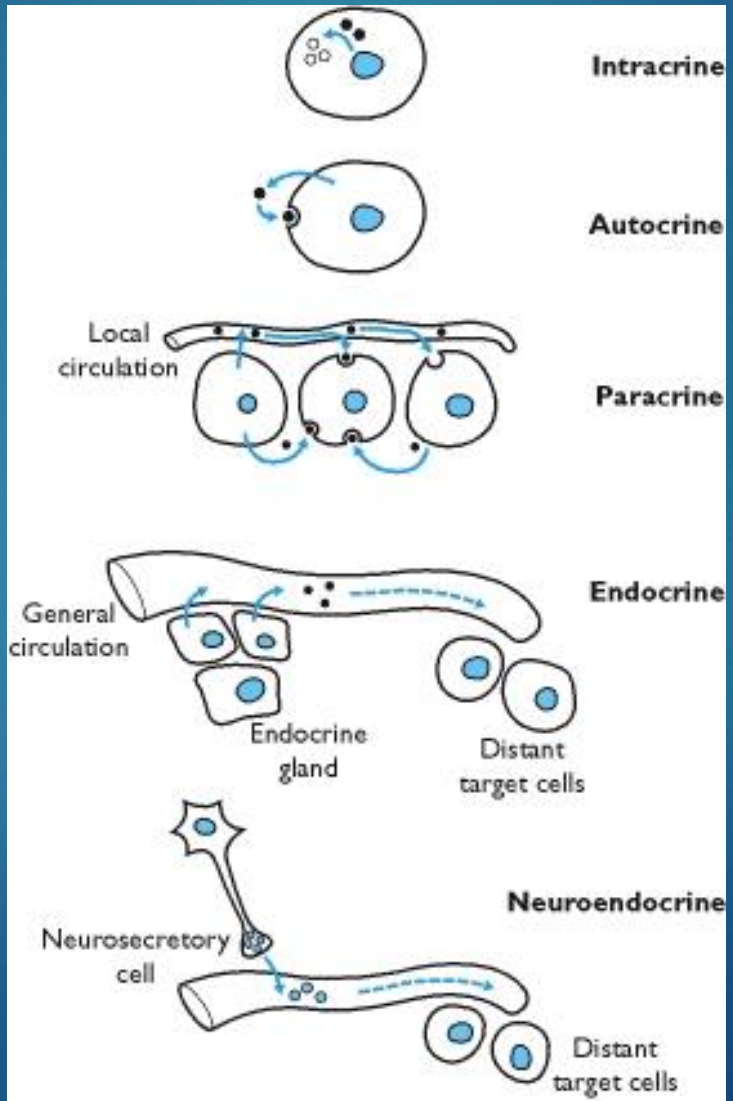
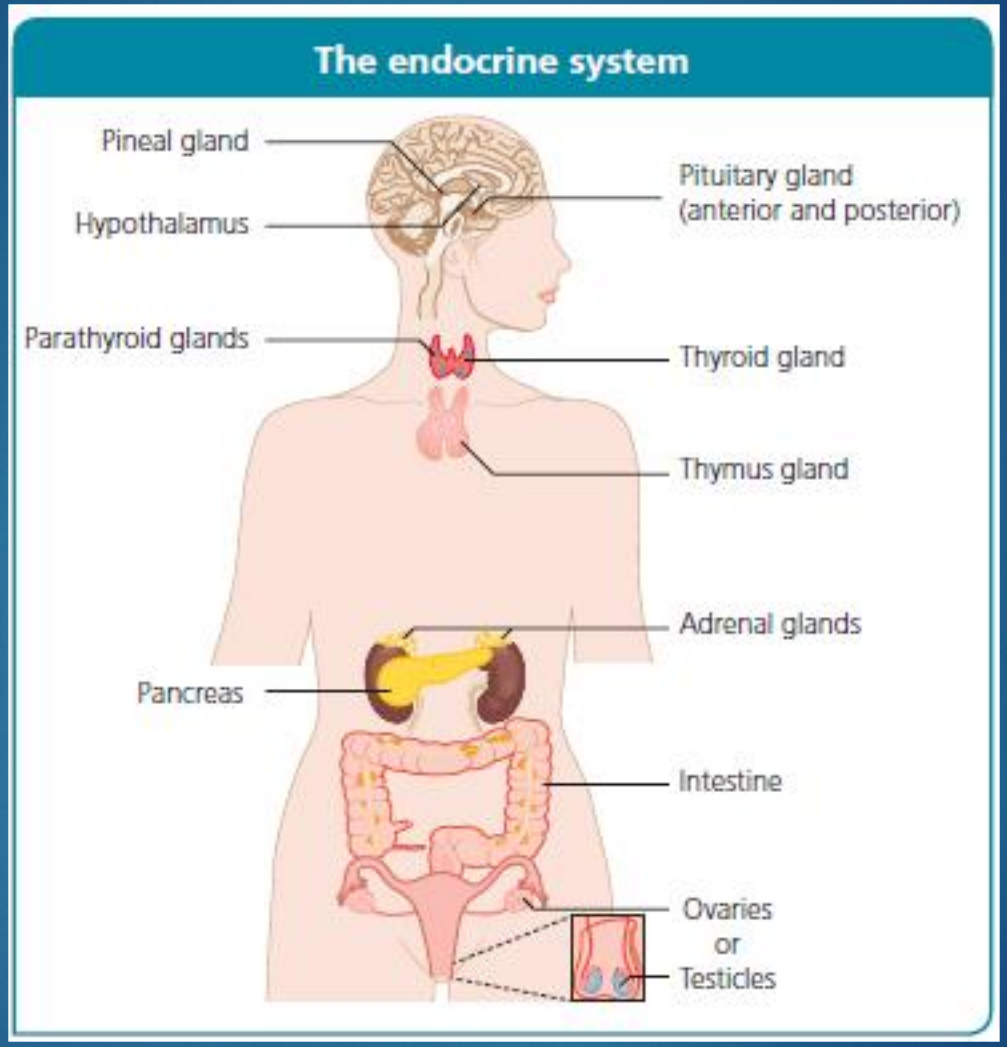
Forms of communication

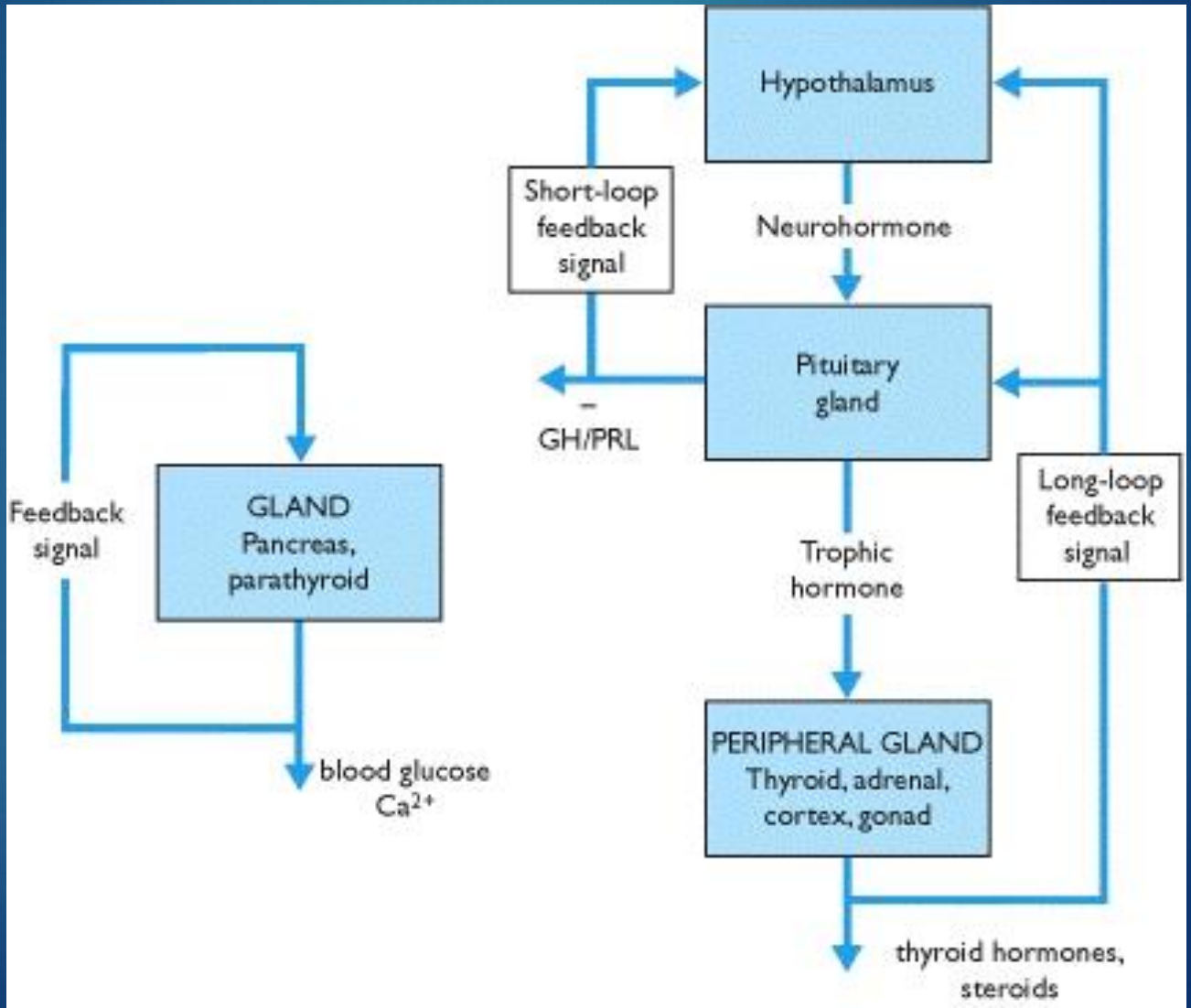



The endocrine system
Pineal gland
Hypothalamus
Parathyroid glands
Pituitary gland
(anterior and posterior)
Thyroid gland
Thymus gland
Adrenal glands
Pancreas
Intestine
Ovaries
or
Testicles

