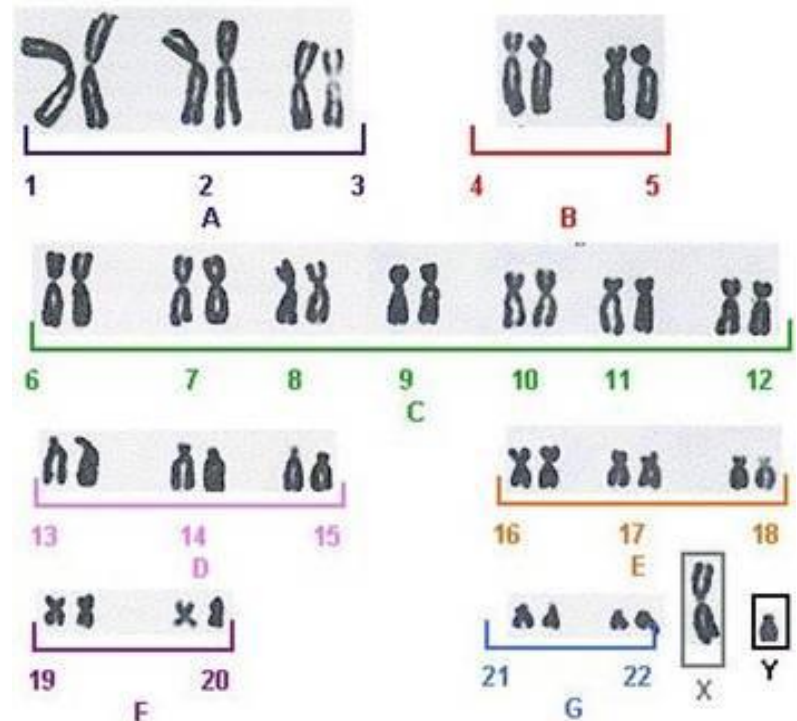


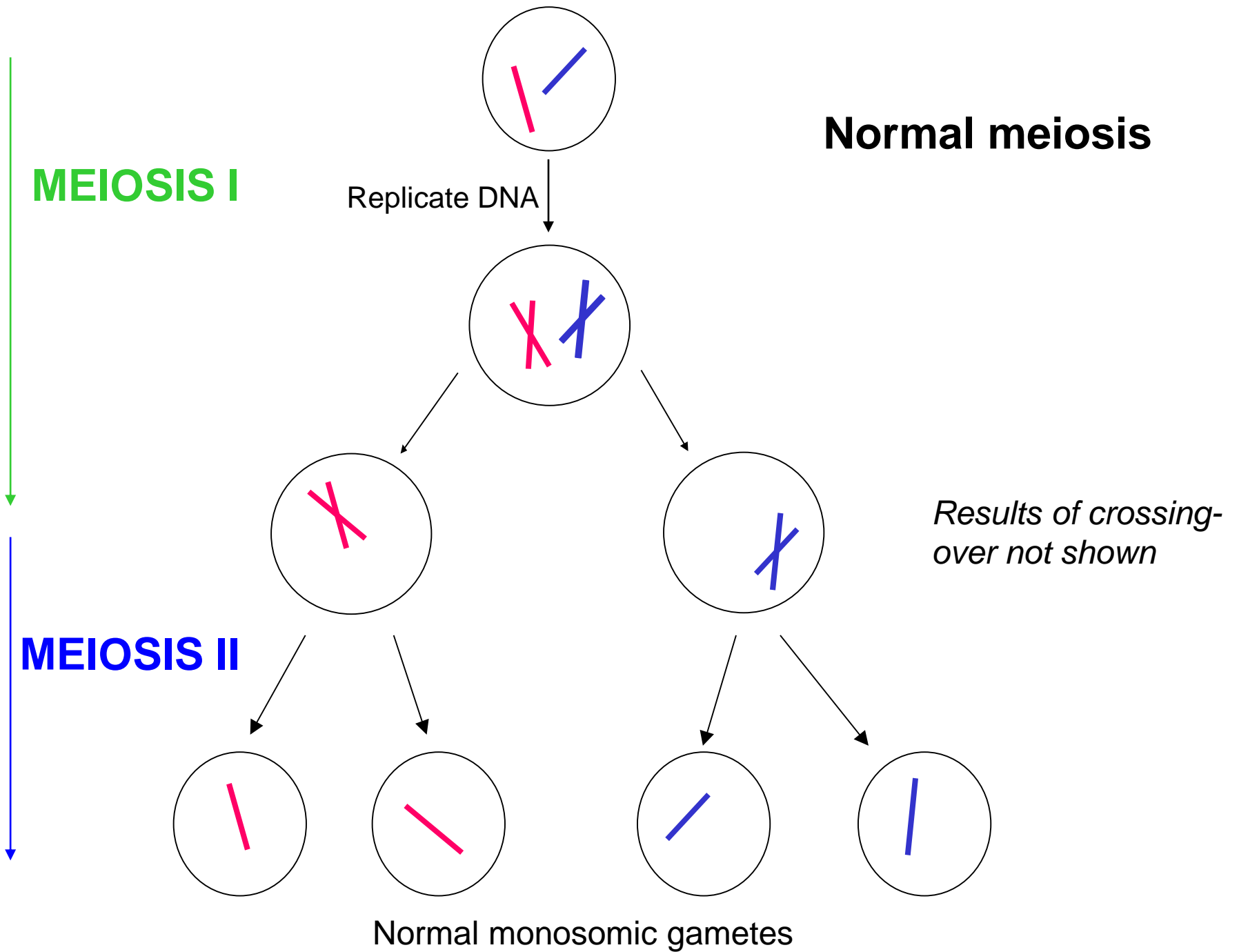
Human chromosomes

- There are 46 chromosomes (23 homologous pairs) in each somatic cell
- 22 pairs of autosomes
- 1 pair of sex chromosomes
XX = Female, XY = Male
- Karyotype - chromosomes are arranged according to shape and size



Nondisjunction and chromosomal disorders

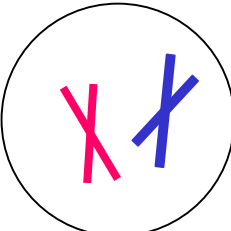
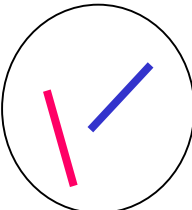
