

A stone statue of a man, possibly a philosopher or scientist, with his right hand raised to his mouth in a gesture of contemplation or secrecy. The statue is set against a background of a blue sky and a body of water. The text is overlaid on the lower left portion of the image.

Food and Sex: Plants, Hormones and Herbs

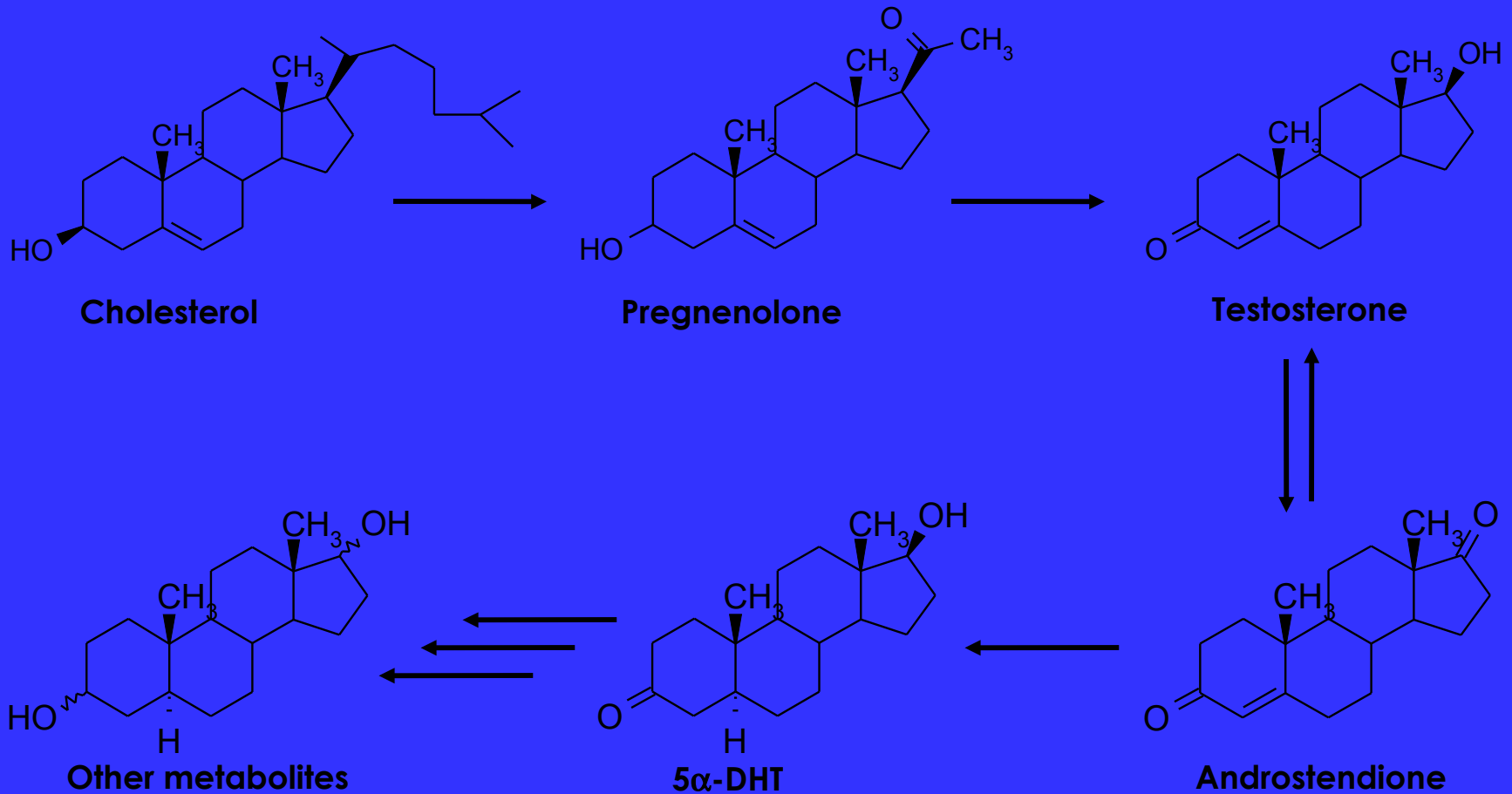
Food and Health Forum, The Royal Society of Medicine,
Wednesday 29th March 2006