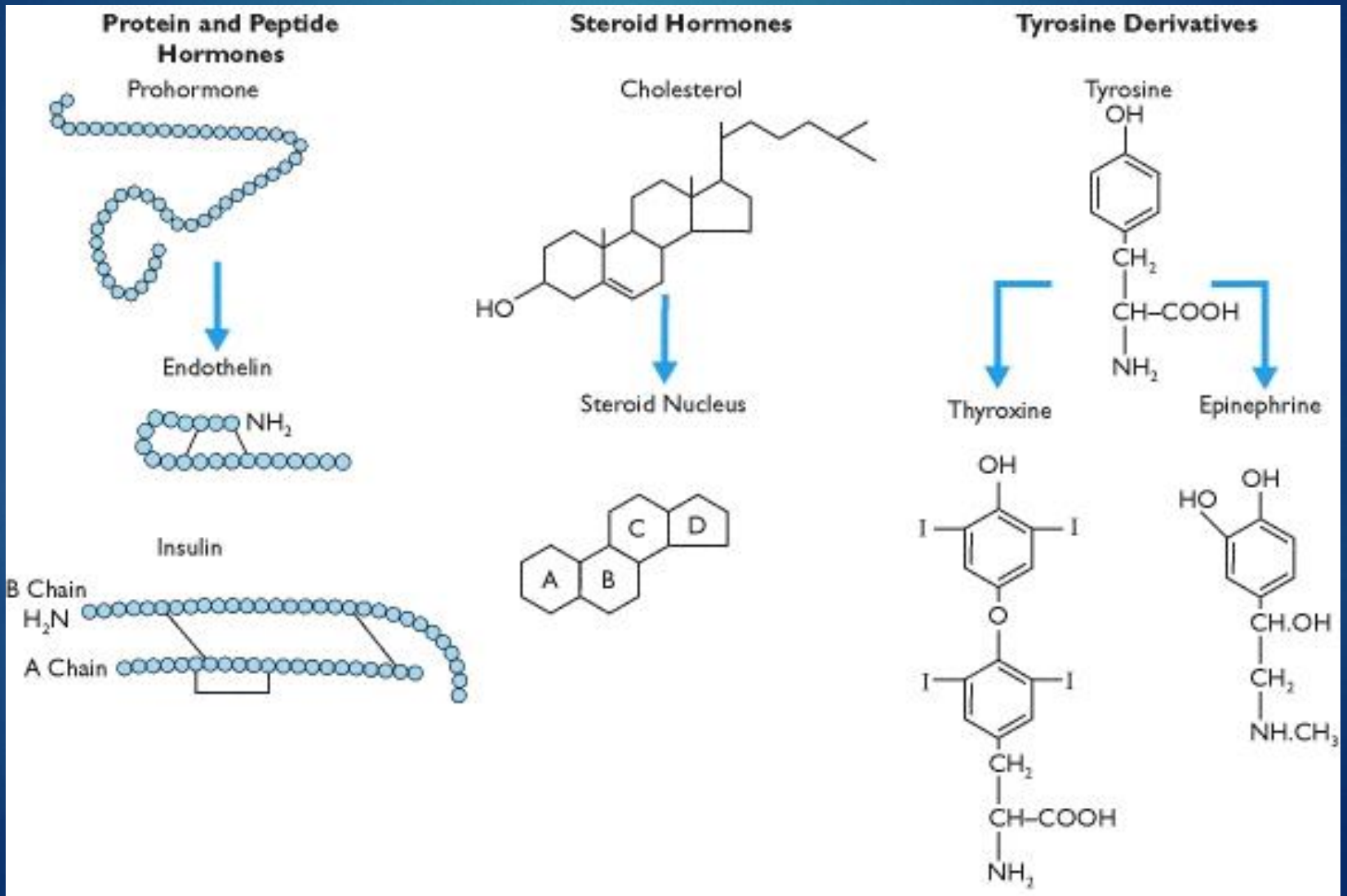
Functions of hormones

- Development & growth
- Differentiation & reproduction
- Homeostasis & immunity
- Metabolism & nutrient supply
- Cognition & emotions

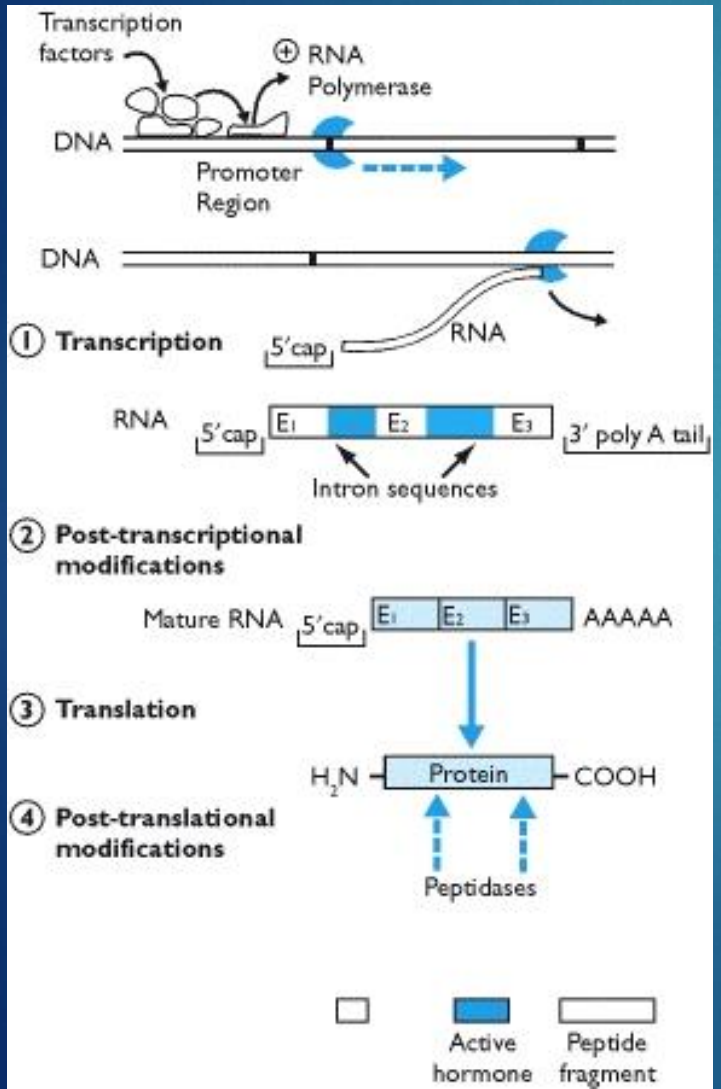
Feed-back

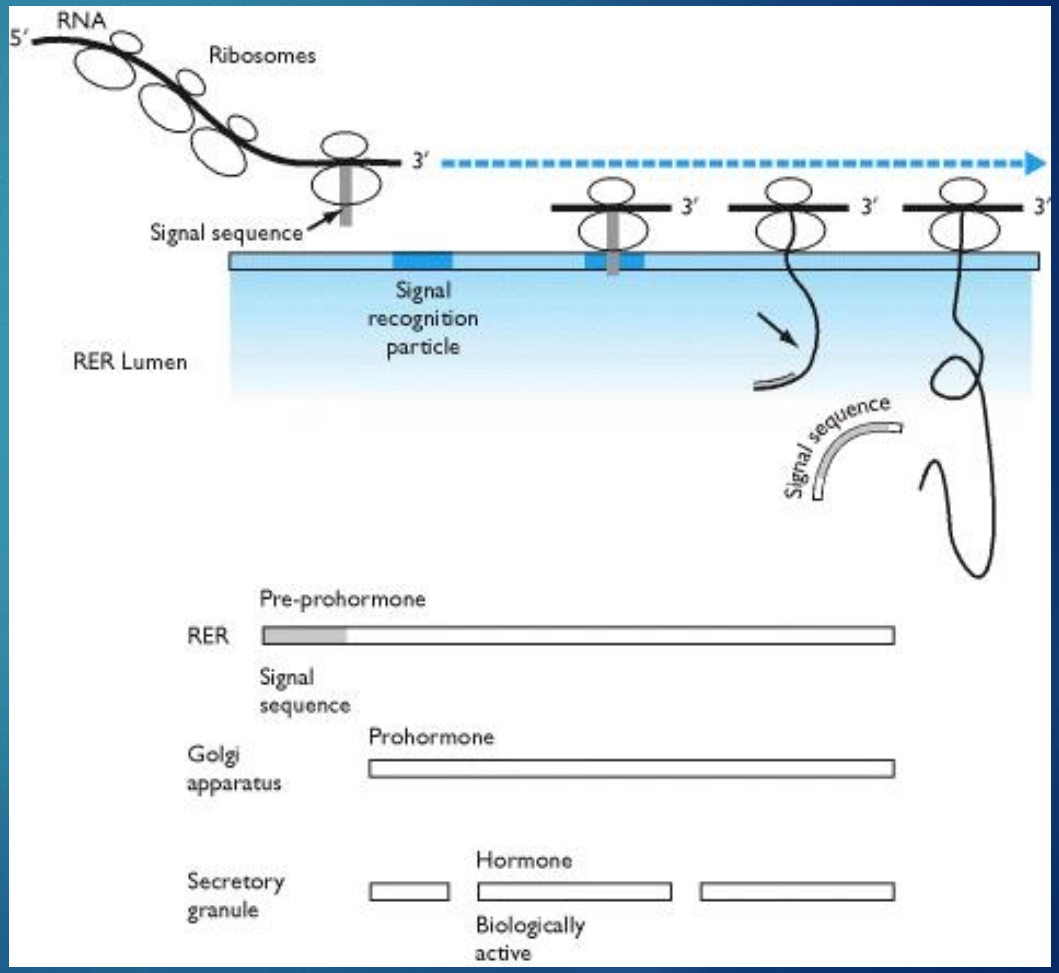

Hypothalamus
Short-loop feedback signal
Neurohormone
Pituitary gland
–
GH/PRL
Feedback signal
GLAND
Pancreas, parathyroid
blood glucose
Ca^{2+}
Trophic hormone
Long-loop feedback signal
PERIPHERAL GLAND
Thyroid, adrenal, cortex, gonad
thyroid hormones, steroids