- Nondisjunction – failure of chromosomes to separate and segregate into daughter cells
- Nondisjunction may occur during meiosis 1 or meiosis 2
- Abnormal number of chromosomes may result



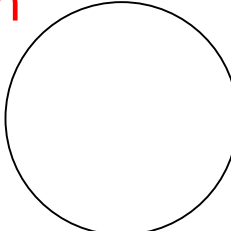
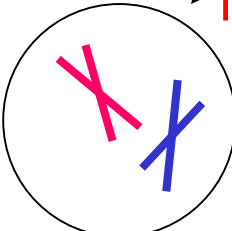
Nondisjunction during meiosis I

MEIOSIS I

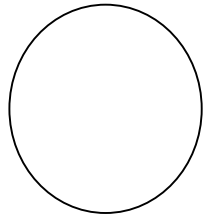
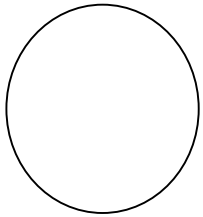
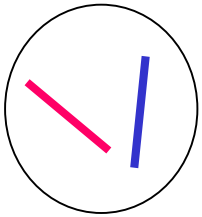
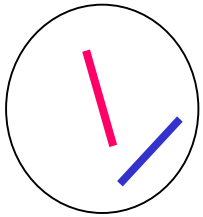
Replicate DNA



