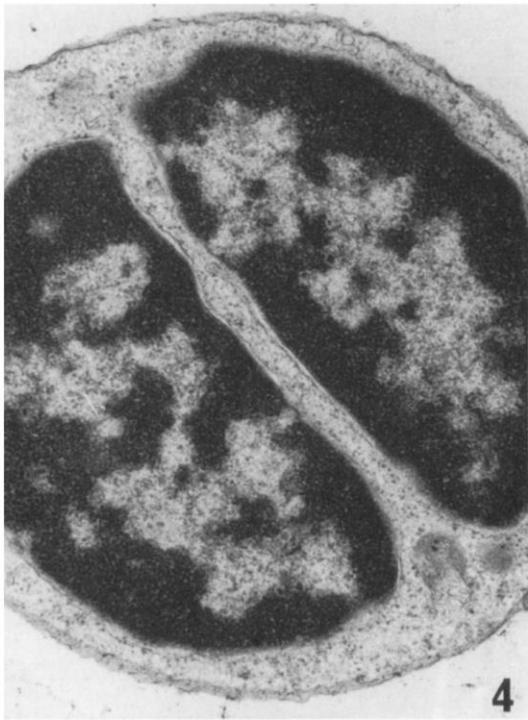
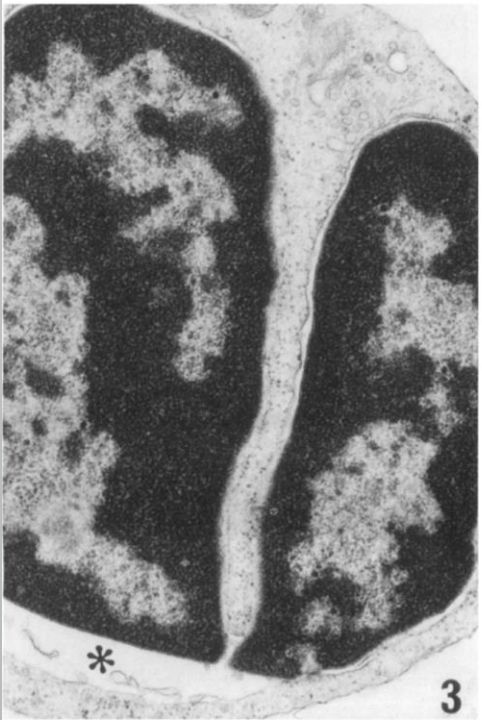
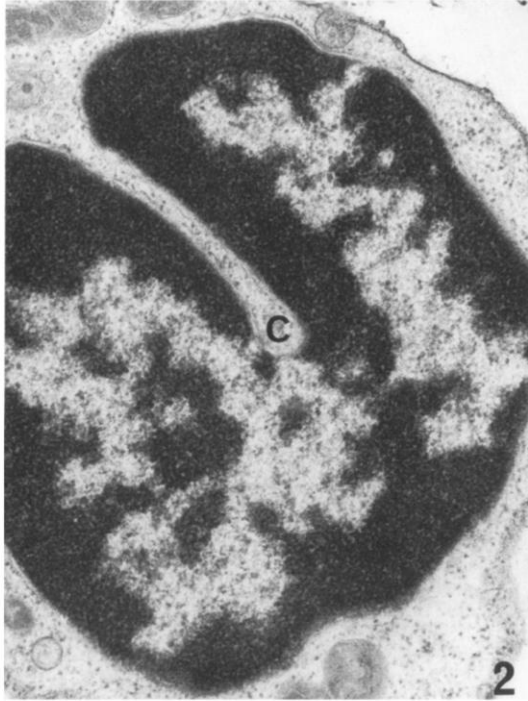
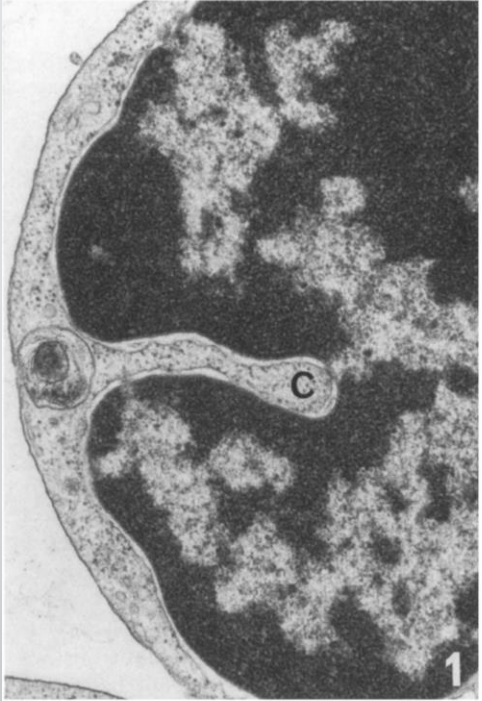