Biochemistry of hormones

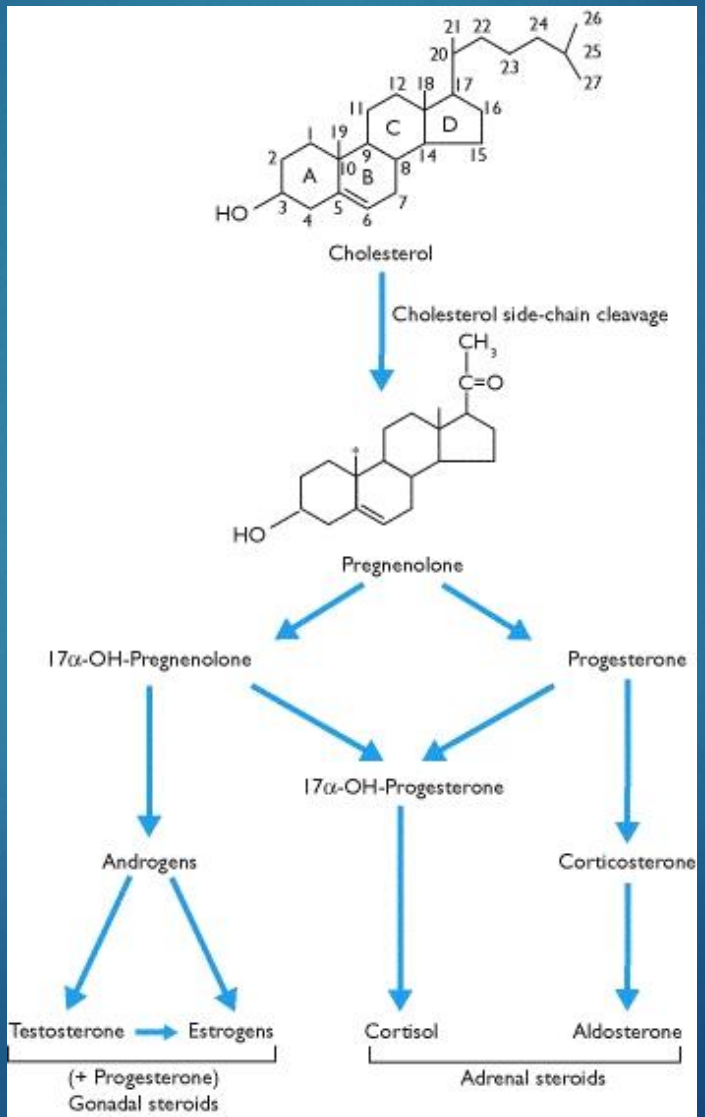


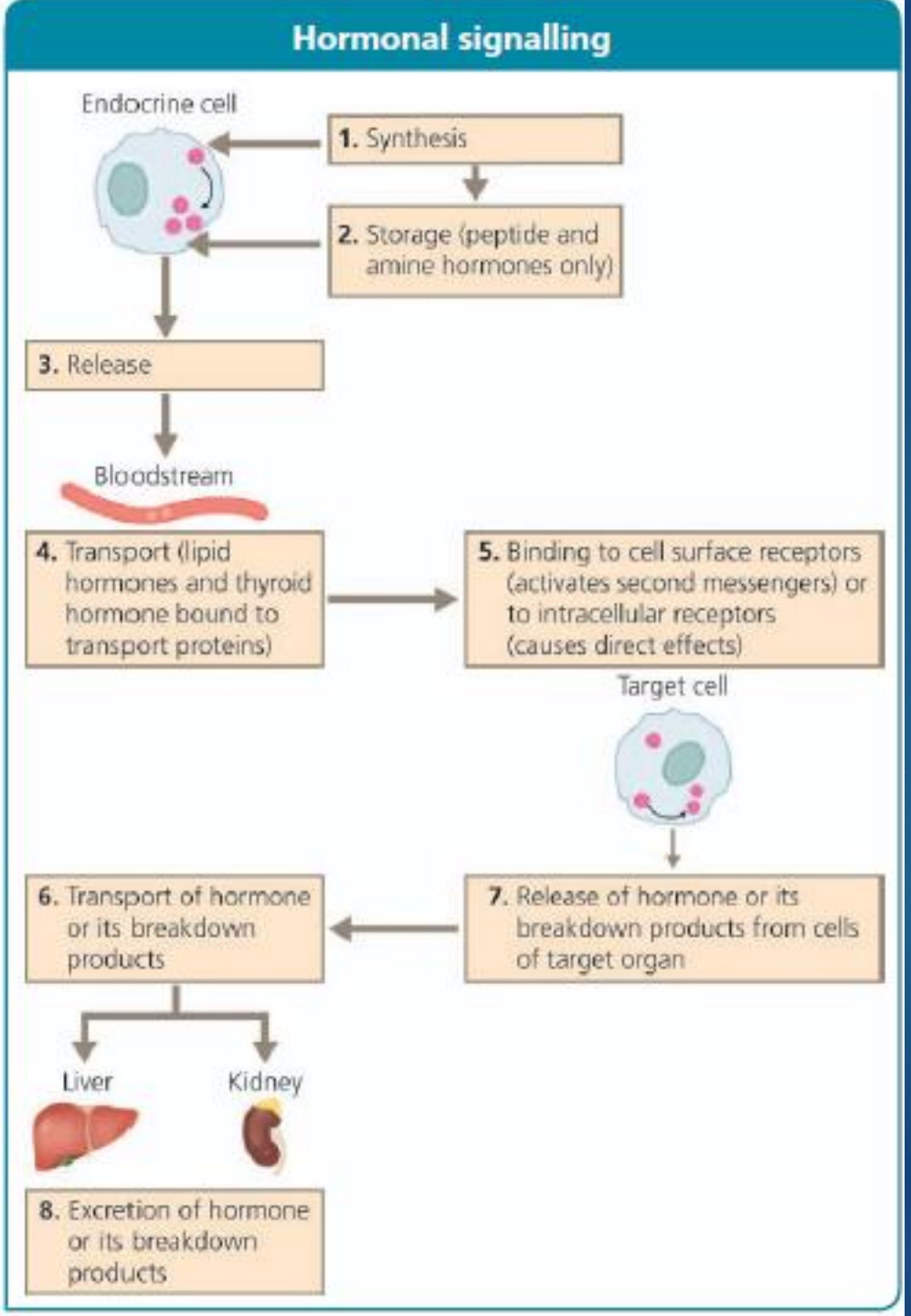
Protein hormones





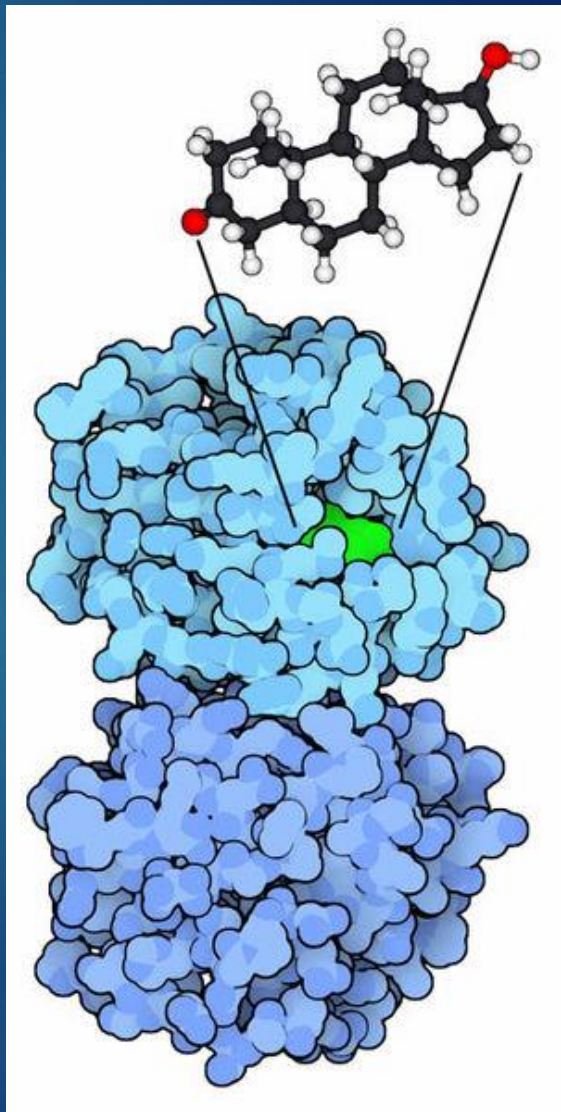
Steroid hormones




Hormonal signalling
Endocrine cell
1. Synthesis
2. Storage (peptide and amine hormones only)
3. Release
Bloodstream
4. Transport (lipid hormones and thyroid hormone bound to transport proteins)
5. Binding to cell surface receptors (activates second messengers) or to intracellular receptors (causes direct effects)
Target cell
6. Transport of hormone or its breakdown products
7. Release of hormone or its breakdown products from cells of target organ
Liver
Kidney
8. Excretion of hormone or its breakdown products

Transport of hormones

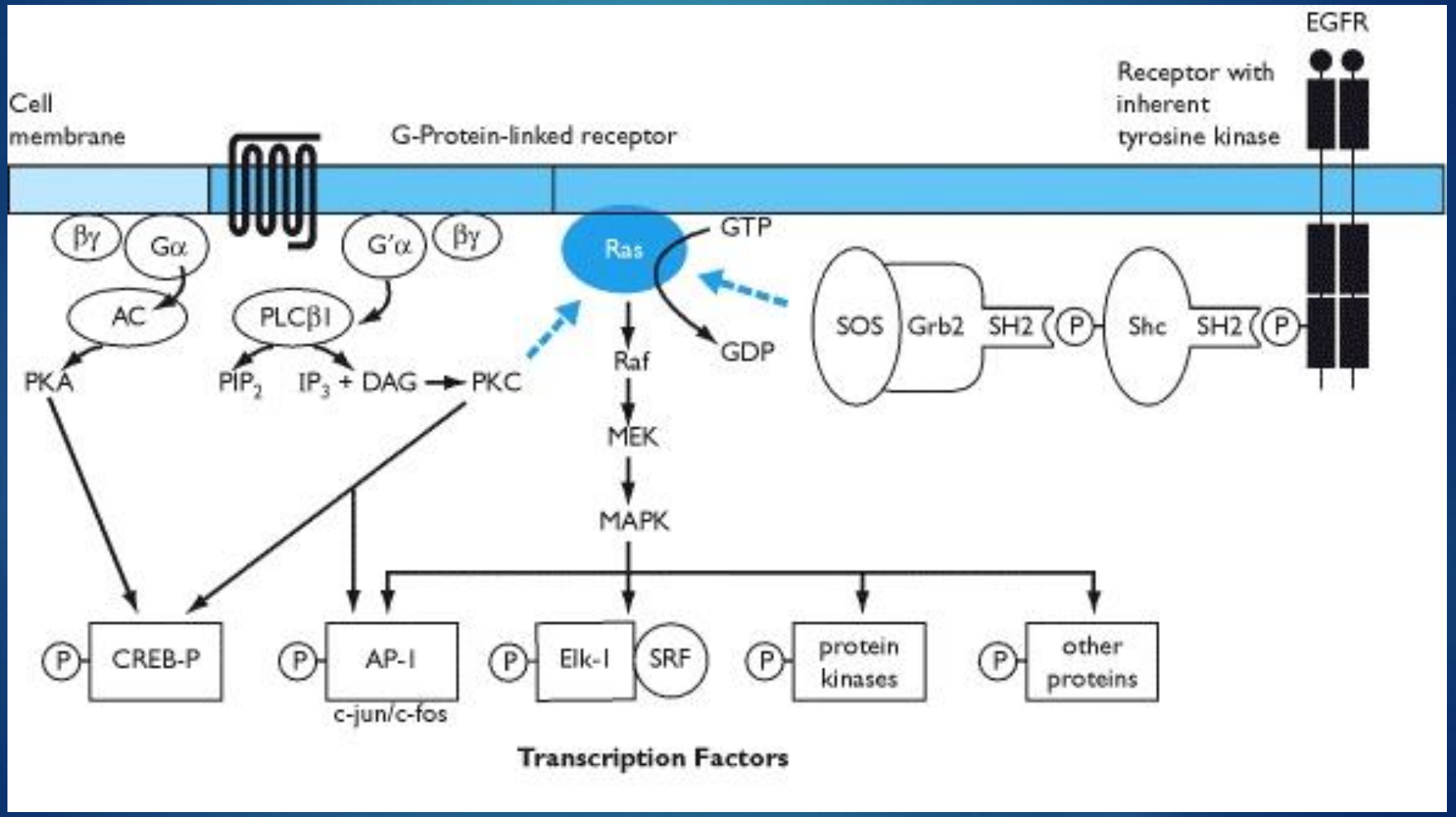
- Soluble
- Bound to proteins
  - SHBG, CBG, ...
  - Albumin
- Free „biologically active“ fraction
- Receptors for binding globulins
- Plasma half-life
  - Highly variable



