

Maturation-promoting factor (MPF):

- Also known as Mitosis-promoting factor/ M-phase-promoting factor.
- It is a cyclin-Cdk complex and was first discovered in frog eggs.
- Stimulates mitotic and meiotic phases of the cell cycle.
- MPF promotes the entrance into mitosis (the M phase) from the G₂ phase by phosphorylating multiple proteins needed during mitosis.

Cell cycle checkpoints (Figure 5.16):

- Variation in the length of the cell cycle depends upon the cell cycle checkpoints which control the cell's progression.
- These makes certain that the cell machinery is operating properly with the correct timing.
- These also checks that each phase of the cycle is completed properly.
- The cell cycle checkpoints determine if a cell is ready to progress to the next stage.
- **G1 checkpoint:** In late G1 phase, it determines if the cell will enter the following S phase. It is largely controlled by growth factors.
- **G2 checkpoint:** determines if the cell will enter the M phase and requires the proper completion of DNA synthesis.
- **Spindle assembly checkpoint:** Occurs between metaphase and anaphase. It requires the proper attachment of all the chromosomes to the spindle apparatus.

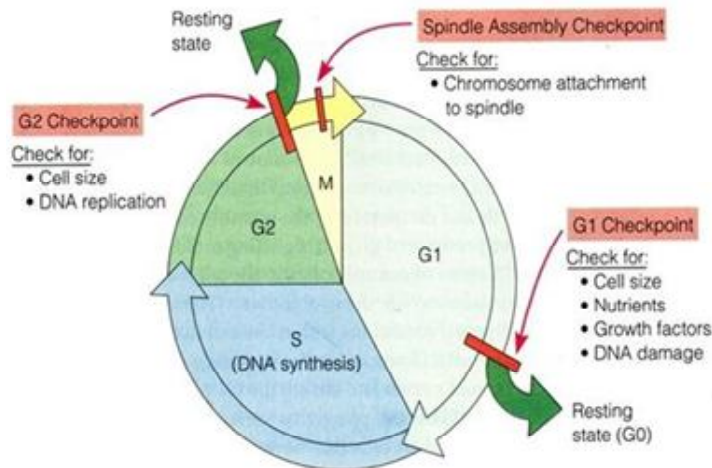


Figure 5.16: Cell cycle checkpoints

Karyotyping:

- This is the process by which chromosomes are organized and visualized for inspection.
- The visual profile generated is called a **Karyogram** (Figure 5.17).
- **Uses:**
 - ◆ To determine the gender of an unborn child.
 - ◆ To test for chromosomal abnormalities.

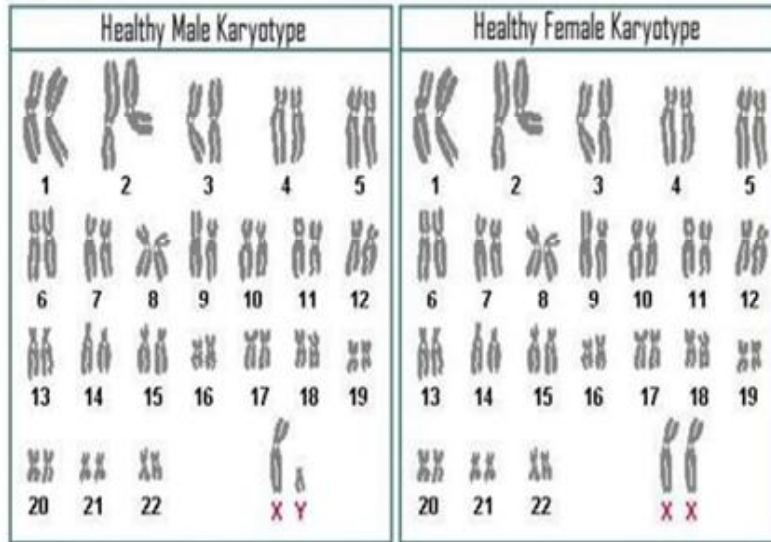


Figure 5.17: Karyogram of a human male and female



PRACTICE SET**[MULTIPLE CHOICE QUESTIONS (MCQ)]**

- The spindle forms in the
(a) G₁ phase (b) G₂ phase (c) M phase (d) S phase
- The event(s) which does not occur during interphase, is/are
(a) Chromatin condenses (b) Protein Synthesis
(c) Organelles replication (d) DNA replication
- The term, not related to mitosis is
(a) gametes (b) chromosomes (c) DNA replication (d) somatic cells
- A centromere is
(a) another name for kinetochore
(b) the structure to which microtubules attach
(c) a constriction on a chromosome bound to a disk
(d) all of the above
- During which phase, a cleavage furrow is formed in animal cells?
(a) C (b) G₁ (c) G₂ (d) M
- Microtubules grow from the poles to kinetochores of each chromatid during
(a) prophase (b) metaphase (c) anaphase (d) telophase
- Which of the following statements is true about meiosis in humans?
(a) Sperm and ova are not identical to the parent cells that produced them.
(b) Females produce far more gametes than do males.
(c) The process begins in males and females at puberty.
(d) (a) and (b)
- What kind of aneuploid gametes will be generated if meiotic non-disjunction occurs at first division? (n represents the haploid number of chromosomes)
(a) only n+1 and n (b) only n-1 and n (c) both n+1 and n-1 (d) either n+1 or n-1
- The minimum no. of chiasmata in a bivalent is
(a) 1 (b) 2 (c) 3 (d) 4
- A cell in G₁ of interphase has 12 chromosomes how many chromatids will be found during metaphase II of meiosis
(a) 6 (b) 12 (c) 18 (d) 24

[MULTIPLE SELECTIVE QUESTIONS (MSQ)]

- The cell is not allowed to pass the cell cycle restriction point if DNA damage is detected. Which of the following proteins are involved in detection of DNA damage and inhibition of the cycle at the restriction point? Please select all that apply.
(a) Replication protein A (RPA) (b) ATM (ataxia telangiectasia mutated) protein
(c) p53 (d) Cyclin D

ANSWER KEY**[MULTIPLE CHOICE QUESTIONS (MCQ)]**

- | | | | | |
|--------|--------|--------|--------|---------|
| 1. (c) | 2. (a) | 3. (a) | 4. (d) | 5. (a) |
| 6. (a) | 7. (a) | 8. (c) | 9. (a) | 10. (b) |

[MULTIPLE SELECTIVE QUESTIONS (MSQ)]

- (a),(b),(c)