Quiz for launch of:
5th edition of Ghadially's
Ultrastructural Pathology of the Cell
and Matrix

Chapter 1 - Nucleus

Written by Josep Lloreta-Trull

Deputised by Regan Doherty

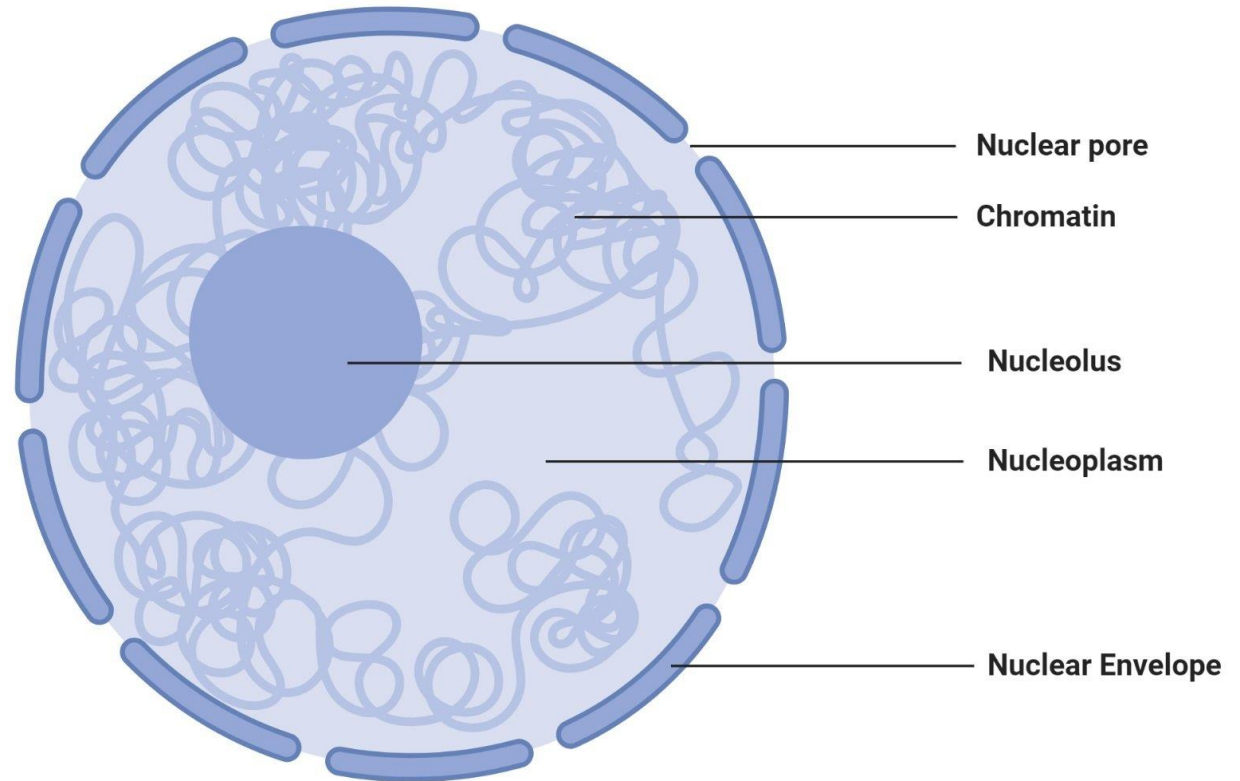
83 pages (111 including references!)

PLATE 1.83 Leukemic cells from the peripheral blood of a case of chronic lymphocytic leukaemia.