Non-disjunction

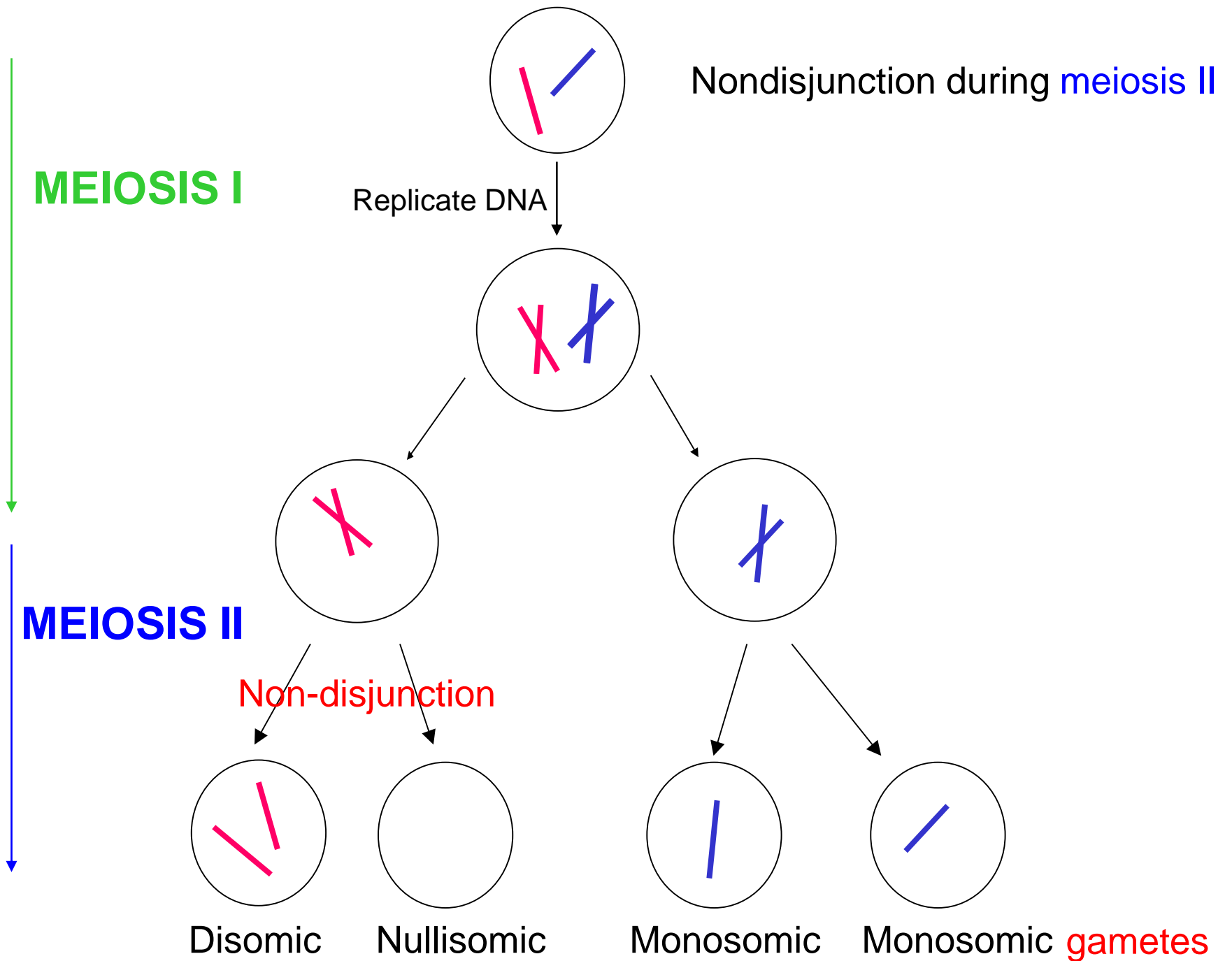


MEIOSIS II



Disomic gametes

Nullisomic gametes



EXAMPLES OF NON-DISJUNCTION

ABNORMALITIES OF SEX CHROMOSOME NUMBER IN HUMANS

Sex Chromosomes	Syndrome	Origin of Nondisjunction	Frequency in Population
XXY	Klinefelter syndrome (male)	Meiosis in egg or sperm formation	$\frac{1}{2,000}$
XYY	None (normal male)	Meiosis in sperm formation	$\frac{1}{2,000}$
XXX	Metafemale	Meiosis in egg or sperm formation	$\frac{1}{1,000}$
XO	Turner syndrome (female)	Meiosis in egg or sperm formation	$\frac{1}{5,000}$

AN EXTRA COPY OF CHROMOSOME 21 CAUSES DOWN SYNDROME

This condition is called **trisomy 21**.
Person with this condition suffers from
the Down syndrome.

