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Reproduction: Semen Production & Sperm Maturation

Printable Flashcards — Pre-Med Biology

Spermatogenesis, seminiferous tubules, Sertoli and Leydig cells, LH/FSH/testosterone/inhibin, sperm pathway, seminal vesicles, prostate, bulbourethral glands, capacitation, and clinical scenarios.

154 cards — Print double-sided, flip on long edge, then cut along dashed lines.

154 cards — Printable Flashcards

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1

Semen vs sperm: what's the difference?

2

Trap: semen is basically just sperm cells. True or false?

3

Where are sperm actually MADE?

4

Where do sperm mainly MATURE and get motility?

5

Where are sperm mainly STORED before ejaculation?

6

Where is most semen FLUID produced?

7

Quick flow order (high yield):

8

Trap: sperm mature in the prostate. True or false?

2

False.

1

Sperm = the cells. Semen = sperm + fluids from glands.

4

Epididymis.

3

In the seminiferous tubules of the testes.

6

Seminal vesicles and prostate.

5

The epididymis (especially the tail).

8

False.

7

Testis -> epididymis -> vas deferens -> ejaculatory duct -> urethra.

9

What is the vas deferens mainly for?

10

What are accessory glands for (big idea)?

11

Sperm are made in the {{c1::testes}}, mature in the {{c2::epididymis}}, and exit through the {{c3::vas deferens}}.

12

Main site of sperm maturation and storage:

13

Spermatogenesis means...

14

Spermatogenesis happens in the...

15

Spermatogonia are...

16

Primary spermatocyte: diploid or haploid?

10

They add fluids that support sperm: energy, protection, and easier transport.

9

Transporting sperm from epididymis toward the urethra.

12

Epididymis

11

Sperm are made in the testes, mature in the epididymis, and exit through the vas deferens.

14

Seminiferous tubules.

13

Making sperm cells (from germ cells) in the testes.

16

Diploid (2n) (still).

15

The stem cells that divide (mitosis) to keep the sperm-making line going.

17

Secondary spermatocyte: diploid or haploid?

18

Spermatids are made after...

19

Spermiogenesis =

20

One primary spermatocyte eventually produces how many sperm?

21

Trap: one primary spermatocyte makes 2 sperm. True or false?

22

What is the big point of meiosis in spermatogenesis?

23

Do all sperm have an X chromosome?

24

Trap: the egg determines whether the baby is male or female. True or false (genetically)?

18

Meiosis II.

17

Haploid (n).

20

4 (in the end).

19

Shaping a spermatid into a sperm cell (tail, head, etc).

22

Make haploid sperm (n) so fertilization restores diploid (2n).

21

False.

24

False.

23

No. Half carry X, half carry Y (roughly).

25

Spermatogenesis: spermatogonia ({{c1::2n}}) -> primary spermatocyte ({{c2::2n}}) -> secondary spermatocyte ({{c3::n}}) -> spermatid ({{c4::n}}) -> sperm.

26

How many sperm (final products) come from one primary spermatocyte?

27

Sertoli cells are basically the...

28

Leydig cells are basically the...

29

LH mainly acts on which cells?

30

FSH mainly acts on which cells?

31

Trap: LH acts on Sertoli cells. True or false?

32

Trap: FSH stimulates Leydig cells to make testosterone. True or false?

26

4

25

Spermatogenesis: spermatogonia (2n) -> primary spermatocyte (2n) -> secondary spermatocyte (n) -> spermatid (n) -> sperm.

28

Testosterone-producing cells between seminiferous tubules.

27

Support/nurse cells inside seminiferous tubules.

30

Sertoli cells -> supports spermatogenesis.

29

Leydig cells -> makes testosterone.

32

False.

31

False.

33

GnRH is released from the...

34

LH and FSH are released from the...

35

Testosterone is important for spermatogenesis because...

36

Inhibin does what (simple)?

37

Testosterone provides negative feedback mainly to...

38

Blood-testis barrier (Sertoli cells) is important because...

39

Trap: sperm are 'self' and the immune system always ignores them. True or false?

40

Hormone map: GnRH -> pituitary -> {{c1::LH}} (Leydig -> {{c2::testosterone}}) and {{c3::FSH}} (Sertoli -> support spermatogenesis).

34

Anterior pituitary.

33

Hypothalamus.

36

Decreases FSH release (negative feedback).

35

High local testosterone levels are needed for normal sperm production.

38

It protects developing sperm from immune attack and creates the right environment.

37

Hypothalamus and pituitary (reduces GnRH/LH).

40

Hormone map: GnRH -> pituitary -> LH (Leydig -> testosterone) and FSH (Sertoli -> support spermatogenesis).

