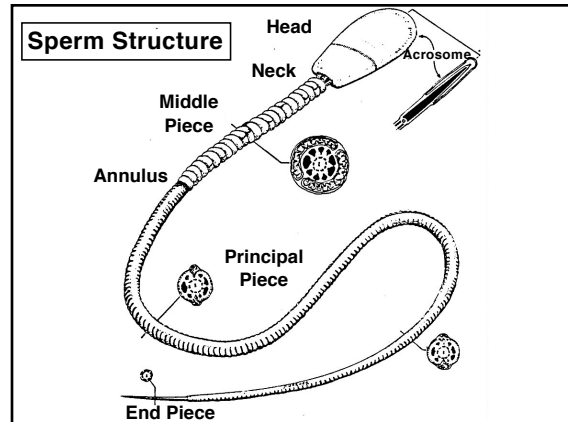


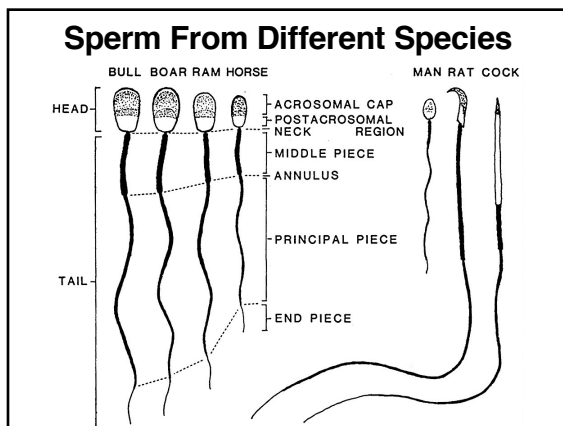
Animal Science 434

Epididymis, Ejaculation and Semen

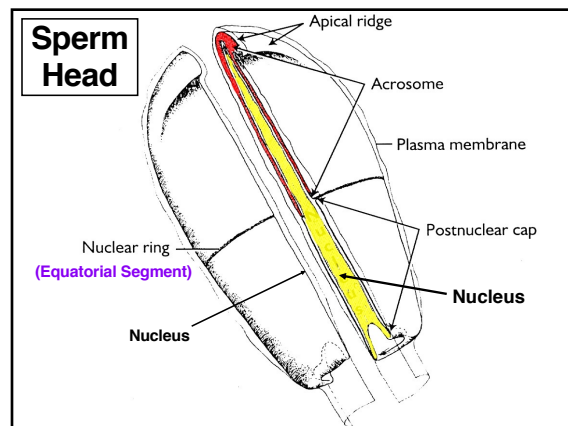
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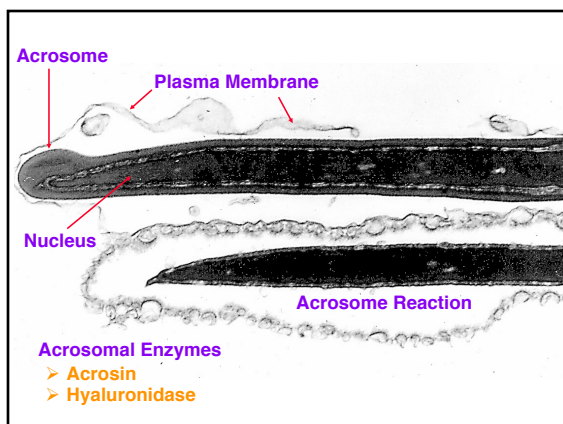
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5

Quiz 14 a

- Where is the acrosome located and what is its physiological role?



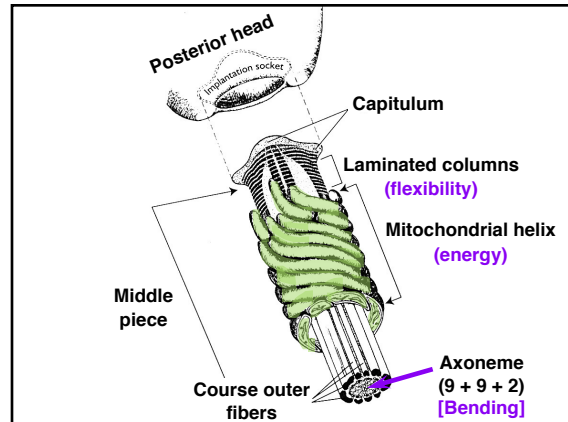
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Quiz 14 a