Fun facts!

- The nucleus was the first of the cell organelles to be discovered by scientists (1831).
- It usually takes up about 10% of the cell's volume.
- Each human cell contains around 2 meters of DNA which is tightly packed, but very organised with proteins.

Nucleus

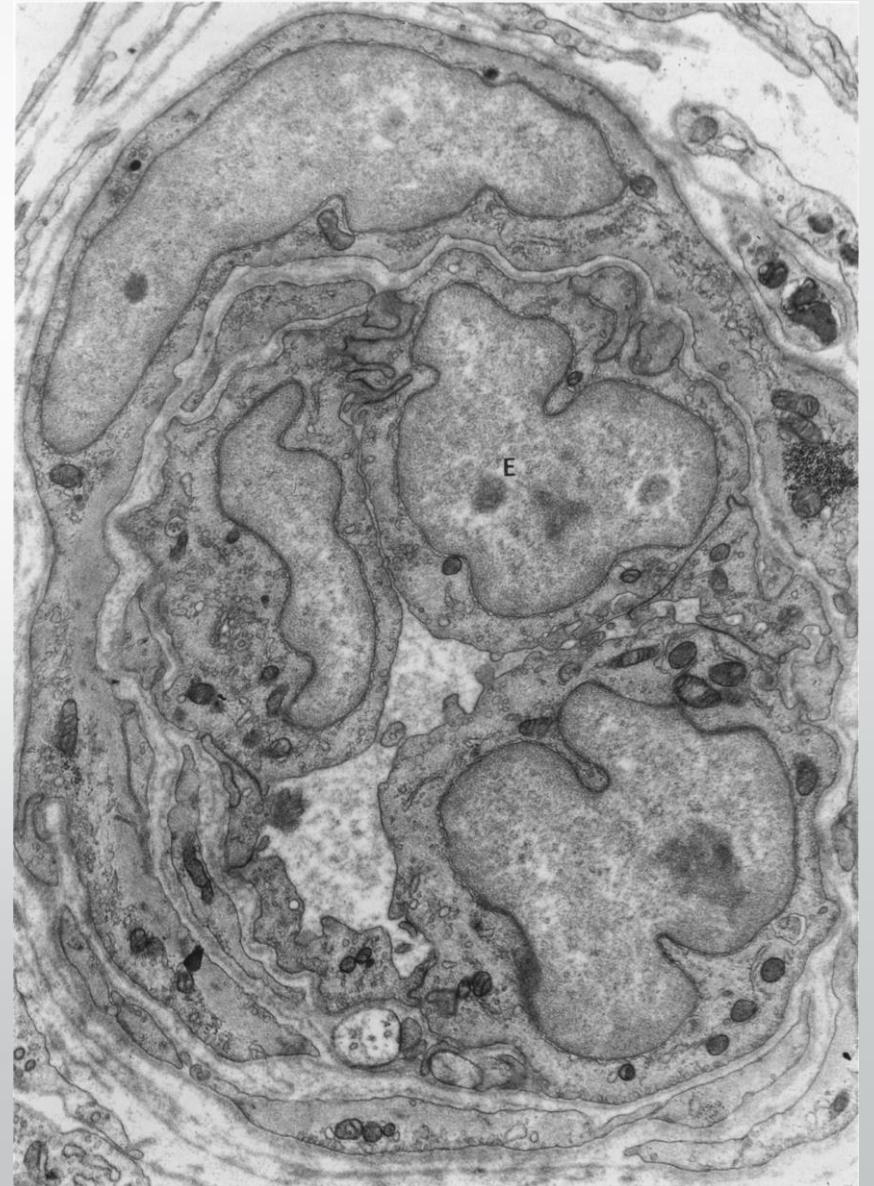


<https://microbenotes.com/nucleus-structure-and-functions/>