Nutrition strongly influences health

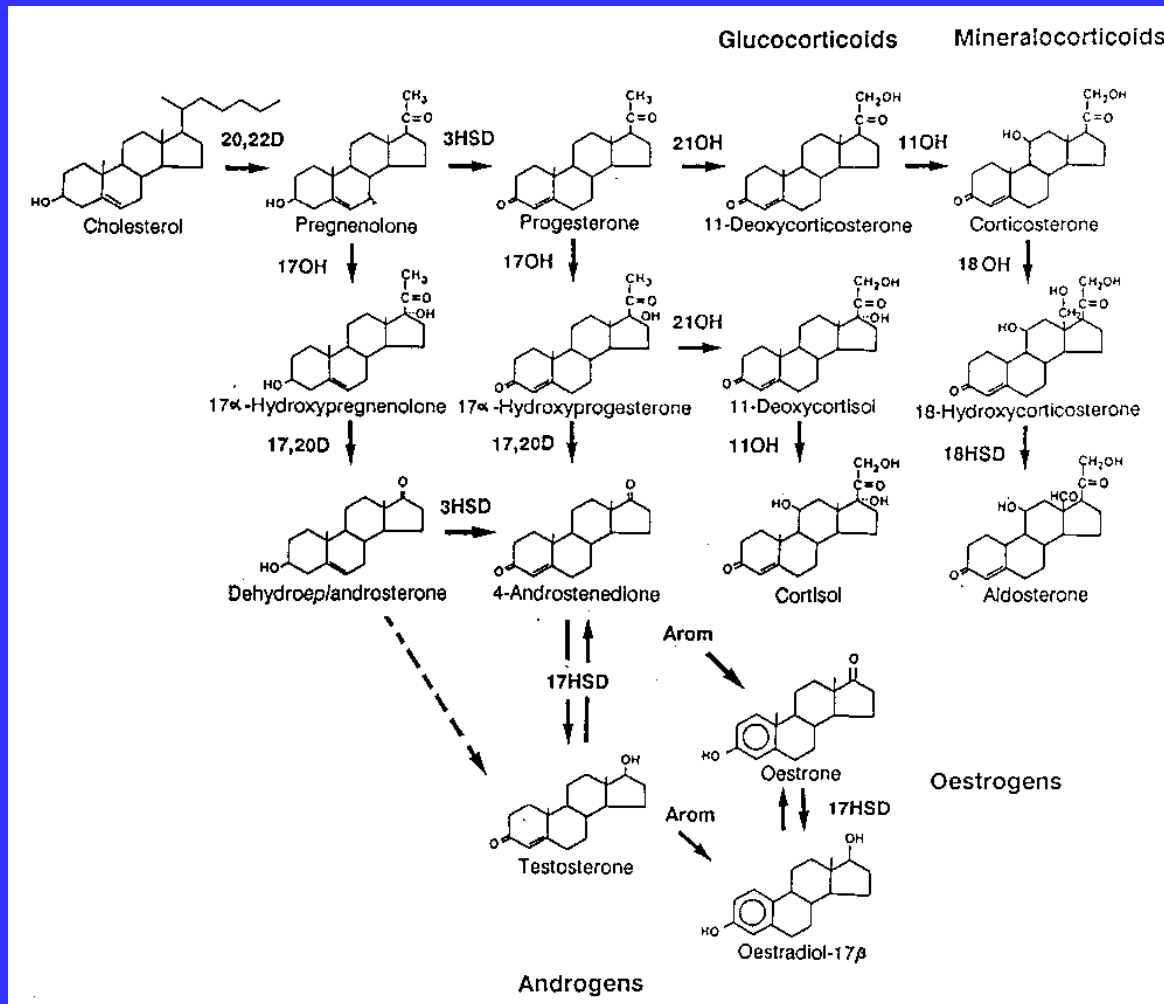
Ill-health, mental or physical, may impair sexual function

Good quality nutrition and good sexual function go together.

Biosynthesis and Metabolism of Testosterone



Is sexual function correlated with good health?