39

False.

41

Feedback: Sertoli cells release {{c1::inhibin}} to reduce {{c2::FSH}}.

42

Cell type that produces testosterone in the testes:

43

Why are testes outside the body (scrotum)?

44

Trap: higher temperature increases sperm production. True or false?

45

Very simple cause-effect: fever/heat exposure can temporarily reduce...

46

Steroid/anabolic steroid abuse can reduce sperm production because...

47

Trap: taking testosterone always increases fertility. True or false?

48

Varicocele (dilated scrotal veins) can affect fertility mainly because it...

42

Leydig cells

41

Feedback: Sertoli cells release inhibin to reduce FSH.

44

False.

43

Spermatogenesis works best at slightly cooler temperature than core body temp.

46

External testosterone shuts down LH/FSH (negative feedback).

45

Sperm quality/count.

48

Raises testicular temperature (and alters environment).

47

False.

49

Sperm leaving the testes are (usually)...

50

What does the epididymis do for sperm (core idea)?

51

Trap: sperm become motile in the seminiferous tubules. True or false?

52

Sperm stored for too long without ejaculation are mostly...

53

What is capacitation (super simple)?

54

Trap: capacitation happens in the epididymis. True or false?

55

Why do we care about capacitation (exam style)?

56

Acrosome reaction (very high-level) is basically...

50

Maturation (gain motility) + storage.

49

Not fully motile and not fully able to fertilize yet.

52

Broken down and reabsorbed by the body.

51

False.

54

False.

53

Final 'activation' changes that sperm undergo in the female reproductive tract to become fully fertile.

56

Sperm releasing enzymes from the acrosome to penetrate the egg's outer layers.

55

Because it explains why sperm in semen are not instantly ready to fertilize the moment they leave the male.

57

Sperm head vs midpiece vs tail (quick):

58

Sperm gain motility mainly in the {{c1::epididymis}}; final fertilization 'activation' ({{c2::capacitation}}) happens in the female tract.

59

Final functional maturation process that happens in the female tract:

60

Semen is designed to help sperm do what 3 things?

61

Semen is usually slightly alkaline because...

62

Trap: semen is acidic to help sperm. True or false?

63

Do sperm make most of the semen volume?

64

Energy source in semen that gets asked a lot:

58

Sperm gain motility mainly in the epididymis; final fertilization 'activation' (capacitation) happens in the female tract.

57

Head = DNA + acrosome, midpiece = mitochondria, tail = movement.

60

Survive, move, and reach the egg.

59

Capacitation

62

False.

61

It helps protect sperm in the acidic environment of the vagina.

64

Fructose (mainly from seminal vesicles).

63

No. Glands make most of the volume; sperm are a small portion.

65

If a question says 'no fructose in semen', what gland should you suspect?

66

What do seminal vesicles mainly contribute (big picture)?

67

Prostate gland mainly contributes...

68

Bulbourethral (Cowper's) glands mainly contribute...

69

Trap: pre-ejaculate guarantees zero sperm, so zero pregnancy risk. True or false?

70

Semen often coagulates then liquefies. Why is that helpful (idea)?

71

If semen didn't liquefy well, sperm motility would be... (concept)

72

Main semen fluid contributors: {{c1::seminal vesicles}} (bulk + fructose), {{c2::prostate}} (enzymes), {{c3::bulbourethral glands}} (mucus/lubrication).

66

Most of the fluid + fructose + prostaglandins (and alkaline stuff).

65

Seminal vesicles problem/blockage.

68

Mucus-like fluid for lubrication + neutralizing the urethra (pre-ejaculate).

67

Enzymes and fluid that helps semen function (including liquefaction).

70

Coagulation helps it stay in the reproductive tract; liquefaction helps sperm start swimming.

69

False.

72

Main semen fluid contributors: seminal vesicles (bulk + fructose), prostate (enzymes), bulbourethral glands (mucus/lubrication).

71

Worse (harder to swim).

73

Gland that provides fructose to semen:

74

Sperm are produced in seminiferous tubules, then they drain into...

75

The epididymis connects to the...

76

The vas deferens joins with the duct of the seminal vesicle to form the...

77

Ejaculatory ducts empty into the...

78

Urethra is shared by... and ...

79

Trap: urine and semen come out at the same time during ejaculation. True or false?

80

Vasectomy cuts/blocks the...

74

Rete testis -> efferent ductules -> epididymis.

73

Seminal vesicles

76

Ejaculatory duct.

75

Vas deferens.

78

Urine and semen (not at the same time).

77

Urethra (passing through the prostate).

80

Vas deferens.

