

Multiple Choice Questions

Section 1: Androgen Production and Mechanisms

Henry G. Burger, M.D., Ph.D. 77(Suppl 4):S3–5 Androgen production in women

1. Androgens and androgen precursors are synthesized by what glands?
 - a) anterior pituitary gland
 - b) adrenal medulla
 - c) ovaries and the adrenals
 - d) only by the ovaries
2. Dehydroepiandrosterone sulphate (DHEAS) is quantitatively the most abundant circulating sex steroid in women. Which of the following statements characterizes its secretion?
 - a) It increases during puberty and early adulthood.
 - b) It decreases significantly as a result of the menopause transition.
 - c) It reaches its highest levels in old age.
 - d) It is controlled by FSH.
3. Which of the following statements concerning serum concentrations of testosterone, the most important biologically active androgen in women, is true?
 - a) They do not vary during the normal menstrual cycle.
 - b) They fall markedly during the menopausal transition.
 - c) They are higher in women aged 40–45 than in women 20–25.
 - d) They are partially dependent on the concentration of sex hormone-binding globulin (SHBG).

Evan R. Simpson, Ph.D. 77(Suppl 4):S6–10 Aromatization of androgens in women: current concepts and findings

1. In postmenopausal women, circulating testosterone is a precursor for which of the following steroids?
 - a) androstenedione
 - b) cortisol
 - c) dehydroepiandrosterone
 - d) estradiol
2. Which of the following enzymes convert circulating testosterone to biologically active compounds?
 - a) 5 α -reductase
 - b) 17 β -hydroxysteroid dehydrogenase type II
 - c) 11 β -hydroxylase
 - d) AtPase
3. In which of the following conditions does peripheral conversion of androgens to estrogens play a significant role?
 - a) osteoporosis
 - b) breast cancer

- c) gonadotropin release
- d) all of the above

Abdul M. Traish, Ph.D., et al. 77(Suppl 4):S11–8 Role of androgens in female genital sexual arousal: receptor expression, structure, and function

1. In women, where are androgens synthesized?
 - a) ovaries
 - b) adrenal glands
 - c) ovaries and adrenal glands
 - d) ovaries, adrenal glands, and in peripheral tissues
2. The androgen receptor is a member of the steroid/thyroid superfamily. It elicits its activity by interacting with
 - a) specific androgen response elements in the DNA of target genes
 - b) a nuclear membrane protein located in the nuclear pores
 - c) a glycoprotein on the membrane of the lysosomes
 - d) G-protein in the plasma membrane
3. Because no biological receptors have been identified which bind dehydroepiandrosterone (DHEA), its activity is attributed to its conversion in peripheral tissues into
 - a) Δ 5-androstenediol
 - b) testosterone
 - c) 5 α -dihydrotestosterone
 - d) estradiol
 - e) all of the above

Richard F. Spark, M.D. 77(Suppl 4):S19–33 Dehydroepiandrosterone: a springboard hormone for female sexuality

1. The hormone dehydroepiandrosterone sulfate (DHEAS) is synthesized in the
 - a) ovary
 - b) testicle
 - c) adrenal gland
 - d) pituitary gland
 - e) pancreas
2. Subnormal dehydroepiandrosterone sulfate (DHEAS) levels are common in which of the following conditions?
 - a) Cushing's syndrome
 - b) adrenal insufficiency
 - c) precocious puberty
 - d) virilizing adrenal hyperplasia
3. In patients with sub-normal DHEAS levels who are given DHEA (50 mg per day), which of the following serum hormone levels increase above baseline levels?
 - a) DHEAS
 - b) testosterone in aging women but not men
 - c) testosterone in women with adrenal insufficiency
 - d) androstenedione

- e) all of the above

Section 2: Androgen Effects on Female Health

Constantine Dimitrakakis, M.D., et al. 77(Suppl 4):S26–33 Androgens and mammary growth and neoplasia

1. What are the effects of flutamide, an androgen receptor antagonist, on mammary epithelial proliferation (MEP) in normal-cycling rhesus monkeys?
 - a) increased by 50%
 - b) decreased by 50%
 - c) increased by 100%
 - d) decreased by 100%
2. Research on androgen effects on breast tissue in rhesus monkeys indicates that
 - a) androgen supplementation of ERT likely increases breast cancer risk
 - b) androgen supplementation of ERT likely decreases breast cancer risk
 - c) androgen supplementation of ERT has no effect on breast cancer risk

Morris Notelovitz, M.D., Ph.D. 77(Suppl 4):S34–41 Androgen effects on bone and muscle