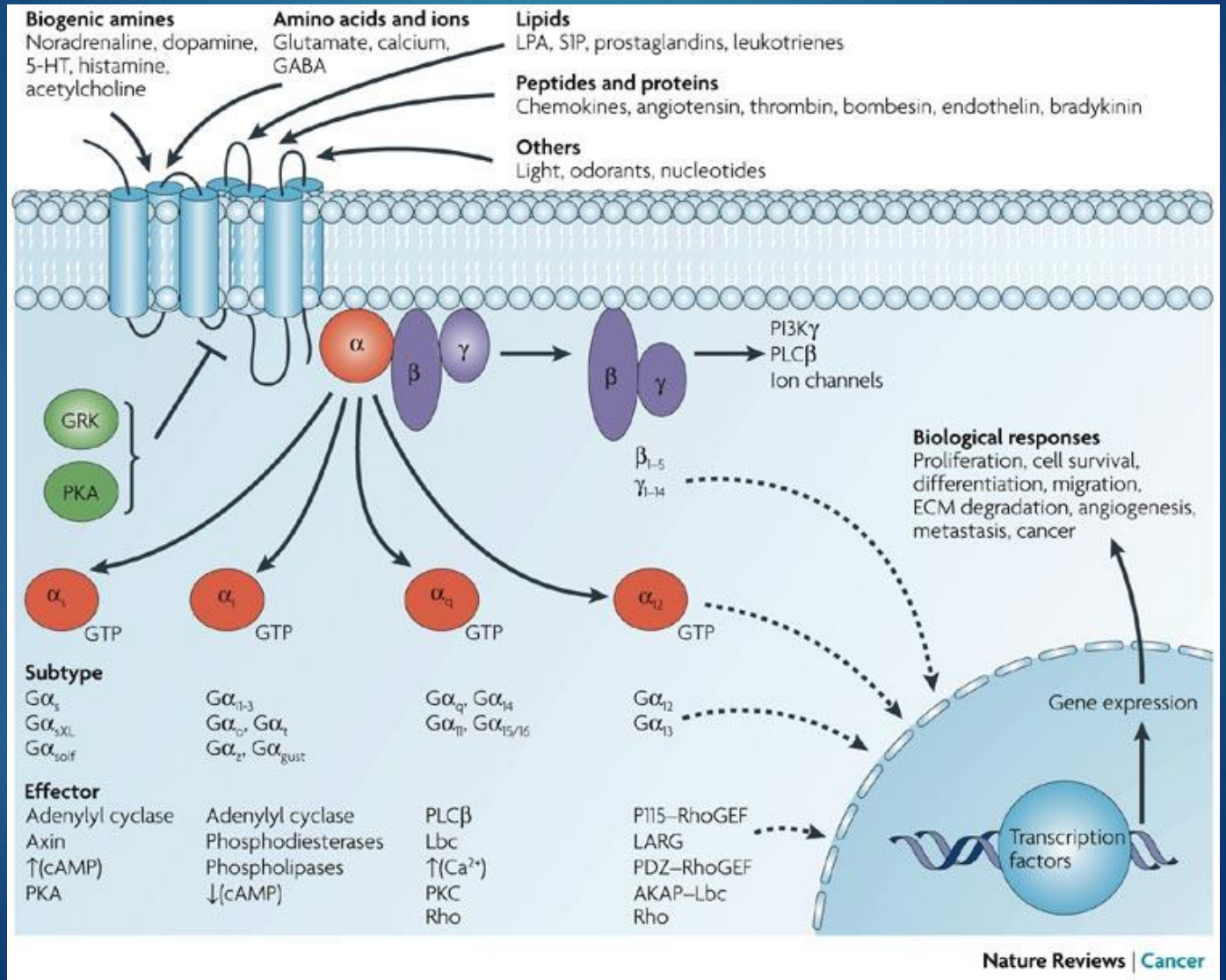
Hormone receptors

- Membrane-bound receptors
  - G-protein coupled receptors
  - Serine/threonine kinases
  - Tyrosine kinases
  - Ion channels
- Intracellular receptors
  - Steroid nuclear receptors