Mediating sexual function:

Hormones: Sex Hormones (GnRH, LH, FSH, DHEA, T, E and P); Melatonin (libido); Thyroid (Libido); Adrenal (T, E, DHEA)

Prostaglandins

Central Nervous System: Neurotransmitters; mid-brain and 'higher' centres

Peripheral Nervous System: arginine (ED)

Lifestyle factors: exercise, stress, smoking, sleep,

Hormone-modulating nutrients

Mediating sexual function

Hormones

LH, FSH, Thyroid, T, E2, Melatonin, oxytocin

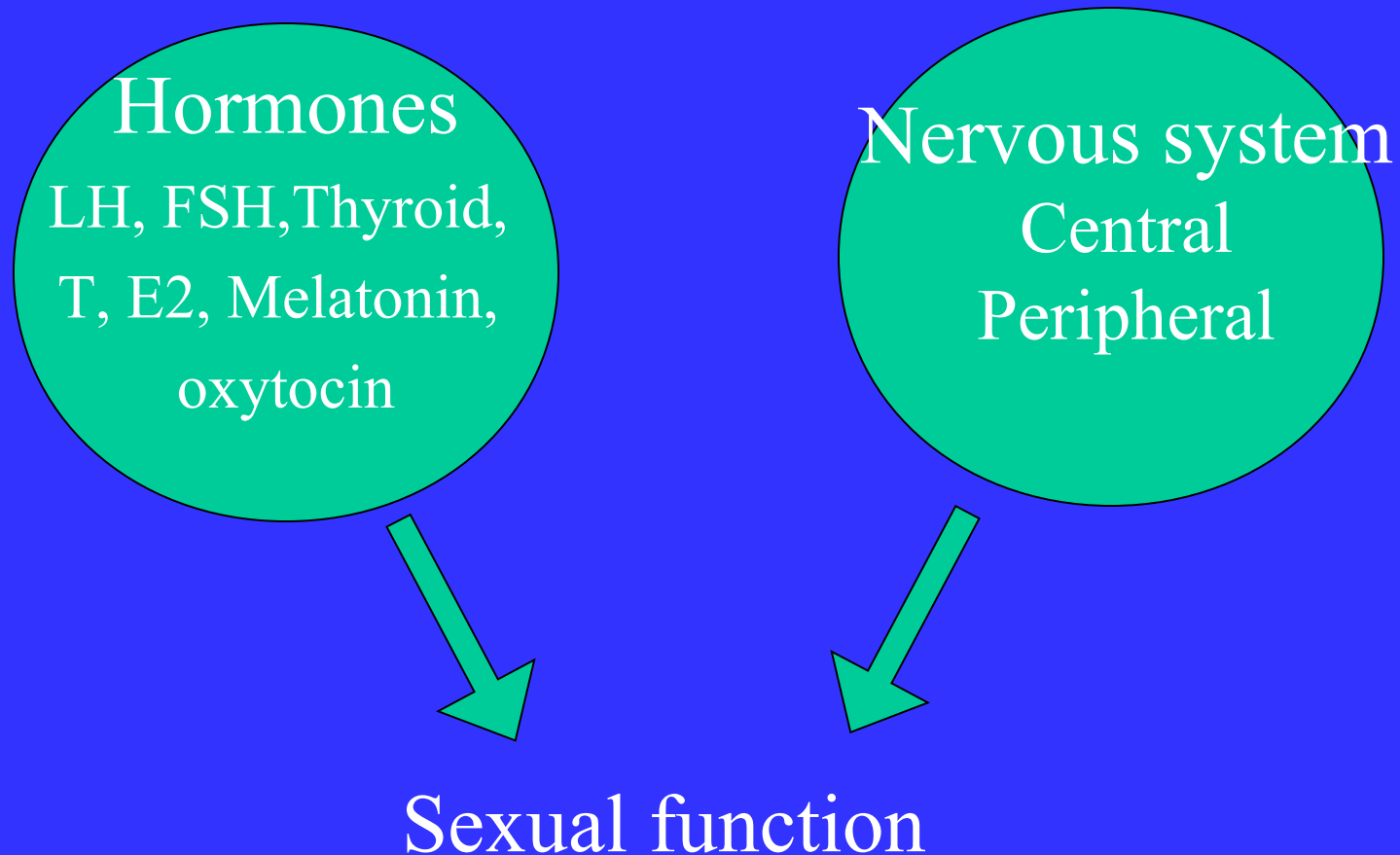
central

Nervous system

Sexual function

peripheral

Mediating sexual function



Major Pathways of Steroid Biosynthesis

Pathway common to adrenals, gonads and placental unit.

1. Cholesterol to pregnenolone, catalysed by the P-450_{scc} enzyme, which is under pituitary hormone control (ACTH or LH depending on the tissue). Cholesterol side-chain removal is blocked specifically by *aminoglutethimide*, a steroid biosynthesis inhibitor.

