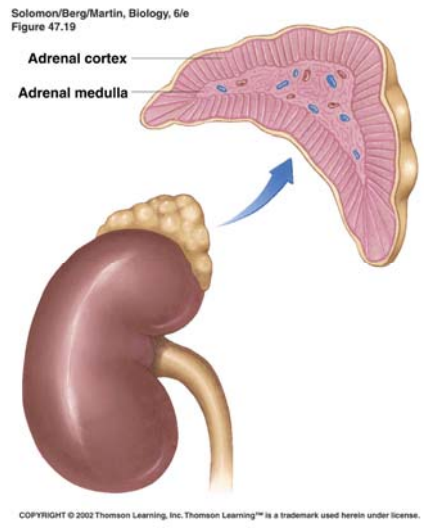
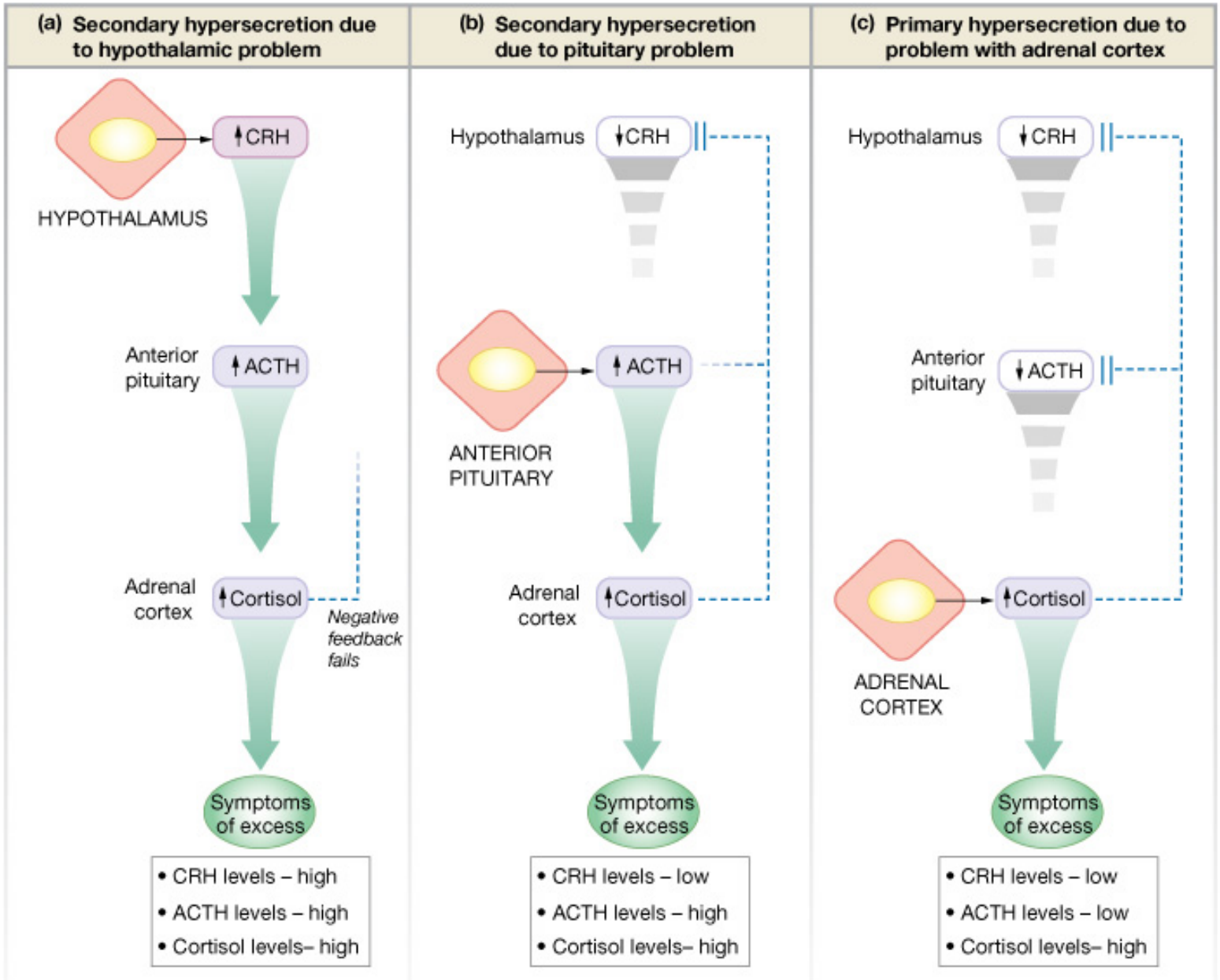
Endocrine Physiology