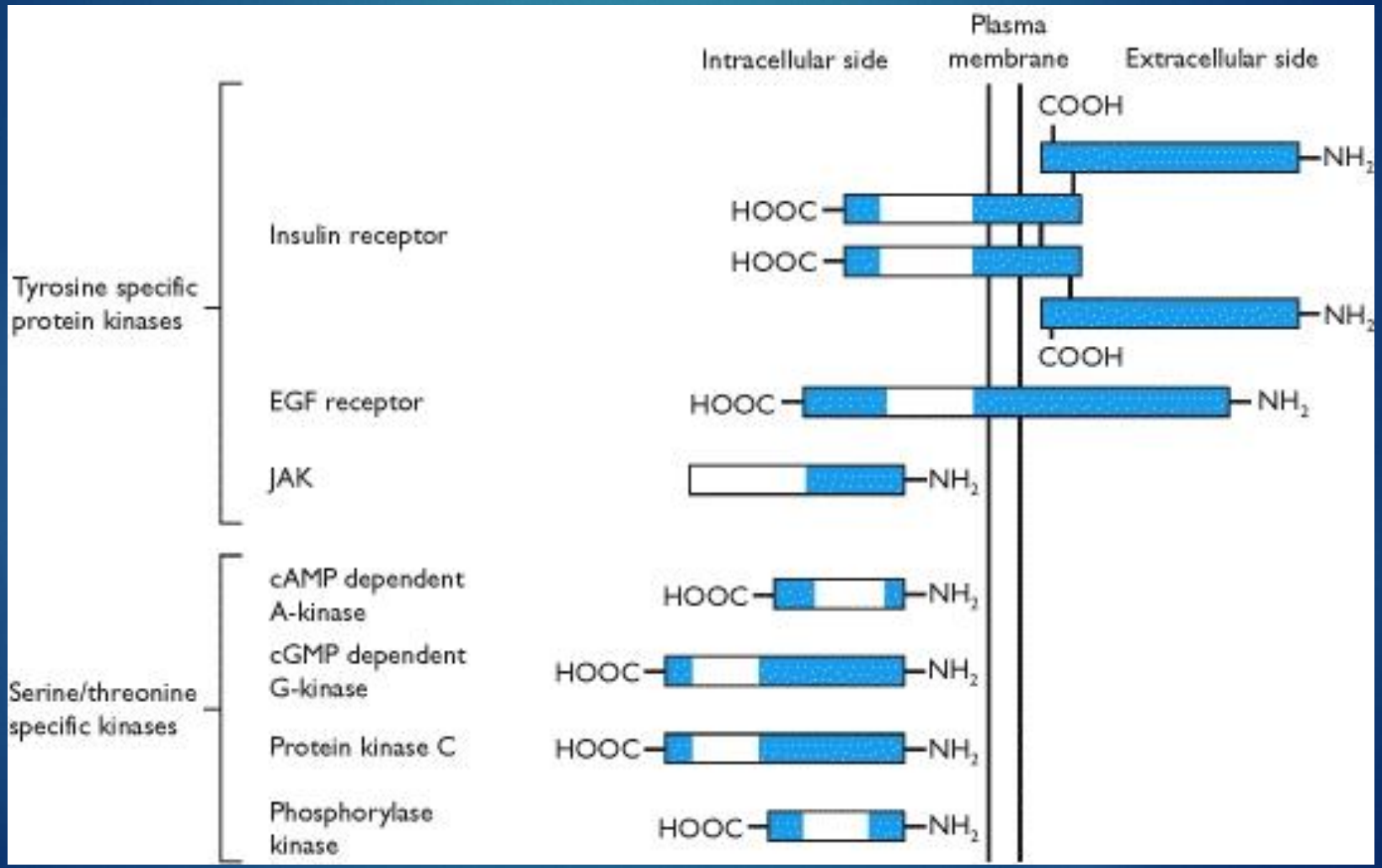
Hormone receptors



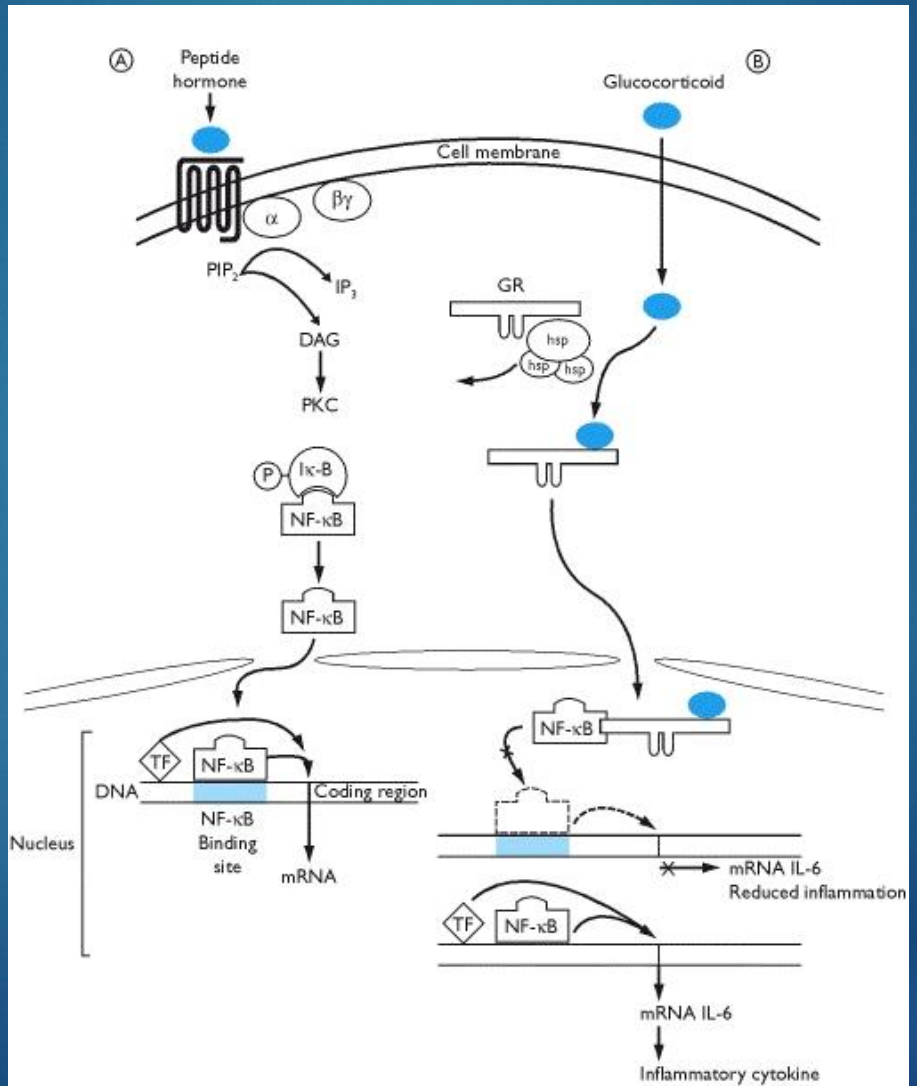
G-protein coupled receptors



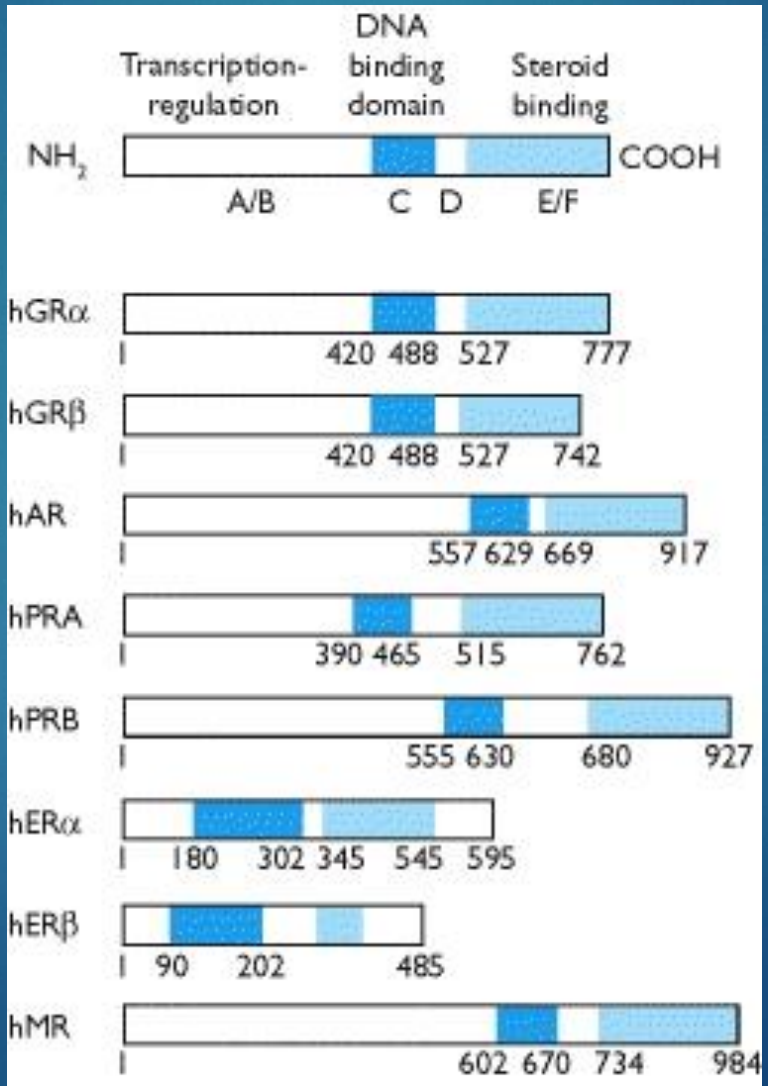
Receptor kinases



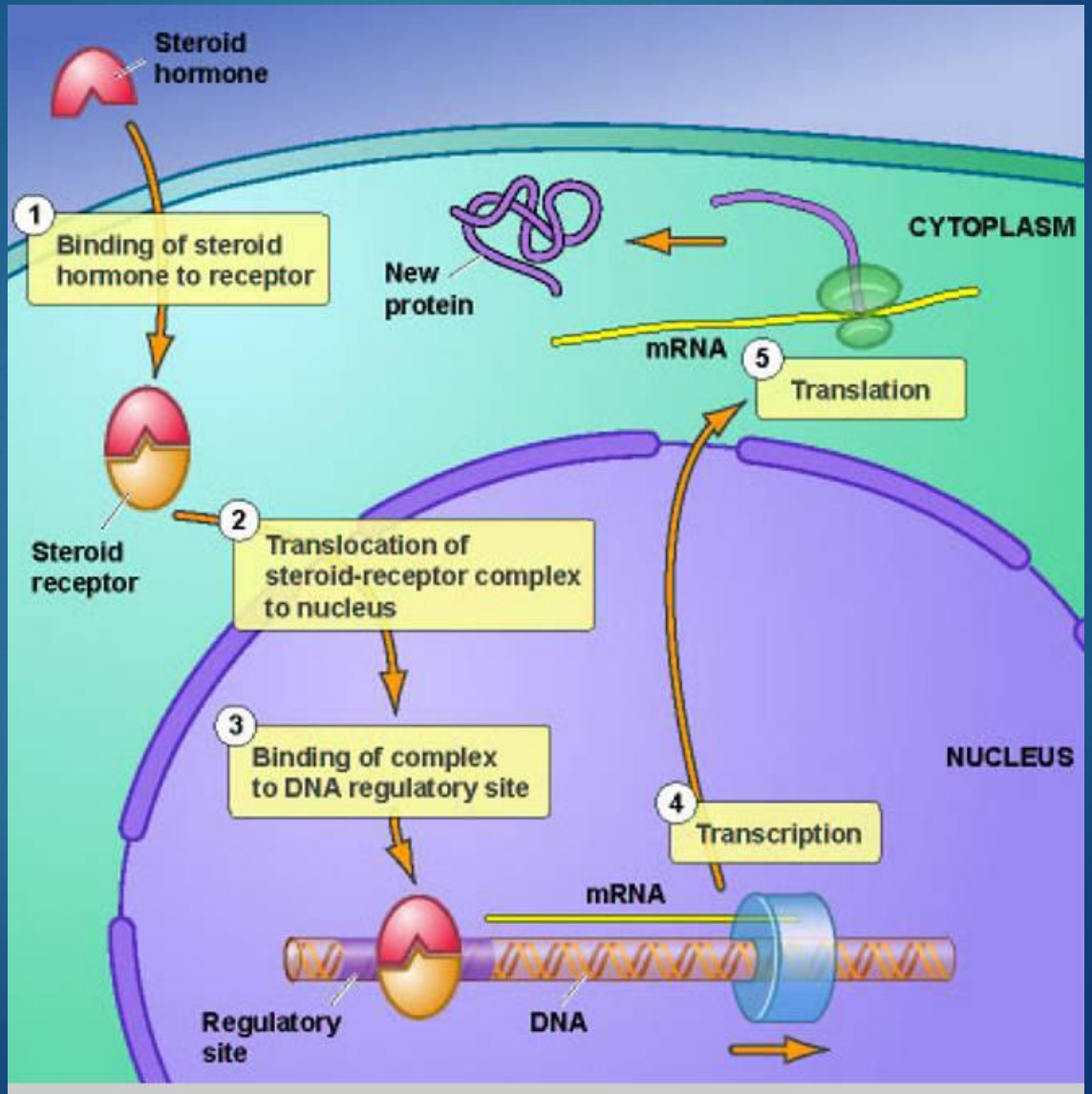
Protein vs. steroid receptors



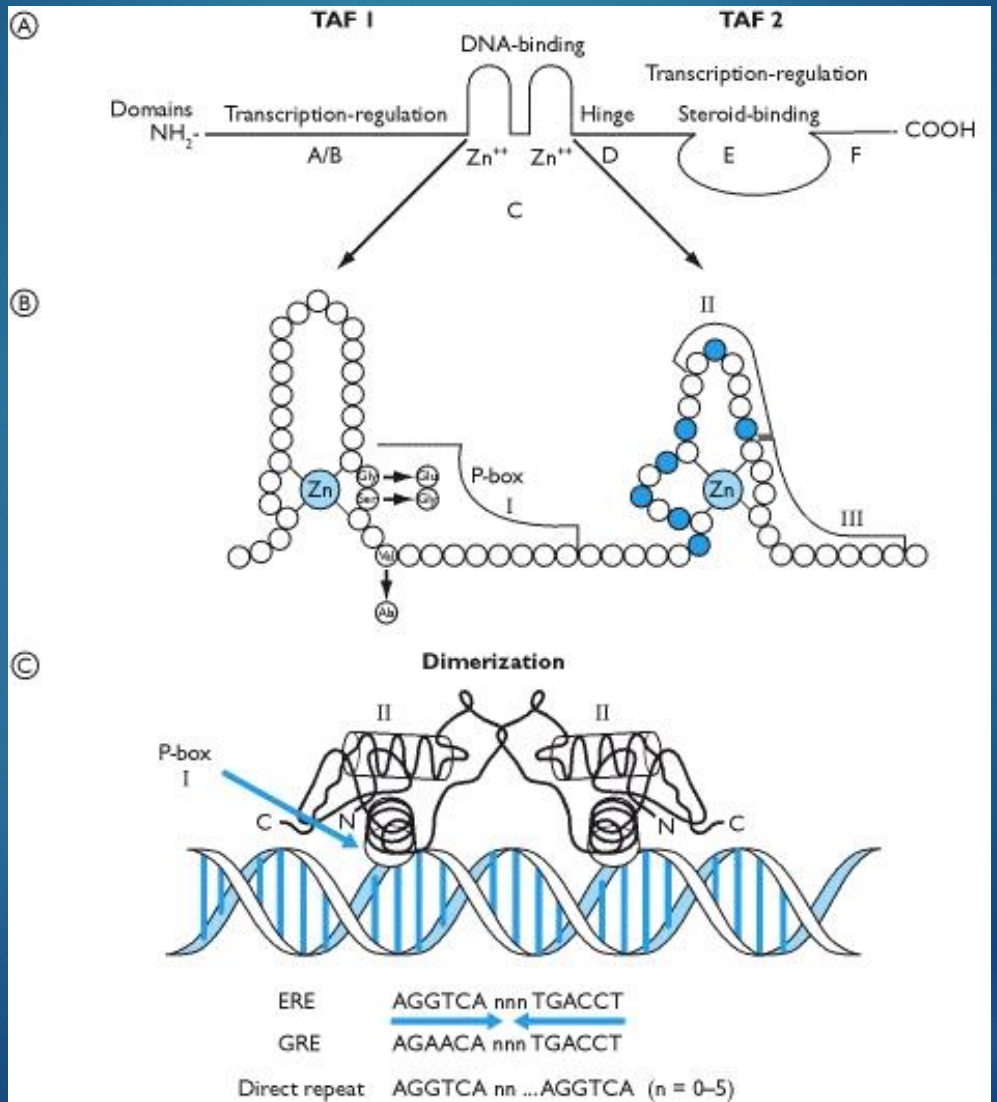
Steroid receptors



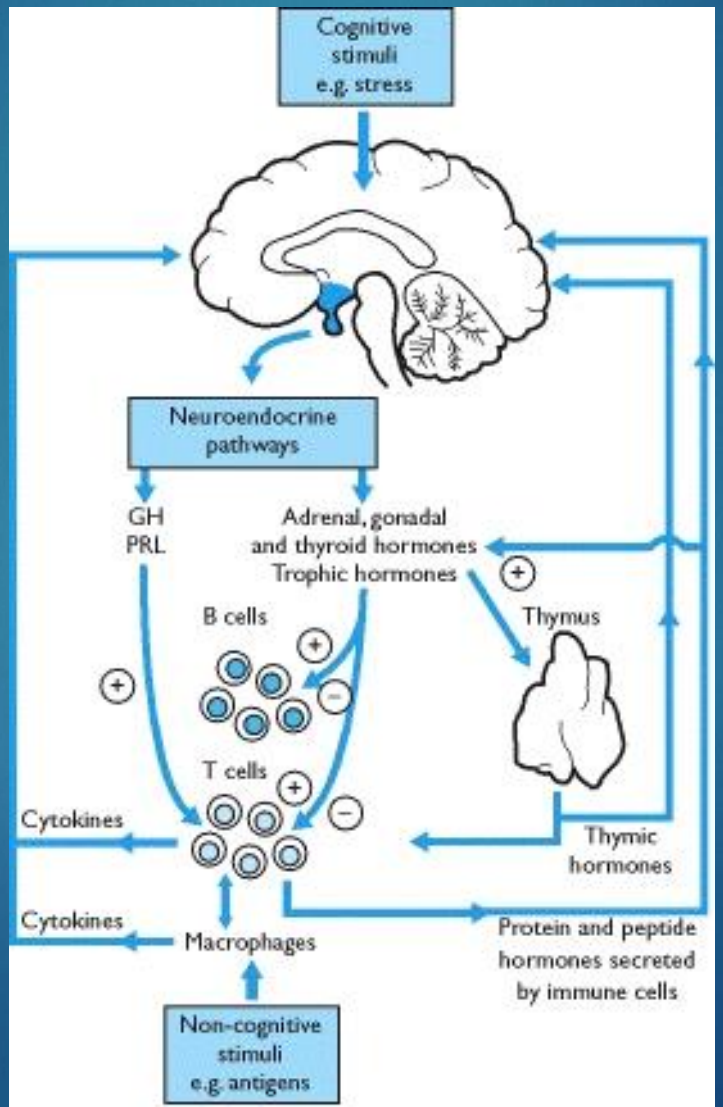
Steroid receptors



Steroid receptors



Neuroimmunoendocrinology



Endocrine disorders

- Overproduction
- Deficiency
- Resistance

- Explained by physiological mechanisms

Biorhythms

- Circadian
- Ultradian
- Infradian
  - Circannual
  - Circaseptadian
  - Circalunar

Bratisl Lek Listy 2002; 103 (2): 59-69

EXPERIMENTAL STUDY

The circalunar cycle of salivary testosterone and the visual-spatial performance

Celec P, Ostatnikova D, Putz Z, Kudela M

Faculty of Medicine, Georg-August-University, Göttingen, Germany. **petercelec@hotmail.com**

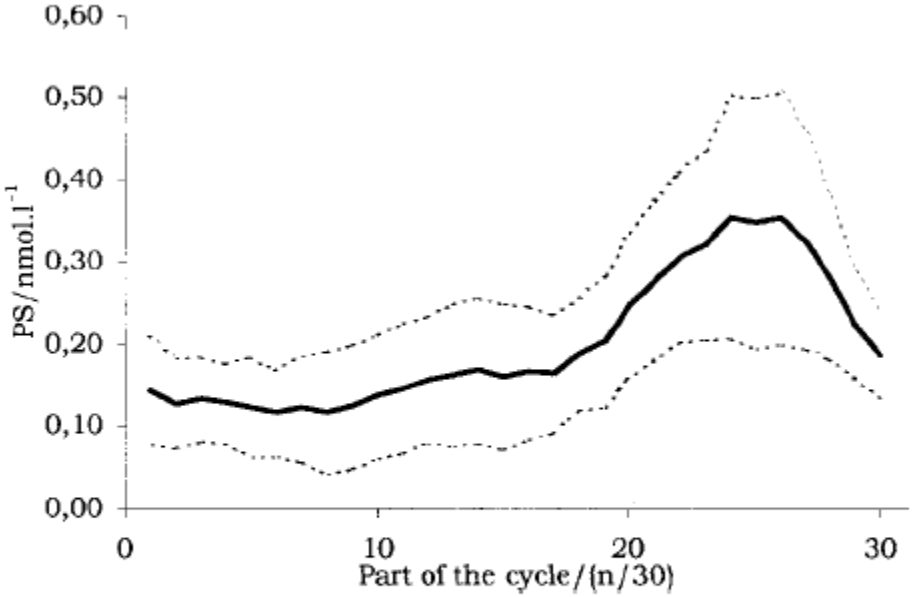


