

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, 01Dec10, 30Nov11
BRP p. 438-, BKH: 514-529, BHK 5th: 510-518, 6th: 535-556, 7th: 535-556

NUCLEUS: (p 539)

membrane-bound structure:

osmotic properties, phase contrast microscopy

envelope double layer:

perinuclear space between 2 nuclear membranes:

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: outer diameter 80 nm, channel about 9 nm

number of pores goes up with increased transport of RNA (fr 3 up to 50/sq $\mu\text{m}.$)

annulus composed two rings of 8 subunits on either side of double membrane

PASSAGE THROUGH THE PORES: (p 543)

ribosome subunits synthesized in nucleus at rate of 20,000/min

special active transport passes them thru the pores.

proteins

20K MW diffuse easily, 60K not at all

histones

(21K) 100 molecules of molecule needed per pore/minute

polymerase subunits

transported in by importins, assemble inside

mRNA

transported out by exportins

NUCLEOPLASM:

chromatin

equal parts DNA and protein:

enzymes and factors

replication, transcription, processing, packaging, transport

heterochromatin

condensed DNA constitutive: kinetochore

DNA PACKAGING: by means of histones, basic proteins (p 536)

nucleosomes octamer of histones

chromatin fiber nucleosomes packed into hollow tube,

looped domains fibers condense into loops

heterochromatin coils of looped dkomains into chromosome arm

NUCLEOLUS: (p 546) (Ribosome factory)

fibers rRNA

granules packaged ribosomal components

Site of ribosomal RNA synthesis

(autoradiography with ^3H cytidine)

ribosome subunits assembled, transported out

(proteins made in cytoplasm, brought back in)

In cells making lots of protein, nucleolus very large

(20-25% of nucleus)

nucleolus organizing regions (NORs):

genes for rRNA s on certain chromosomes

nucleolus disappears just prior to mitosis