The Adrenal Gland

Dr. Khalid Al-Regaiey



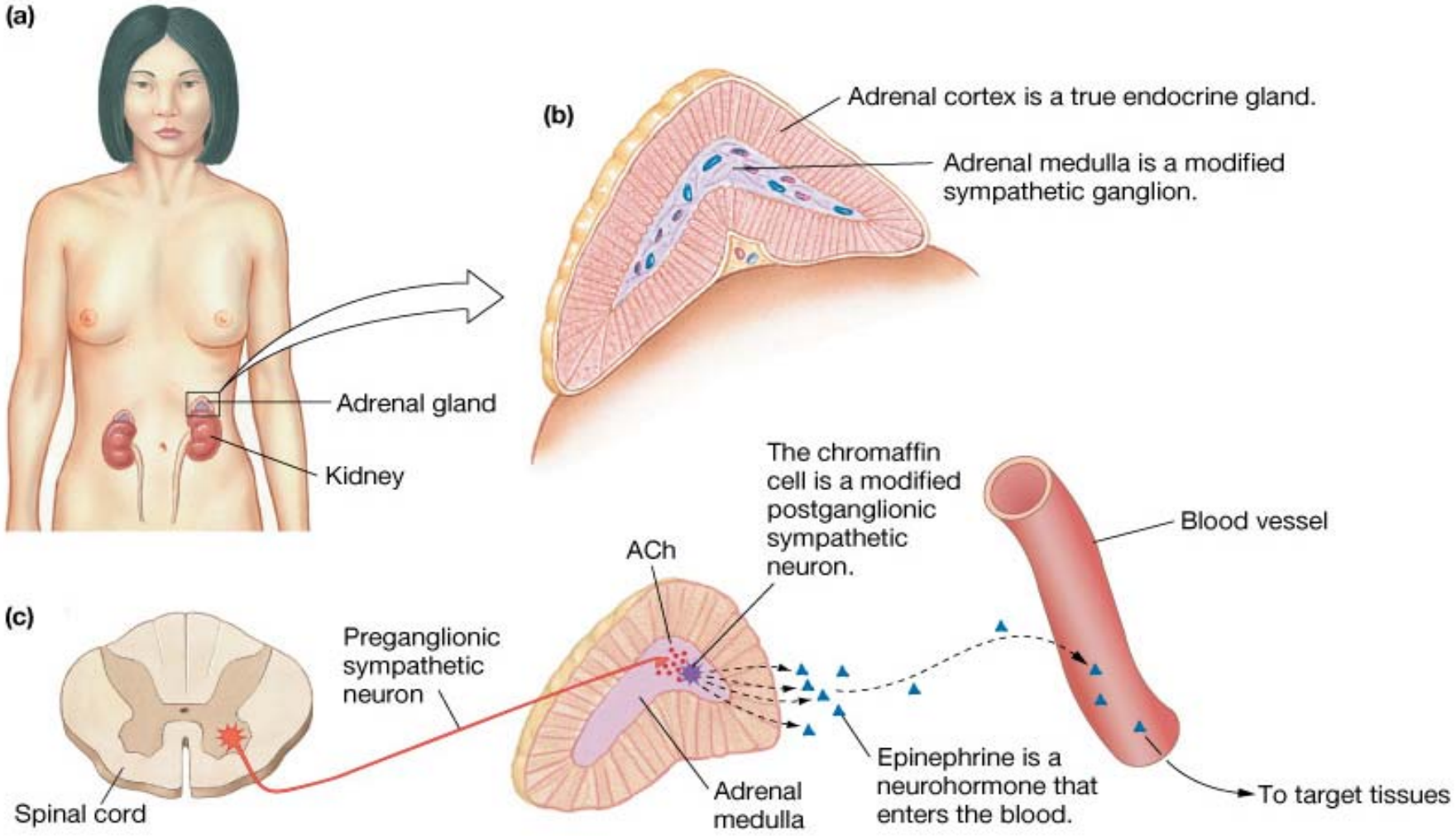
Revision


(a) Secondary hypersecretion due to hypothalamic problem
CRH
HYPOTHALAMUS
Anterior pituitary
ACTH
Adrenal cortex
Cortisol
Negative feedback fails
Symptoms of excess
• CRH levels – high
• ACTH levels – high
• Cortisol levels– high
(b) Secondary hypersecretion due to pituitary problem
Hypothalamus
CRH
ANTERIOR PITUITARY
ACTH
Adrenal cortex
Cortisol
Symptoms of excess
• CRH levels – low
• ACTH levels – high
• Cortisol levels– high
(c) Primary hypersecretion due to problem with adrenal cortex
Hypothalamus
CRH
Anterior pituitary
ACTH
ADRENAL CORTEX
Cortisol
Symptoms of excess
• CRH levels – low
• ACTH levels – low
• Cortisol levels– high

Adrenal Medulla

- Represents an enlarged and specialized sympathetic ganglion
- Made up of strands of **chromaffin cells** that secrete epinephrine and some norepinephrine
  - Epinephrine (~75 - 80%)
  - Norepinephrine (~25-30%)
- Is often stimulated with the rest of the sympathetic nervous system
- Catecholamines are formed from tyrosine