79

False.

81

Trap: after vasectomy, semen volume becomes almost zero. True or false?

82

After vasectomy, what happens to sperm production in testes?

83

If the vas deferens is blocked, what will NOT be present in ejaculate (mainly)?

84

Pathway core: epididymis -> {{c1::vas deferens}} -> {{c2::ejaculatory duct}} -> {{c3::urethra}}.

85

Ejaculatory duct = {{c1::vas deferens}} + {{c2::seminal vesicle duct}}.

86

Tube cut in a vasectomy:

87

Which gland contributes the MOST to semen volume (high-yield)?

88

Trap: prostate contributes most of semen volume. True or false?

82

Sperm are still produced, but they can't exit; they're broken down and reabsorbed.

81

False.

84

Pathway core: epididymis -> vas deferens -> ejaculatory duct -> urethra.

83

Sperm cells.

86

Vas deferens

85

Ejaculatory duct = vas deferens + seminal vesicle duct.

88

False.

87

Seminal vesicles.

89

Seminal vesicles fluid is rich in...

90

Prostate fluid is helpful because it contains...

91

Bulbourethral glands matter because they...

92

Prostaglandins in seminal fluid (very high-level) can help by...

93

If a question asks 'which gland makes the pre-ejaculate (pre-cum)?', answer:

94

Trap: Cowper's gland fluid makes up most semen volume. True or false?

95

If sperm need energy to swim, what's the classic molecule in semen that provides it?

96

If semen is overall slightly alkaline, but prostate fluid can be slightly acidic, why doesn't that 'ruin' semen pH?

90

Enzymes that help semen become less sticky (liquefy) and support sperm function.

89

Fructose and other stuff that supports sperm (often alkaline).

92

Supporting sperm transport in the female tract.

91

Lubricate and help neutralize the urethra before sperm pass through.

94

False.

93

Bulbourethral (Cowper's) glands.

96

Because semen is a mixture; other fluids (like seminal vesicles) help buffer it.

95

Fructose.

97

Big gland map: seminal vesicles = {{c1::most volume}} + {{c2::fructose}}; prostate = {{c3::enzymes}}; bulbourethral = {{c4::mucus/lubrication}}.

98

Gland that produces pre-ejaculate to lubricate/neutralize urethra:

99

Scenario: semen volume is normal but sperm count is zero. What procedure could explain this?

100

Scenario: no fructose in semen test. Which structure might be blocked/absent?

101

Scenario: sperm are present but very poor motility. Name one place to suspect (conceptually).

102

Scenario: male has normal testosterone but low FSH. What feedback hormone could be high?

103

Scenario: LH is low, testosterone is low. Where is the issue likely upstream?

104

Scenario: LH is high but testosterone is low. What's a simple interpretation?

98

Bulbourethral (Cowper's) glands

97

Big gland map: seminal vesicles = most volume + fructose; prostate = enzymes; bulbourethral = mucus/lubrication.

100

Seminal vesicles/duct issue.

99

Vasectomy.

102

Inhibin.

101

Epididymis (maturation problem) or semen too viscous (liquefaction issue).

104

Testes (Leydig cells) aren't responding well.

103

Hypothalamus or pituitary.

105

Scenario: someone says 'sperm are made in the prostate'. What's the quickest correction?

106

Scenario: a diagram shows a tube connecting epididymis to urethra. That's likely the...

107

Spermatogenesis vs sperm maturation: what's the clean difference?

108

Epididymis vs vas deferens: who matures/stores vs who transports?

109

Seminal vesicles vs prostate: who gives fructose vs who gives enzymes for liquefaction?

110

Sertoli vs Leydig: who supports sperm vs who makes testosterone?

111

Meiosis vs mitosis in sperm production: which one makes haploid cells?

112

Trap: spermiogenesis is meiosis. True or false?

106

Vas deferens.

105

No: sperm are made in testes (seminiferous tubules). Prostate just adds fluid.

108

Epididymis matures/stores; vas deferens transports.

107

Spermatogenesis = making sperm (testis). Maturation = making them motile/functional (epididymis + female tract).

110

Sertoli supports sperm; Leydig makes testosterone.

109

Seminal vesicles give fructose; prostate gives enzymes (liquefaction).

112

False.

111

Meiosis makes haploid cells.

113

Comparison quickie: testis ({{c1::spermatogenesis}}) vs epididymis ({{c2::maturation/storage}}).

114

Cell type that supports and nourishes developing sperm inside seminiferous tubules:

115

Sperm are haploid. That means they have...

116

Semen is usually expelled by contractions of smooth muscle in...

117

What is the urethra's role in male reproduction?