2. Pregnenolone by a) "delta-5" pathway by way of 17 α -hydroxypregnenolone and DHEA to testosterone

b) "delta-4" pathway (progesterone onwards).

Progesterone is the starting point for mineralocorticoid synthesis, whereas glucocorticoids are derived from its metabolite, 17 α -hydroxyprogesterone.

3. Estrogens are formed from androgens (androstenedione and/or testosterone). Most reactions are *irreversible*. Reversible reactions depend on cofactor availability (eg NADP/NADPH ratio).

Steroids in Man

Fat soluble lipids, cyclopentanoperhydro-phenanthrene ring structure with differing side chains and additional rings.

Secreted: ovaries, testes, adrenal cortex, placenta. Includes vitamin D, digitalis, sterols (e.g., cholesterol), bile acids.

Actions: Control metabolism eg testosterone, estrogen and progesterone; adrenal cortical hormones include glucocorticoids (cortisone and cortisol and mineralocorticoids (aldosterone)).

Uses: oral contraceptives, treatment of arthritis, Addison's disease and skin conditions. Anabolic steroids increase muscle mass and strength.

.Side effects: duration and dose-related (high blood pressure, edema, hirsutism, and menstrual disturbances).

Hypophysial-pituitary axis

Hypothalamus (Arcuate nucleus):

Gonadotrophic Releasing Hormone(GnRH)



Ant. Pituitary:

LH, FSH, Prolactin



Testes:

Leydig cells produce testosterone

Sertoli cells activate spermatogenesis

Plant Sterols (phytochemicals)

White powders with mild, characteristic odor, insoluble in water and soluble in alcohols.

Function: structural component of cell membrane (equivalent to cholesterol in animals)

By removing carbons 24^1 and 24^2 cholesterol is obtained.

Uses: food additives, medicine and cosmetics. As a food additive, phytosterols lower cholesterol (reducing cholesterol absorption in intestines) and may prevent cancer.

Prostaglandins (structure):

Isolated from human semen 1930s Ulf von Euler of Sweden, but, in fact, synthesized in most cells.

Structure: unsaturated carboxylic acids, consisting of a 20 carbon skeleton that also contains a five member ring from the fatty acid, arachidonic acid. The unique shape of the arachidonic acid caused by a series of cis double bonds helps to put it into position to make the five member ring.

Metabolism requires niacin (B3), B5, Vitamin A, Zn and manganese.

Prostaglandins (function):

Act as chemical messengers (like hormones) within the cells where they are synthesized:

Activate inflammatory response (pain, fever) as white blood cells flood site of tissue damage.

Stimulates b.v. constriction and clumping of platelets (thromboxane); stops clot formation in b.v. walls (PGI₂).

Causes uterine contractions and induces labour (PGE₂).

G I tract: inhibits acid synthesis and increases secretion of protective mucus

Kidneys: increases blood flow

Lungs: Prostaglandins (leukotriens) promote constriction of bronchi associated with asthma.

A marker of breast cancer risk:

2a-OH-E1 (SERM) and 16a-OH-E1 (promotes cellular proliferation) compete for the same substrate (E1), so that the ratio of 2/16 hydroxyestrone (from a single urine sample) is an important marker for breast cancer risk: a low 2/16 ratio (<2) increases the risk of breast cancer by a factor of three.

Nutritional protection with:

Brassica, isoflavones, flax-seed, fish oil, indole-3-carbinol

Lifestyle Factors

The extremes of food intake effect sexual function:

Too much food:

Obesity (libido) and type 2 Diabetes (ED)

Too little food:

Starvation (libido)

The wrong foods:

Saturated fats ++ lower T (libido)

Plants and Herbs that boost sexual activity:

Oatstraw, nettles, wild yam, yarrow, sage, oregano, angelica, saw palmetto, turmeric, chickweed, ginseng and echinacea.

Tribulis Terrestris (increase LH, ?T, DHEA and androstenedione)

Yohimbine (Central sympathomimetic/Peripheral v/d)

Cruciferous vegetables (increase E2 conjugation)

Dietary Products that reduce sexual activity:

Soy (isoflavone) products increase Estrogens (libido in men)

Saturated fats lower testosterone (libido)

Hormone Metabolism:

Soy products (Increase Estrogens)

Saturated fats (Lower testosterone)

Hormone Synthesis:

Requires niacin (B3), B5, Vitamin A, Zn and manganese