https://www.ducksters.com/science/biology/cell_nucleus.php

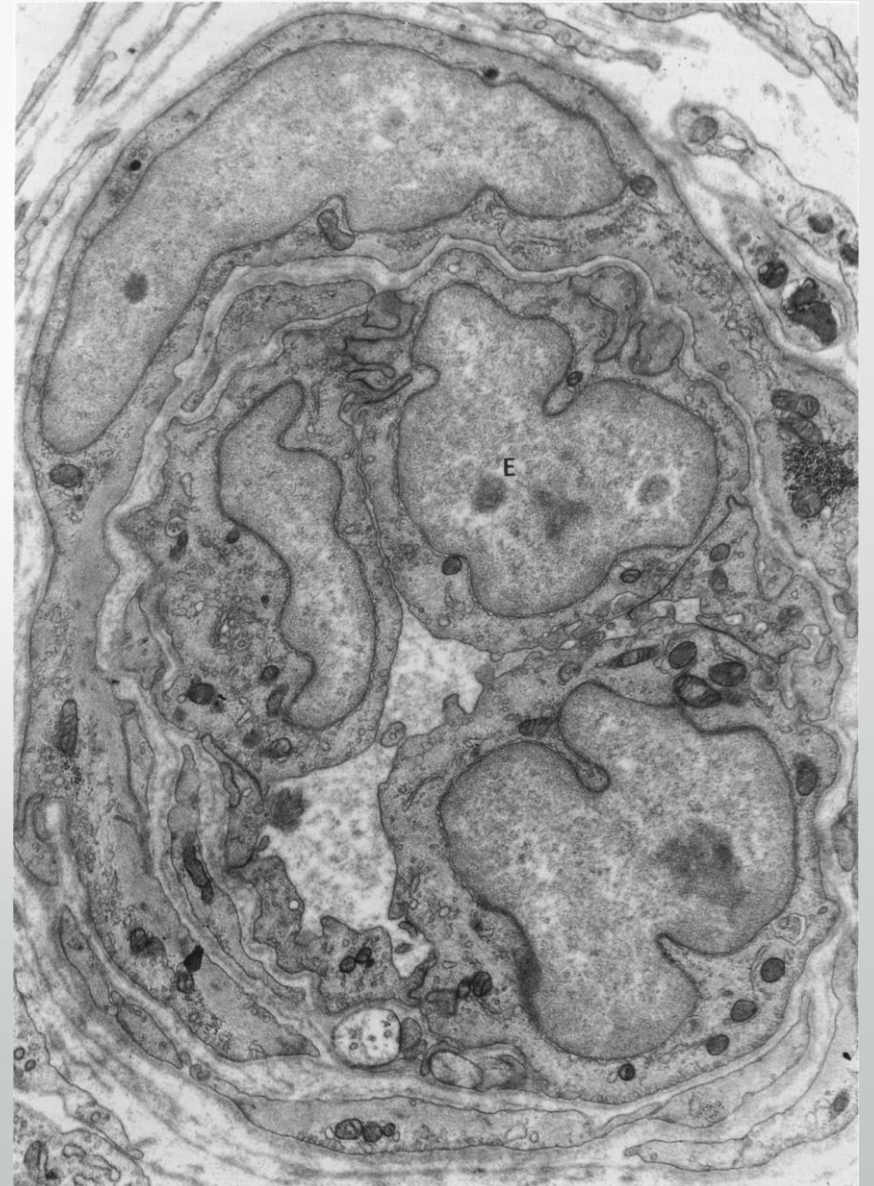
capillary vessel from human subsynovial tissue

- Plate 1.1: What structural differences can be observed between the endothelial cell nuclei and the pericyte nucleus in this image, and what might these differences indicate about their function or state?



