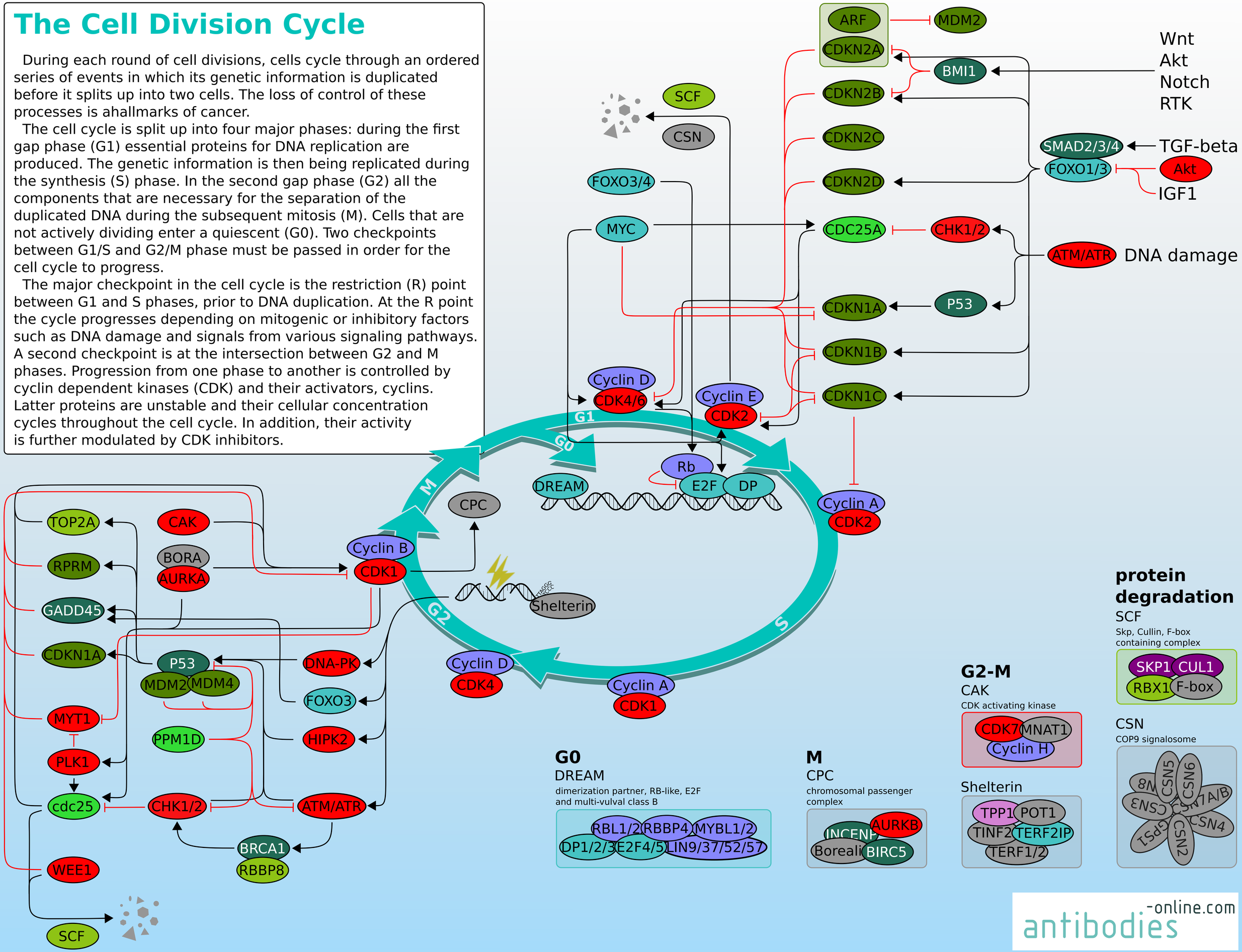
The Cell Division Cycle

During each round of cell divisions, cells cycle through an ordered series of events in which its genetic information is duplicated before it splits up into two cells. The loss of control of these processes is ahallmarks of cancer.

The cell cycle is split up into four major phases: during the first gap phase (G1) essential proteins for DNA replication are produced. The genetic information is then being replicated during the synthesis (S) phase. In the second gap phase (G2) all the components that are necessary for the separation of the duplicated DNA during the subsequent mitosis (M). Cells that are not actively dividing enter a quiescent (G0). Two checkpoints between G1/S and G2/M phase must be passed in order for the cell cycle to progress.

The major checkpoint in the cell cycle is the restriction (R) point between G1 and S phases, prior to DNA duplication. At the R point the cycle progresses depending on mitogenic or inhibitory factors such as DNA damage and signals from various signaling pathways. A second checkpoint is at the intersection between G2 and M phases. Progression from one phase to another is controlled by cyclin dependent kinases (CDK) and their activators, cyclins. Latter proteins are unstable and their cellular concentration cycles throughout the cell cycle. In addition, their activity is further modulated by CDK inhibitors.



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