

**PROCESSES REGULATING CHROMATIN ORGANISATION AND
NUCLEAR AND NUCLEAR ENVELOPE ASSEMBLY AFTER MITOSIS**

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In eukaryotic cells, the nucleus is physically separated from the rest of the cell by a nuclear envelope, which is composed of two lipid bilayer membranes, nuclear pore complexes and a nuclear lamina. The outer nuclear membrane, which is functionally similar to ER membranes, is separated from the inner nuclear membrane by a perinuclear space. Both membranes apparently connect at the nuclear pores. The nuclear lamina lies beneath the inner nuclear membrane. The major protein components of the lamina are nuclear lamins. They interact with several integral membrane proteins, such as all the LEM domain proteins, as well as with LAP1, LBR, otefin, and myne-1. Integral membrane proteins of the nuclear envelope interacting with lamins play a fundamental role in regulating the myriad of interactions between nuclear membranes, nuclear lamina, chromatin and DNA. Nuclear lamins are type V intermediate filament proteins. Based on their expression pattern, properties and localization, they can be divided into two classes: B-type and A-type. The B-type lamins are expressed in almost all cells. They are usually associated with membrane vesicles during mitosis. The A-type lamins are expressed primarily in differentiating cells. They are generally more soluble than B-type lamins during M-phase. It has been thought that all fundamental processes occurring in a cell nucleus require the presence of a properly assembled nuclear lamina. The process of cell cycle-dependent nuclear lamina disassembly and presumably the nuclear envelope disassembly which results, is correlated with specific lamin phosphorylation, most probably by the cdc2 protein kinase. The nuclear envelope is completely disassembled during mitosis in higher eukaryotic (vertebrate) cells. Two hypotheses were formulated describing the possible fate of the nuclear envelope membranes during nuclear disassembly. According to first hypothesis, nuclear envelope membranes disperse into mitotic vesicles and cisternae, the lipid and protein composition of which reflect the composition of the original membrane. The second hypothesis suggests that the nuclear envelope membranes simply disperse within ER membranes. It now appears that the two theories may be valid. It seems that the first hypothesis is valid at least in oocytes and early embryonic cells while the second is useful to describe the processes in vertebrate tissue culture cells.