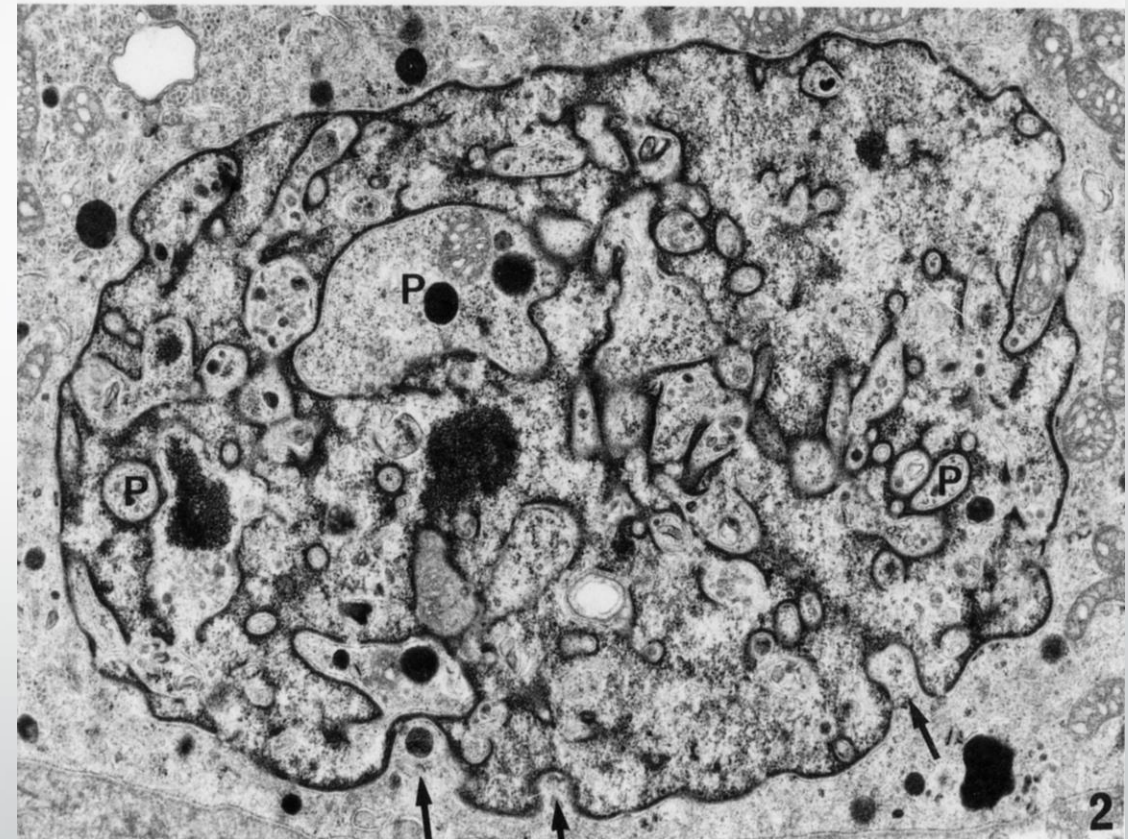
capillary vessel from human subsynovial tissue

- The pericyte nucleus is elongated and flattened, while the endothelial cell nuclei are more rounded. These differences indicate the specialised functions and mechanical environments of these cells. (Plate 1.1)



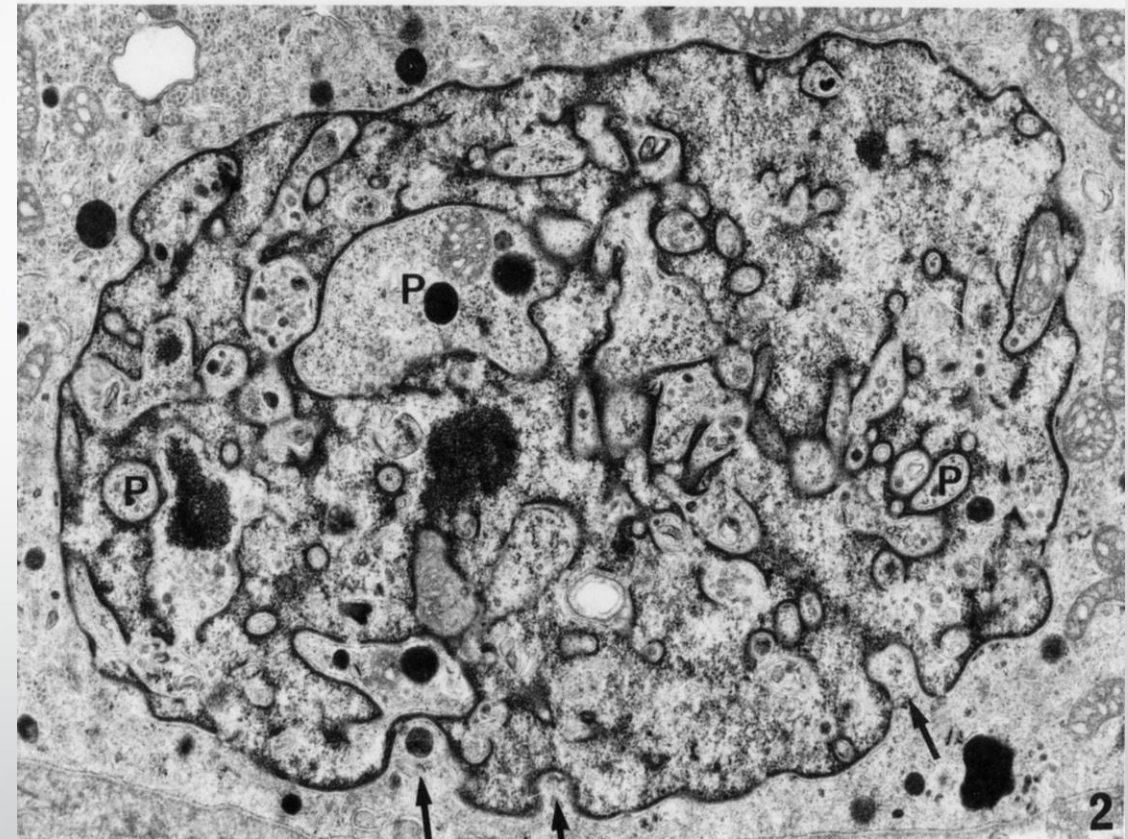
- Plate 1.2, Figure 2: Describe the morphological features that give this melanoma nucleus a “sieve-like” or “sponge-like” appearance. What is the significance of such nuclear irregularities in tumor pathology?

