Cell Biology of Sex

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for BioS 10 & 90
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Poll

Bean
Poll
World Population Growth Through History

Billions

Source: U.S. Census Bureau, International Data Base, July 2007 version.
Population growth rate ~ 1.2
Doubling time ~ 58 yrs
(PRB)
It’s all about YOU…

The most important day of your life…

Poll
World Population Clock

math.berkeley.edu/~galen/popclk.html
Figure 1. Montage transmission electron micrograph of a human sperm cell. The cell has a compact nucleus, conspicuous mitochondria, no endoplasmic reticulum, minimal cytoplasm and a large tail (about 45 μm in length). Superfluous cytoplasm and associated machinery is jettisoned when the sperm emerges from the testis, leaving a 'stripped down', minimalist cell.

Assignment for Points:
Portray the role of each compartment
Used with permission of the artist, Patrick Moberg
Try to remember... when you were gametes!

Think like a sperm...

Think like an oocyte...
Gametes are prefabricated for action, a cascade of functions.

Gamete production includes unique patterns of gene expression and regulation.

Gametes have complex structure and many phenotypes.

Every Gamete is a genetically distinct human individual!

Here’s where they came from…
All sexually reproducing organisms do something like this!

Zygo- = yoked, paired [Greek]

from Sylvia Mader, Human Reproductive Biology, 3rd ed.
Your parents… (And YOU)

When fetuses…

PGCs, Primordial Germ Cells populated the presumptive gonadal tissue…

from Sylvia Mader, Human Reproductive Biology
from Sylvia Mader, Human Reproductive Biology, 3rd ed.
from Sylvia Mader, Human Reproductive Biology, 3rd ed.
From Alberts et al., Molecular Biology of the Cell, 5th ed., 2008
Duration of spermatogenesis
Mean: 74 days   95% CI: 69 - 80 days
Not affected by DSP/g or frequency of emission

Epididymal transit time
Caput+corpus: 0.7 - >3.5 days
Cauda: 1.5 - >4.5 days
Transit time varies with DSP/testis

DSP = daily sperm production  ~10^8/day

1. Primary follicles contain oocyte and begin producing the sex hormone estrogen.

2. Secondary follicles contain secondary oocyte and produce the sex hormones estrogen and some progesterone.

3. Vesicular (Graafian) follicle develops.

4. Ovulation: The secondary oocyte is released.

5. Corpus luteum produces the sex hormones progesterone and some estrogen.

6. Corpus luteum degenerates.

from Sylvia Mader, Human Reproductive Biology, 3rd ed.
Fertilization

Green=Acrosome
Purple=Zona Pelludica
Gray= Sperm w/out Acrosome

**note that the acrosome compartment opened after contact with the zona pellucida**

http://www.nature.com/fertility/content/images/ncb-nm-fertilitys57-f1.jpg
Modification of the Equitorial Region
Figure 1. Mammalian fertilisation. Within the female reproductive tract (i) sperm undergo a series of surface and intracellular transformations, collectively termed capacitation, which enables them (ii) to bind to the zona pellucida (ZP) and (iii) undergo the acrosome reaction. (iv) The release of hydrolytic enzymes from the acrosome facilitates sperm passage through the ZP and (v) fusion with the oolemma.
from Sylvia Mader, Human Reproductive Biology, 3$^{rd}$ ed.
From Alberts et al., Molecular Biology of the Cell, 5th ed., 2008
And then…

from Sylvia Mader, Human Reproductive Biology
Questions

Discussion

Editorials

Jokes

Thanks! Watch DVD