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- discussed meiosis → its importance, structures, terminology, the phases
- now focus more applied questions.

meiosis disorders.

- remember when discussed DNA? said 2 types of mutations
 - 1. point mutations → substitutions, insertion, deletions
 - 2. chromosomal mutations → whole chromosome affected at once.

∴ when talking about meiosis disorders → we are talking about chromosomal mutations. (ie. a whole chromosome added or removed from a cell.)

→ main chromosomal category you need to know about is called Aneuploidy. (ie. chromosomal non-disjunction)
"diploid" 2 chromosome sets. number.

* Aneu = abnormal chromosome number. for that particular organism

* chromosomal (non-disjunction) → = incorrect separation.
↓
→ incorrect homologous chromosome separation or an incorrect sister chromatid separation.

(PIC showing non-disjunction).

- LHS: non-disjunction occurs in meiosis I ∴ in meta I homologous chromosomes line up in middle, (4 chromosomes - count centromeres), but bcoz they have incorrectly separated BOTH chromosomes go to same pole. (3 chromosomes in one, 1 in other)

② - then in meiosis 2 ^{separation} proper ~~disjunction~~ occurs BUT end up with 2 cells having 3 chromosomes + 2 cells having 1 chromosome. (what should I get $\rightarrow$ 2 chromosomes each). $\therefore$ if fertilization takes place with these cells I would be 1 chromosome short (22) OR have 1 additional chromosome. (24).

- RHS $\rightarrow$ non-disjunction can also happen in meiosis 2. here the sister chromatids do not separate properly. (
 - for right cell has normal division $\therefore$ end up with normal haploid number (n). BUT other cell has 1 extra ^{chromatid} ($n+1$) and 1 less ^{chrome} ($n-1$).

- NOTE: non-disjunction can happen at ANY of the chromosome numbers $\therefore$ in humans can have at least 23 different types of non-disjunction.
- BUT for exams only 2 you need to know from memory. $\therefore$

1) Down Syndrome.

- Extra chromosome 21 (so 3 x chromosome 21)
- Go through some symptoms $\rightarrow$ PiCS
 - slanted eyes
 - small nose
 - abnormal ears.
- also mental + social development issues that can occur.
- There is a "spectrum" of this down syndrome effect. $\rightarrow$ do not need to know details.

③

2) Klinefelter syndrome

- Extra X chromosome (so sex chromosomes are XXY)
- $\therefore$ you are a male (XY) with an extra chromosome X. (note XXX is a completely different disorder.)
- Characteristics? $\rightarrow$ see PIC!
 - mainly been seen as a male.
 - BUT.
 - sparse facial hair $\rightarrow$ no beard.
 - reduced muscle tone.
 - prominent breasts $\rightarrow$ not very obese
 - smaller testes.

Klinefelter
↓
infertile?

Karyotype. $\rightarrow$ related to application Qs for meiosis.

- see PIC!
- a PIC of the actual chromosomes of an individual. (Condensed form of chromatin.)
- Cell going through cell division + chemicals used to pause ~~affects~~ the cell division.
- Karyotype = a visual representation (or picture) of the chromosomal composition of an individual. (do not confuse w DNA profile.)
- note: in karyotype chromosomes have not duplicated. (ie. X-structure). BUT looking at 46 chromosomes. $\therefore$ chromosomes have been grouped together based on their homologous pairs.
- what can you tell from this karyotype:
 1. male/female. $\rightarrow$ here gonosome = XY $\therefore$ male.
 2. Does it have 1 of 2 disorders you need to know from memory? down syndrome (3x21), Klinefelter syndrome (XXY) $\rightarrow$ neither in this karyotype. note: can be sex study $\rightarrow$ given disorders.