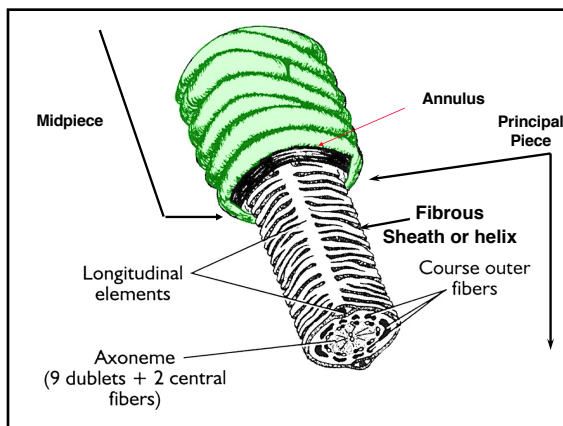
- Where is the acrosome located and what is its physiological role?
- In the anterior tip of the sperm head under the plasma membrane and on top of the nucleus.
- It is involved in releasing its enzymes during fertilization.



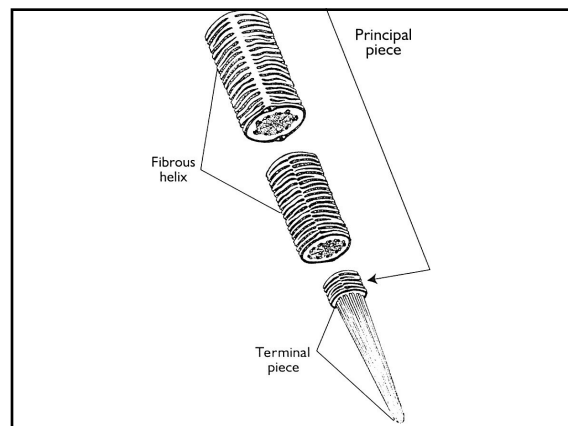
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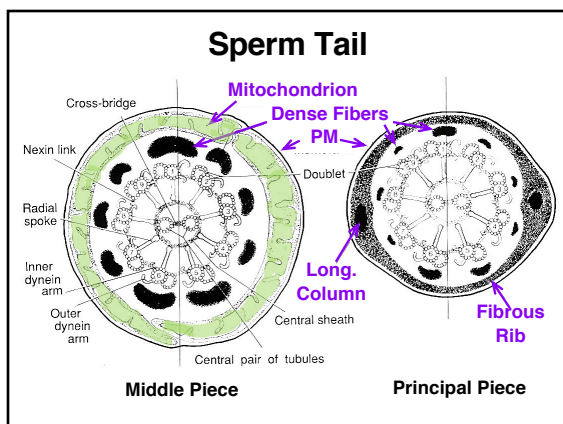
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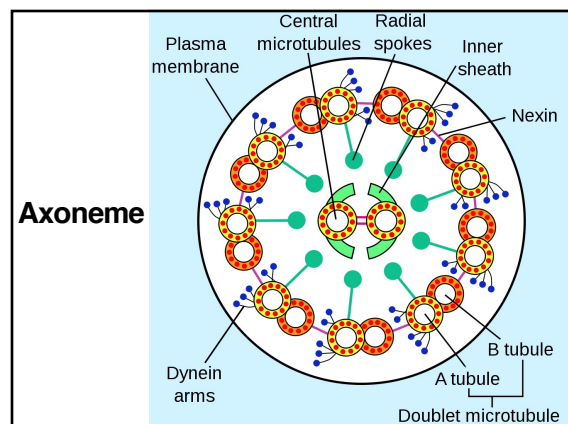
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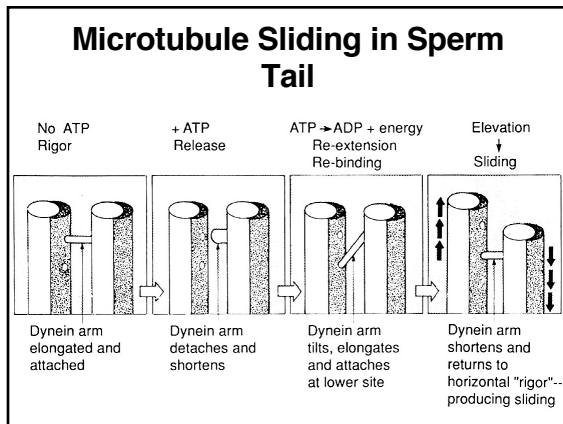
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13

Quiz 14 b

- Where is the ATPase involved in sperm motility located?