Adrenal Medulla



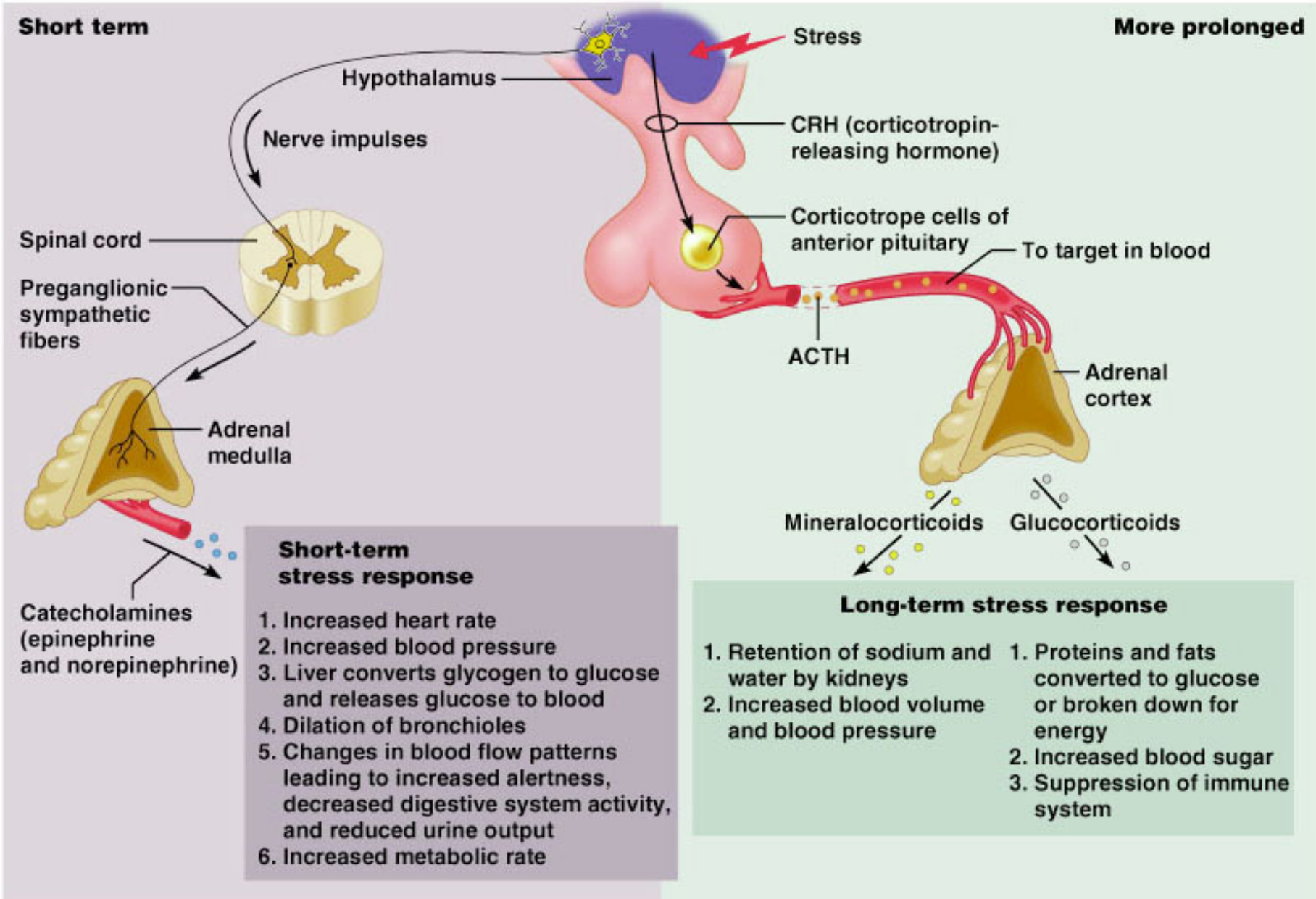
Actions of catecholamines

- Their secretion is an integral part of Fight or Flight Reaction
- The perception or anticipation of danger or harm (anxiety), trauma, pain, hypovolemia, hypotension, anoxia, extreme temperature, hypoglycemia and severe exercise cause rapid secretion of catecholamines
- The initial stimulant is from the hypolthalamus and brainstem
- Gluconeogenesis and glycgenolysis are stimulated as well as lipolysis
- Inhibit insulin and stimulate glucagon

Actions (cont.)

- Increase of basal metabolic rate and thermogenesis
- Heart rate, contractile force and cardiac output are increased
- Vasoconstriction of renal, splanchnic, and cutaneous beds
- Relaxation of bronchioles
- Dilation of pupil

Stress and the Adrenal Gland



Pheochromocytoma

- Benign tumor in chromaffin cells
- Signs:
  - Severe episodes of headache, palpitation, chest pain, extreme anxiety with a sense of impending death
- High blood levels of catecholamines
- Treatment: removal of the tumor