Fig. 3. The circalunar cycle of salivary progesterone in women. The average levels are related to the relative time parts (n=30) of the standardized menstrual cycle. (Dotted curves show A±SD.)

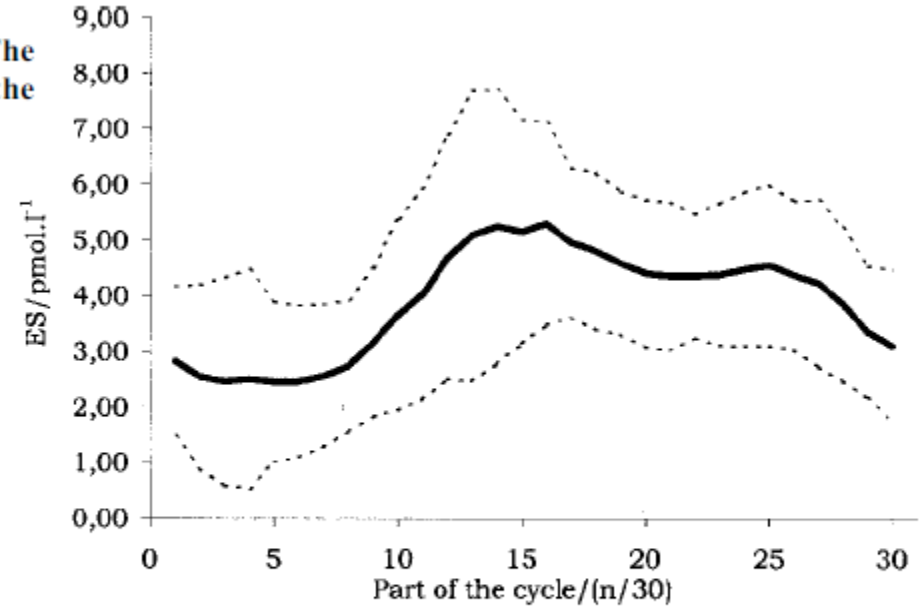


Fig. 2. The circalunar cycle of salivary estradiol in women. The average levels are related to the relative time parts (n=30) of the standardized menstrual cycle. (Dotted curves show A±SD.)

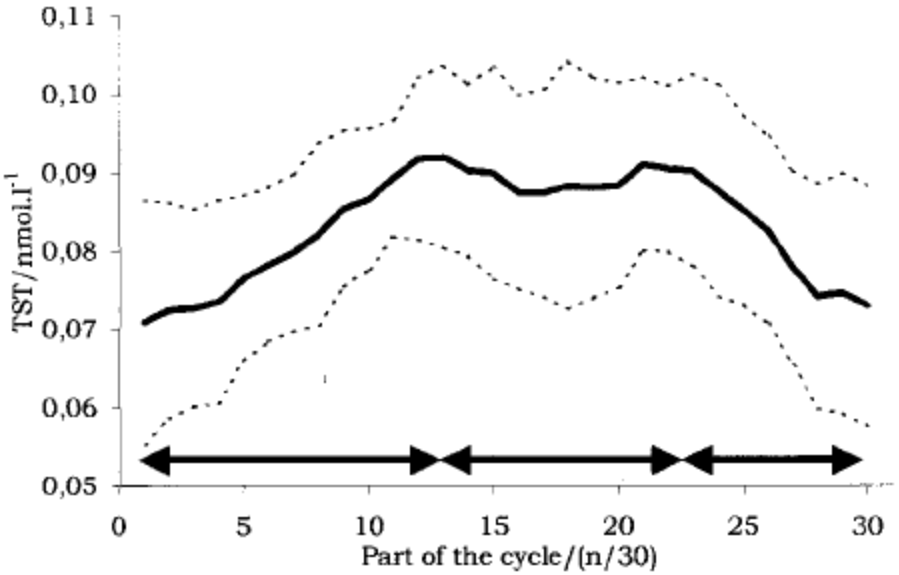


Fig. 1. The circalunar cycle of salivary testosterone in women. The average levels are related to the relative time parts (n=30) of the standardized menstrual cycle. (Dotted curves show A±SD, the arrows show the local extremes.)

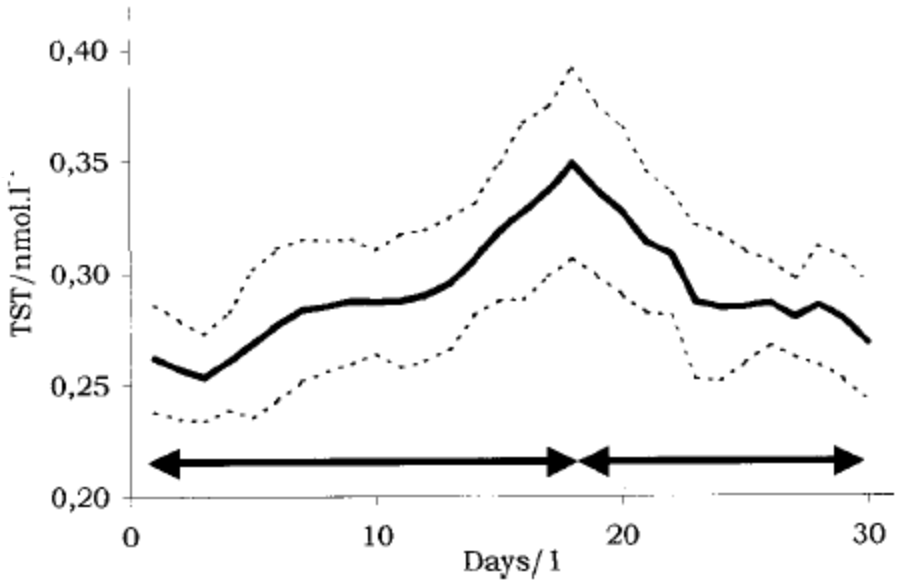


Fig. 4. The predicted circalunar cycle of salivary testosterone in men. The average levels are related to absolute days. (Dotted curves show A±SD, the arrows show the local extremes.)