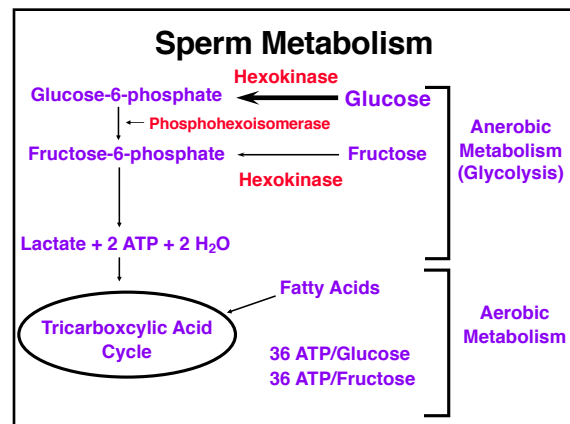
14

Quiz 14 b

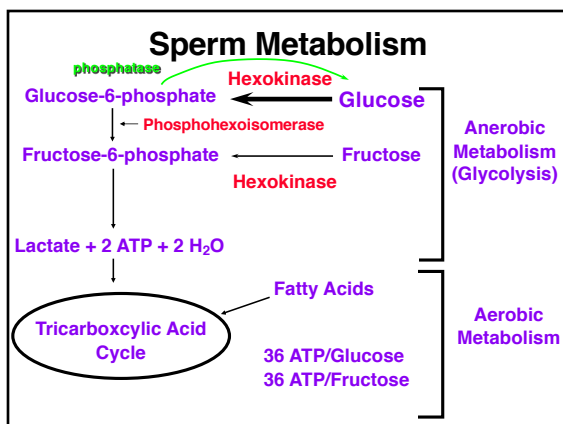
- Where is the ATPase involved in sperm motility located?

On the dynein arms between microtubule pairs.

15



16



17

ATP Utilization in Sperm

- motility (60%)
- substrate cycling (40%)
 - wasted
- maintenance of ionic gradients
 - very small amount
- transcription and translation
 - none after condensation of nucleus and loss of residual body

18

Quiz 14 c

- Sperm require metabolism through the TCA or Krebs cycle (Aerobic Metabolism) in order to generate sufficient ATP to be motile?

True False



19

Quiz 14 c

- Sperm require metabolism through the TCA or Krebs cycle (Aerobic Metabolism) in order to generate sufficient ATP to be motile?

True False



Sperm can use either glycolysis or respiration to generate sufficient ATP for motility.

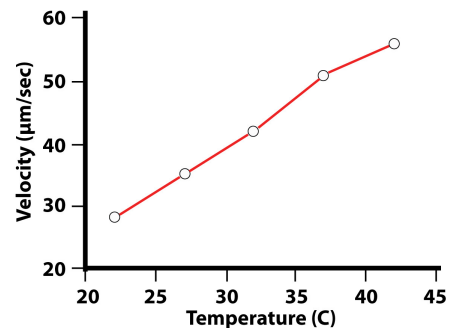
20

Sperm Metabolism

- Temperature dependent
 - ATP production increases as temperature increases
- ATP dependent processes are temperature dependent
 - motility increases with increasing temperature

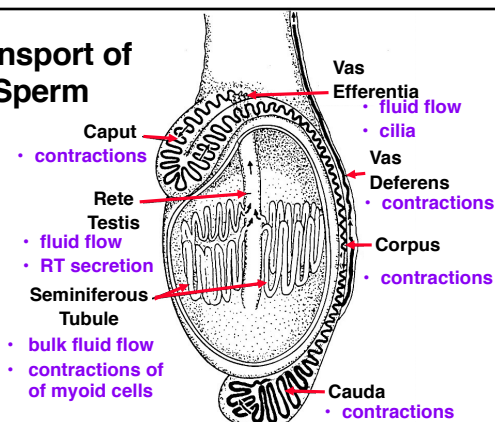
21

Effect of Temperature on Motility



22

Transport of Sperm



23

Epididymal Function

1. Maturation
 - change in fertility
 - develop motility
 - nuclear condensation
 - cytoplasmic droplet
2. Concentration
 - remove water

24

Epididymal Function

3. Secretion

- T → DHT
- energy substrates (GPC, free fatty acids, carnitine)
- glycoproteins, lipids, enzymes

4. Transport

- smooth muscle contraction

5. Storage

- cauda

25

Hormonal Control of Epididymis

• Absolute need for Androgen

• Caput

- tubal testosterone

• Corpus

- tubal dihydrotestosterone (DHT)
- vascular testosterone

• Cauda

- tubal DHT
- vascular testosterone

26

Quiz 14 d

- The production of DHT from T and its release into the epididymal lumen is an example of secretion in the epididymis.

True False



27

Quiz 14 d

- The production of DHT from T and its release into the epididymal lumen is an example of secretion in the epididymis.