1. Estrogen and androgen receptors are found in which of the following bone cell types?
 - a) osteoblasts
 - b) osteoclasts
 - c) osteocytes
 - d) all of the above
2. Compared to estrogen alone therapy, combined estrogen and androgen therapy has what effect on bone mineral density (BMD)?
 - a) lowers the BMD response to ERT
 - b) increases the BMD response to ERT
 - c) has no effect on the ERT-mediated BMD response
3. Progesterone receptors are present in human osteoblasts and osteoclasts. Which of the following therapies enhance the ERT mediated increase in BMD?
 - a) micronized progesterone
 - b) medroxyprogesterone acetate
 - c) norethindrone acetate

Lorraine Dennerstein, Ph.D., et al. 77(Suppl 4):S42–8 Hormones, mood, sexuality, and the menopausal transition

1. Which hormone relates best to changes in sexual functioning during the menopausal transition?
 - a) estradiol
 - b) testosterone
 - c) inhibin
 - d) none of the above

2. Which aspects of quality of life are directly affected by the hormonal changes of the menopausal transition rather than by aging?
 - a) mood
 - b) sexual functioning
 - c) cognitive functioning
 - d) all of the above
3. Which of the following hormones show marked changes related to the menopausal transition rather than to chronological aging?
 - a) testosterone and DHEAS
 - b) cortisol
 - c) LH
 - d) estradiol and FSH

Barbara B. Sherwin, Ph.D. 77(Suppl 4):S49–54 Randomized clinical trials of combined estrogen-androgen preparations: effects on sexual functioning

1. For whom is combined estrogen-androgen replacement therapy indicated?
 - a) all postmenopausal women
 - b) surgically menopausal women
 - c) women whose sexual complaints persist following treatment with estrogen-alone
 - d) women under the age of 60 years
2. Randomized controlled trials of the efficacy of combined estrogen-androgen drugs for postmenopausal replacement therapy show that
 - a) route of administration of the drug is related to symptom relief
 - b) side effects always occur with physiological doses of testosterone
 - c) the combined drug has its major effects on hot flashes and atrophic vaginitis
 - d) the combined drug has its major effects on sexual desire and satisfaction

John Bancroft, M.D. 77(Suppl 4):S55–9 Sexual effects of androgens in women: some theoretical considerations

1. What effect does exogenous testosterone commonly have on mood?
 - a) induces depression
 - b) increases irritability and anger
 - c) improves sense of well-being
 - d) none of the above
2. Which of the following effects are commonly experienced by women using combined oral contraceptives?
 - a) reduced interest in sex
 - b) no apparent effect on mood or sexuality
 - c) worsening of premenstrual symptoms
 - d) reduced symptoms around menstruation
 - e) all of the above

Section 3: Androgen Deficiency States and Sequelae

Jan L. Shifren, M.D. 77(Suppl 4):S60–2 Androgen deficiency in the oophorectomized woman

1. Following oophorectomy, approximately what is the decrease in circulating testosterone concentrations?
 - a) 30%
 - b) 50%
 - c) 70%
 - d) 90%
2. Although studies demonstrate that the majority of women experience an improved sexual life following hysterectomy, women were less likely to report improvement and more likely to report sexual problems if their ovaries had been removed at the time of surgery.
 - a) true
 - b) false
3. In a small randomized, double-blind, placebo-controlled trial of physiologic transdermal testosterone replacement in estrogen-replaced oophorectomized women with sexual dysfunction, while they were receiving the higher dose of testosterone, women reported significant improvements in
 - a) sexual activity and pleasure
 - b) psychological general well-being
 - c) both
 - d) neither

Philip M. Sarrel, M.D. 77(Suppl 4):S63–7 Androgen deficiency: menopause and estrogen-related factors

1. Estrogen depletion at menopause is associated with
 - a) an increase in sex hormone-binding globulin
 - b) a decrease in sex hormone-binding globulin
 - c) an increase in bioavailable testosterone
 - d) a decrease in bioavailable testosterone
 - e) b and c
2. Which of the following statements about testosterone is (are) correct?
 - a) During a woman's reproductive years her serum testosterone levels are usually higher than her serum estradiol levels.
 - b) Testosterone is the ovarian substrate for estradiol.
 - c) Oral estrogen replacement therapy can lead to a decrease in bioavailable testosterone.
 - d) Oral methyltestosterone decreases serum sex hormone-binding globulin levels.
 - e) all of the above
3. Androgen replacement therapy for postmenopausal women has been shown to:
 - a) oppose the actions of estrogens in controlling hot flashes

- b) supplement the actions of estrogens in controlling hot flashes
- c) neutralize the effects of estrogens on markers of bone resorption and formation
- d) increase the occurrence of sexual aversion
- e) all of the above

Susan R. Davis, M.D. 77(Suppl 4):S68–71 When to suspect androgen deficiency other than at menopause