Biol Res 37: 777-782, 2004

Analysis of rhythmic variance – ANORVA. A new simple method for detecting rhythms in biological time series

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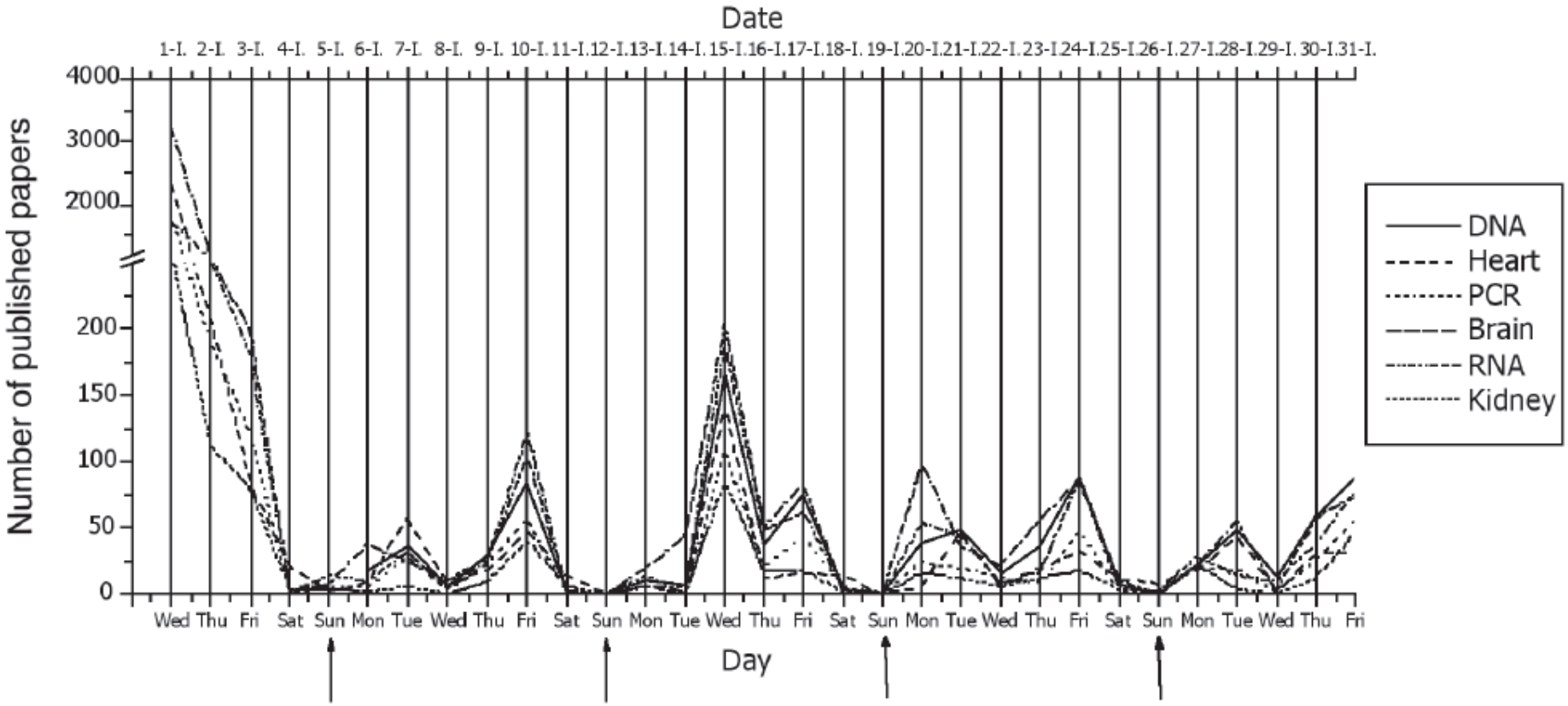
[3] Department of Banking and International Finance, Faculty of National Economy, Economic University, Bratislava, Slovakia
[4] BiomeD research & publishing group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Number of published papers
4000
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2000
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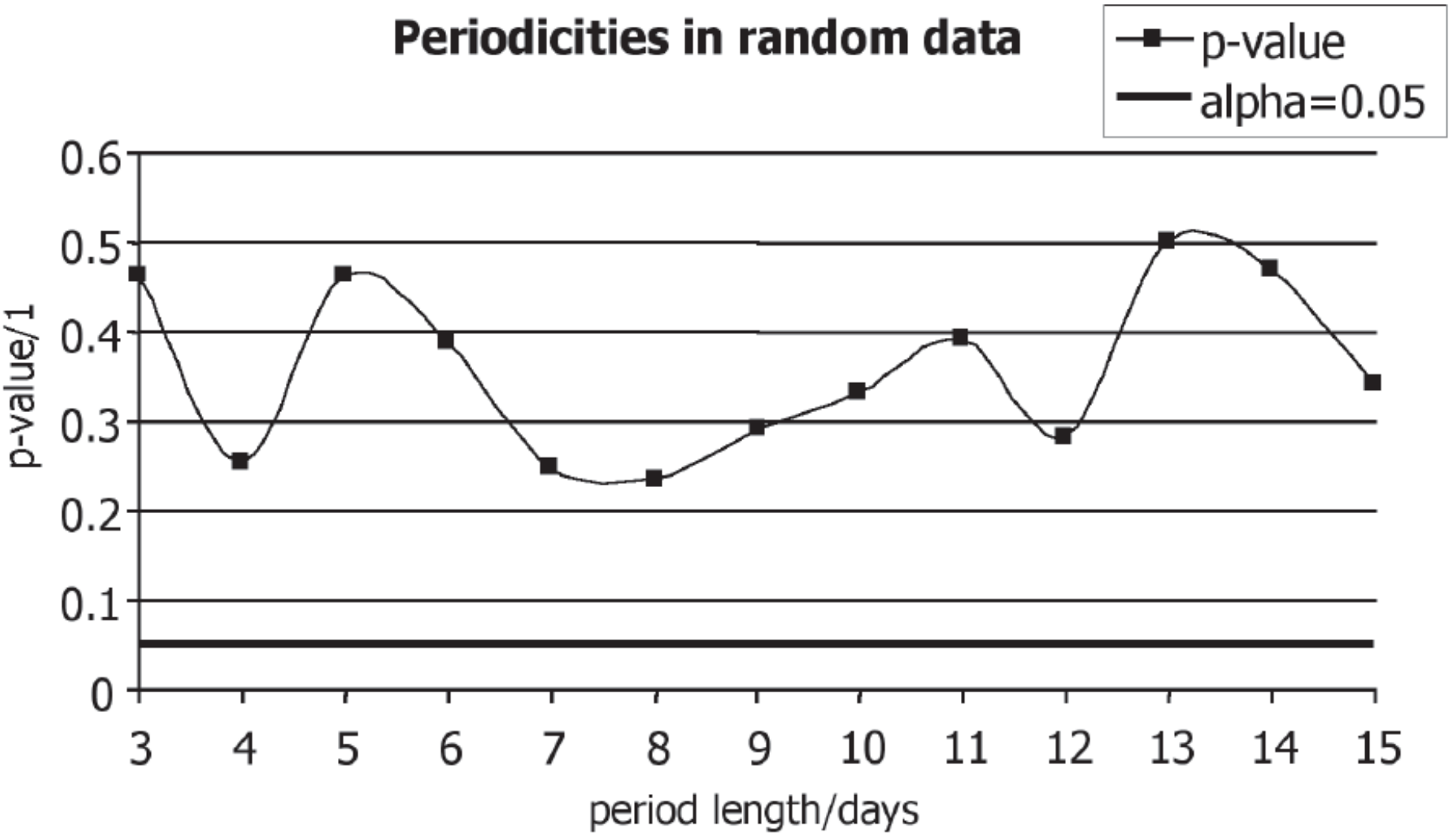
PCR
Brain
RNA
Kidney


Periodicities in random data
p-value
alpha=0.05
p-value/1
0.6
0.5
0.4
0.3
0.2
0.1
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7
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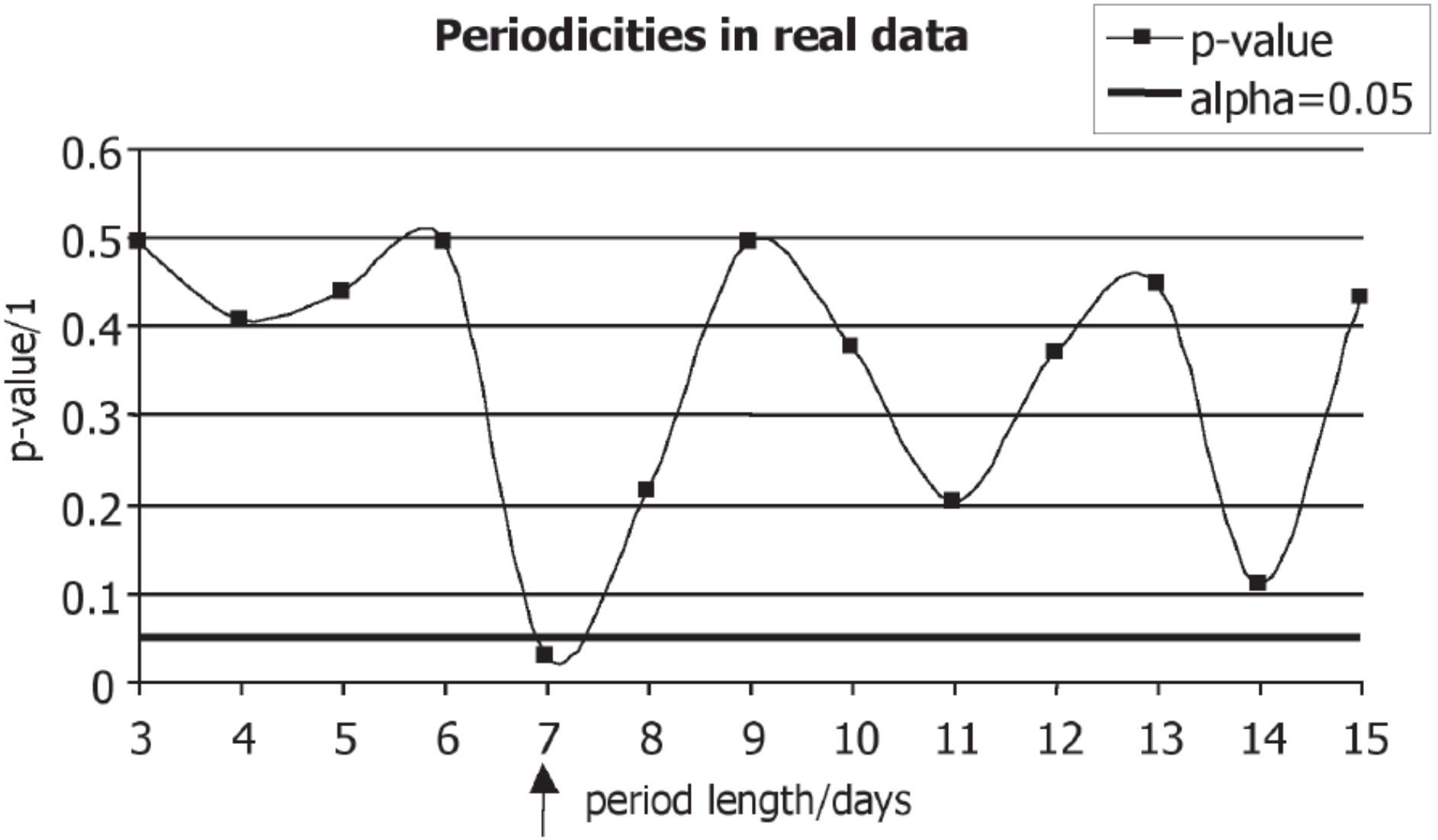
11
12
13
14
15
period length/days