True False



28

Ejaculate Characteristics

Species	Time lapse for	Composition of
Bull	1 second	single fraction
Ram	1 second	single fraction
Boar	5 - 25 minutes	fractionated sperm-free sperm-rich coagulum
Stallion	30 - 60 seconds	fractionated sperm-free sperm-rich mucus
Human	10 - 30 seconds	single fraction but coagulated

29

Components of Semen

- water
- sperm
- substrates
 - fructose
 - sorbitol
 - inositol
 - glycerol phosphatidyl choline (GPC)
 - citric acid
- inorganic salts
 - sodium, potassium, calcium, magnesium, chloride
- proteins

30

Initial Semen Evaluation

- color
- volume
- concentration
- motility
- viability
- morphology

31

Semen Color and Volume

- Color
 - White to cream color - good
 - Yellow – urine present
 - Clear or thin in appearance – few sperm
- Volume
 - Weight, 1 ml = 1 gm
- Concentration
 - Hemocytometer – gold standard
 - Spectrophotometer, photometer, fluorometer(measure DNA)

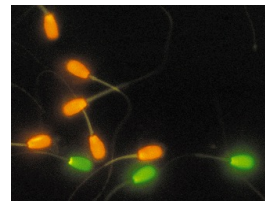
32

Motility Evaluation

- Also a viability evaluation
- Visual estimation – Nearest 5% estimate
 - Total motility – all the moving sperm
 - Progressive motility – those sperm moving in a straight line
- CASA – Computer aided sperm analysis
 - Tracts individual sperm and computes a variety of statistics on the sample
- Sample preparation is key to usefulness of data obtained!!!

33

Fluorescent Sperm Viability Assay



Sybr14 / PI
•Green = viable
•Red = dead

Adaptable to Microscopy
or Flow cytometry

34

Morphology

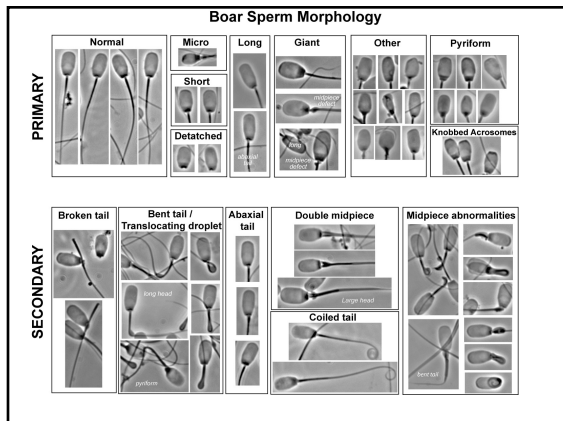
- Variety of sample preparations and methods for evaluation
 - Stain vs. no stain
 - Wet mount vs. dried or fixed
 - Magnification of observation
 - Computer systems require training samples

35

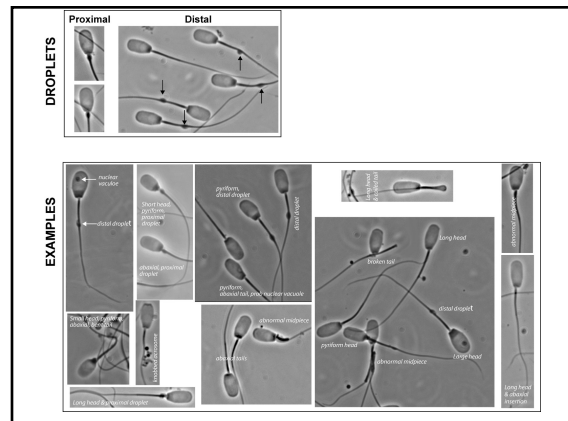
Morphology Classifications

- Scheme A
 - ✓Primary – Head abnormalities
 - ✓Secondary – Tail abnormalities
- Scheme B
 - ✓Primary – Head abnormalities
 - ✓Secondary – Tail abnormalities
 - ✓Tertiary – Cytoplasmic droplets

36



37



38

Ejaculate Characteristics					
Species	Ejaculate Volume	Sperm Conc. (x10 ⁹ /ml)	Total Sperm (x10 ⁹) /Ejaculate	% Motile	% Normal
Bull	8.0	1.5	12	75	95
Ram	1.0	3.0	3	95	95
Boar	200	.25	50	70	90
Stallion	80	.15	12	70	40-90
Man	2-6	.15	.9	65	30-70

39

Quiz 14 e

Is the sperm identified below normal or abnormal and why?

40

Quiz 14 e

Is the sperm identified below normal or abnormal and why?

Abnormal and secondary defect

41