1. Which of the following may be associated with lowered bioavailable (free) testosterone in women?
 - a) panhypopituitarism
 - b) oral contraceptive pills
 - c) oral postmenopausal estrogen therapy
 - d) all of the above
2. Under which of the following circumstances would you suspect that androgen insufficiency may be contributing to loss of libido and diminished well-being?
 - a) a 26-year-old woman presenting with low libido who has regular menstrual cycles and is not on any therapy
 - b) a 30-year-old woman who has undergone bilateral ovariectomy and who is using a transdermal estrogen patch
 - d) a 28-year-old woman on high dose SSRI therapy for depression
 - e) none of the above

Gloria A. Bachmann, M.D. 77(Suppl 4):S72–6 The hypoandrogenic woman: pathophysiologic overview

1. Androgen replacement therapy should not be used
 - a) for symptomatic postmenopausal women, especially women who have had their ovaries removed
 - b) in postmenopausal women who are already on estrogen replacement therapy but who continue to have menopausal symptoms
 - c) in the same manner and the same doses for both men and women
2. Symptom(s) associated with androgen decline include
 - a) acne, alopecia, and menstrual disorders
 - b) android obesity and infertility
 - c) diminished sex motivation, fantasy, arousal, and quality of life
 - d) migraine headache and other neurologic symptoms
3. Androgens do not affect which of the following?
 - a) muscle development
 - b) bone mass
 - c) sexual function
 - d) cognition
 - e) gastrointestinal function

Section 4: Clinical Assessment and Diagnosis

James A. Simon, M.D. 77(Suppl 4):S77–82 Estrogen replacement therapy: effects on the endogenous androgen milieu

1. The so-called “androgen deficiency” syndrome is often confused with
 - a) clinical depression
 - b) chronic fatigue syndrome
 - c) hypothyroidism
 - d) all of the above
2. Which of the following common treatments reduce bioavailable androgens?
 - a) oral contraceptive pills
 - b) glucocorticoids
 - c) oral estrogen replacement therapies
 - d) all of the above
3. Methyltestosterone is the most commonly used androgen in women in the U.S. Which of the following is *not* true about this androgen’s actions?
 - a) It binds to and stimulates the androgen receptor.
 - b) It is aromatized to estradiol.
 - c) It liberates both endogenous estradiol and testosterone.
 - d) It reduces SHBG concentrations.

André T. Guay, M.D. 77(Suppl 4):S83–8 Screening for androgen deficiency in women: methodological and interpretive issues

1. When is the best time to measure testosterone levels in premenopausal women?
 - a) during the early follicular phase of the menstrual cycle
 - b) during the middle third of the menstrual cycle
 - c) in the late luteal phase of the menstrual cycle
 - d) anytime in the menstrual cycle
2. The most accurate measurement of testosterone in women is
 - a) total testosterone
 - b) bioavailable testosterone
 - c) analog free testosterone by analog assay
 - d) free testosterone by equilibrium dialysis

Raymond C. Rosen, Ph.D. 77(Suppl 4):S89–93 Assessment of female sexual dysfunction: review of validated methods

1. Approximately how many women in the general population aged 18–59 complained of one or more sexual problems in the past year?

- a) 10–20%
 - b) 21–30%
 - c) 31–40%
 - d) 41–50%
 - e) more than 50%
2. What is the most widely used physiological method in laboratory studies of female genital arousal?
 - a) Doppler ultrasonography
 - b) vaginal photoplethysmography
 - c) labial thermocouplers
 - d) magnetic resonance imaging
 - e) none of the above
 3. What are the major advantages of self-report (questionnaire) measures of female sexual function?
 - a) standardization
 - b) non-invasiveness
 - c) lack of expense
 - d) ease of administration
 - e) all of the above

Glenn D. Braunstein, M.D. 77(Suppl 4):S94–9 Androgen insufficiency in women: summary of critical issues

1. Which of the following steroids, measured in serum, best reflects the androgen status of a woman?
 - a) testosterone
 - b) androstenedione
 - c) dihydrotestosterone
 - d) dehydroepiandrosterone sulfate
 - e) androstenediol
2. Which of the following is *not* associated with a decreased free testosterone level in woman?
 - a) hypogonadotropic hypogonadism
 - b) primary adrenal insufficiency
 - c) secondary adrenal insufficiency
 - d) natural menopause
 - e) exogenous estrogen administration
3. The best method for assessing the serum free testosterone concentration in a woman suspected of having the androgen insufficiency syndrome is
 - a) measurement of sex hormone-binding globulin and testosterone concentrations and calculation of the Free Androgen Index
 - b) equilibrium dialysis
 - c) direct immunoassay using an analog ligand
 - d) measurement of 3 α -androstenediol-glucuronide level