Characteristic facial features:

- Round face
- Flattened nose bridge
- Small, irregular teeth
- Short stature
- Heart defects

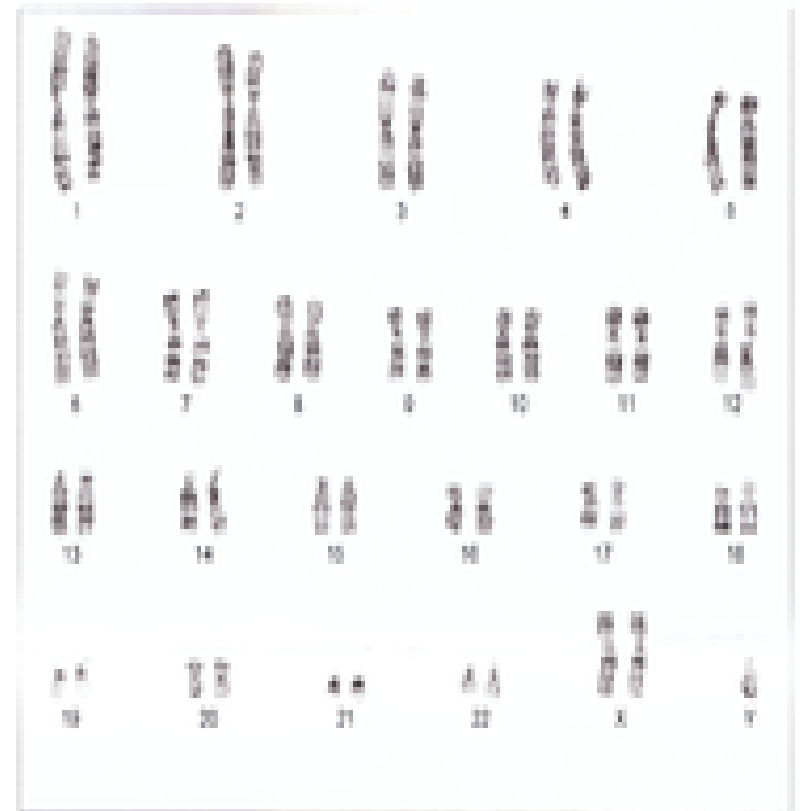


Klinefelter's syndrome, 47, **XXY**

It is the most common sex chromosome disorder and the second most common condition caused by the presence of extra chromosomes

Symptoms:

- Language impairment
- Lanky, youthful build or rounded body type
- Low levels of Testosterone and small testicles / Infertile



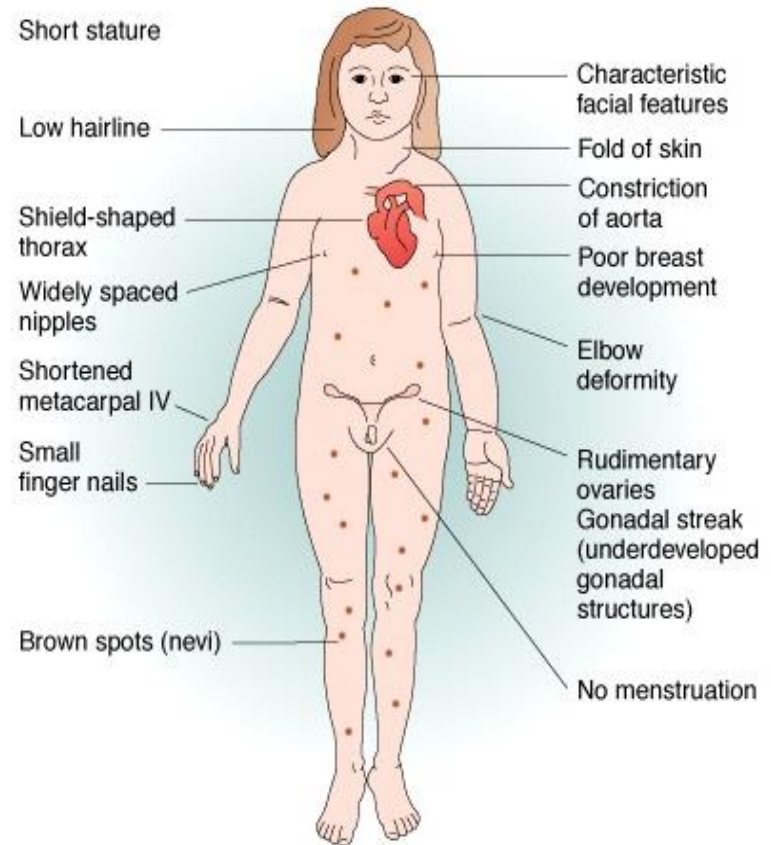
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Turner's Syndrome (X)

Common symptoms:

- Short stature
- swelling of the hands and feet
- Broad chest and widely spaced nipples
- Low hairline
- Low-set ears
- Reproductive sterility
- Increased weight, obesity
- Small fingernails
- Characteristic facial features
- Webbed neck



What genetic disorder is this?