118

Why is the blood-testis barrier a big deal in fertility?

119

Trap: sperm are made in the epididymis because that's where they're stored. True or false?

120

If a question asks 'why add fluid at all?', the simplest correct answer is:

114

Sertoli cells

113

Comparison quickie: testis (spermatogenesis) vs epididymis (maturation/storage).

116

Vas deferens and surrounding structures (plus accessory glands).

115

One set of chromosomes (n).

118

It creates a protected environment so sperm can develop properly without immune problems.

117

Final tube that carries semen out of the body.

120

To give sperm a supportive environment (energy + protection + transport).

119

False.

121

Quick high-level 'what kills sperm quality' idea:

122

Semen = {{c1::sperm}} + gland fluids (seminal vesicles, prostate, bulbourethral).

123

Main site where spermatogenesis occurs:

124

When does spermatogenesis start (humans, basic)?

125

Trap: males are born with a fixed lifetime supply of sperm like eggs. True or false?

126

Are the sperm in an ejaculation 'freshly made that day'?

127

If something damages spermatogenesis today (like high fever), when might sperm quality drop show up?

128

Compare in one line: spermatogenesis vs oogenesis (big idea).

122

Semen = sperm + gland fluids (seminal vesicles, prostate, bulbourethral).

121

Heat, hormonal shutdown (low LH/FSH), or blocked maturation/transport.

124

At puberty.

123

Seminiferous tubules

126

No. Many come from storage in the epididymis.

125

False.

128

Spermatogenesis is continuous after puberty; oogenesis has a limited pool and is cyclic.

127

Later (weeks later), because sperm take time to develop.

129

Spermatogenesis begins at {{c1::puberty}} and continues through adult life (not a fixed lifetime supply).

130

Seminal vesicles sit where (roughly)?

131

Prostate sits where (high-yield anatomy)?

132

Bulbourethral glands sit where (roughly)?

133

Trap: seminal vesicles store sperm. True or false?

134

If a question asks which gland contributes alkaline fluid, the easiest pick is usually...

135

If a question mentions 'liquefaction enzyme' after ejaculation, the gland to think of is...

136

Very simple: which gland is most linked to 'fuel' for sperm?

130

Behind the bladder, near where vas deferens joins to form ejaculatory ducts.

129

Spermatogenesis begins at puberty and continues through adult life (not a fixed lifetime supply).

132

Near the base of the penis; they empty into the urethra.

131

It surrounds the first part of the urethra just below the bladder.

134

Seminal vesicles.

133

False.

136

Seminal vesicles (fructose).

135

Prostate.

137

Trap fix: sperm are stored in the {{c1::epididymis}}, not the {{c2::seminal vesicles}}.

138

High-yield warning: semen volume tells you directly about...

139

Trap: bigger semen volume always means more sperm. True or false?

140

If semen volume is very low, one simple thing to suspect (conceptually) is...

141

Scenario: no sperm + normal semen volume + normal testosterone. Most likely:

142

Scenario: semen volume low + fructose low + sperm low. A simple 'plumbing' idea:

143

Semen volume mainly reflects {{c1::gland fluids}}, not {{c2::sperm count}}.

144

If Sertoli cells are damaged, which feedback hormone may drop?

138

Accessory gland fluid volume more than sperm count.

137

Trap fix: sperm are stored in the epididymis, not the seminal vesicles.

140

Missing/blocked accessory gland contribution (especially seminal vesicles).

139

False.

142

Ejaculatory duct obstruction (blocks seminal vesicle + vas deferens input).

141

Vas deferens blocked/cut (vasectomy).

144

Inhibin (and support for spermatogenesis).

143

Semen volume mainly reflects gland fluids, not sperm count.

145

If Leydig cells are damaged, which hormone production drops?

146

If testosterone is very low, what happens to LH in a normal feedback loop (tends to)?

147

If testosterone is very high from outside use, LH and FSH tend to...

148

Feedback idea: high {{c1::testosterone}} tends to lower {{c2::LH}} and {{c3::FSH}}.

149

Main energy sugar for sperm in semen:

150

Gland that contributes most of semen volume:

151

Hormone from pituitary that stimulates Leydig cells:

152

Hormone from pituitary that stimulates Sertoli cells:

146

LH increases (pituitary tries to stimulate the testes).

145

Testosterone.

148

Feedback idea: high testosterone tends to lower LH and FSH.

147

Decrease.

150

Seminal vesicles

149

Fructose

152

FSH

151

LH

153

Structure where sperm gain motility and mature:

154

Tube that carries sperm from epididymis toward ejaculatory duct:

154

Vas deferens

153

Epididymis