

NUCLEUS AND THE NUCLEOLUS

11/25/91, rvsd 11/23/94, 11/17/95, 11/25/96, 11/22/99, 11/20/00, 21 Nov 01, 19 Nov 04, 26 Nov 07, 1Dec08
BRP p. 438-, BKH: 514-529, BHK 5th: 510-518, 6th: 535-556, 7th: 535-556

NUCLEUS: (P 539)

osmotic properties and phase contrast microscopy suggested membrane-bound structure
envelope double layer, perinuclear space between: continuous with rough ER cisternae and Golgi.
outer membrane may be studded with ribosomes

nuclear pores: (p 540)

first seen in 1950s, point of fusion with inner and outer membranes
nuclear pore complex: diameter about 80 nm, but actual channel about 9 nm
number of pores goes up with increased transport of RNA (fr 3 up to 50/sq μm .)
annulus composed two rings of 8 subunits on either side of double membrane

ribosomes synthesized in nucleus at rate of 20,000/min

100 molecules of histone molecule needed per pore/minute
proteins 20K MW diffuse easily
60K not at all
subunits of polymerases come in, assemble inside

NUCLEAR CORTEX:

Nucleoplasmic side, 30-40 nm thick organized chromosomes

NUCLEOPLASM:

chromatin:	equal parts DNA and protein:
enzymes and factors:	replication, transcription, processing, packaging, transport
heterochromatin:	condensed DNA constitutive: kinetochore

DNA packaged by means of histones (536, 538, 539)

nucleosomes, octamer of histones,
packs into hollow tube,
then into chromosome

NUCLEOLUS: (p 546) fibers (rRNA) and granules (packaged ribosomal components)

Site of ribosomal RNA synthesis (autoradiography with ^3H cytidine)
Ribosome factory (proteins made in cytoplasm, brought back in)
In cells making lots of protein, nucleolus very large (20-25% of nucleus)
nucleolus organizing regions (NORs) on sites on certain chromosomes contains genes for rRNA
nucleolus disappears just prior to mitosis