Periodicities in real data
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p-value/1
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14
15
period length/days

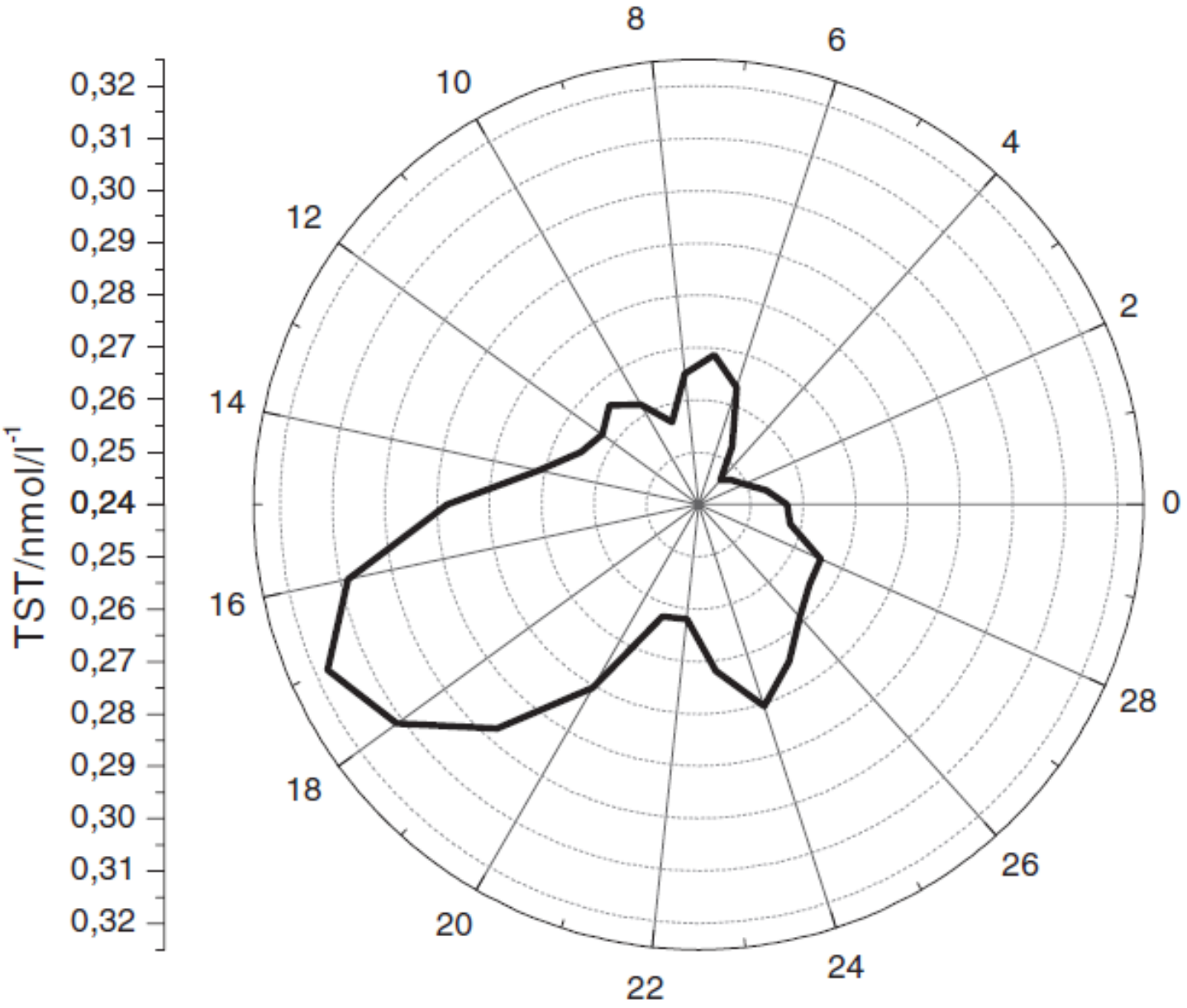
Biological Rhythm Research
2003, Vol. 34 No. 3. pp. 305–315

0165-0424/3403-305$16.00

Circatrigintan Cycle of Salivary Testosterone in Human Male

Peter Celec[1,6], Daniela Ostatníková[2], Zdeněk Putz[3], Július Hodosy[2,6], Peter Bursky[4], Luboslav Stárka[5], Richard Hampl[5] and Matúš Kúdela[6,7]

[1]Faculty of Medicine, Georg-August University, Göttingen, Germany; [2]Institute of Physiology, Faculty of Medicine, Comenius University, Bratislava, Slovakia; [3]Institute of Endocrinology, L'ubochňa, Slovakia; [4]Faculty of Technical Engineering and Informatics, Slovak Technical University, Bratislava, Slovakia; [5]Institute of Endocrinology, Praha, Czech Republic; [6]Department of Zoology, Faculty of Natural Sciences, Comenius University, Bratislava, Slovakia; [7]Faculty of Mathematics, Physics and Informatics, Comenius University, Bratislava, Slovakia


TST/nmol/l-1
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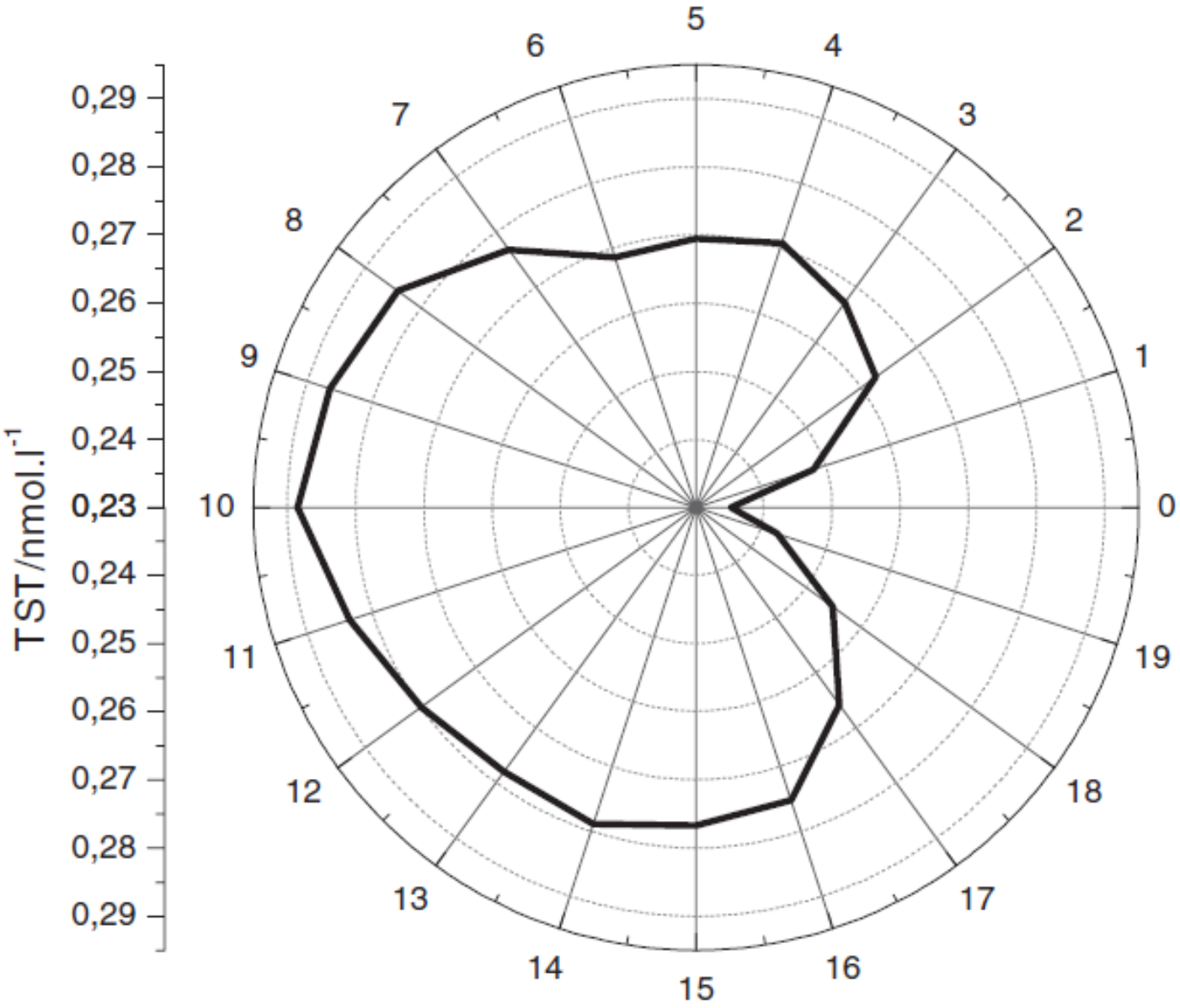
TST/nmol.l-1
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Discussion

- Journal info, author info?
- Aim?
- Subject? Objects?
- Methods?
- Main results?
- Limitations?
- Conclusions?
- Application?