tumour cell from metastatic malignant melanoma



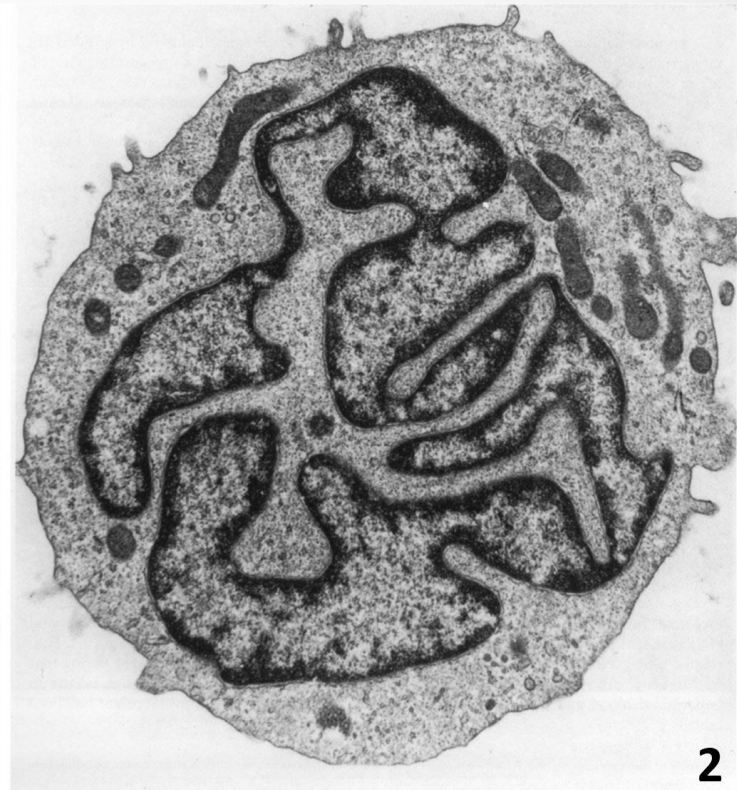
- The melanoma nucleus shows irregular chromatin distribution with clear areas resembling a sieve. Such irregularities are indicative of the aggressive and abnormal nature of tumour cells. (Plate 1.2, Figure 2)

tumour cell from metastatic malignant melanoma



- Plate 1.5, Figure 2: What are the defining features of a cerebriform nucleus in Sézary syndrome (a rare and aggressive type of cutaneous T-cell lymphoma, a cancer that primarily affects the skin.) and how can these be distinguished from similar convoluted nuclei in other conditions?

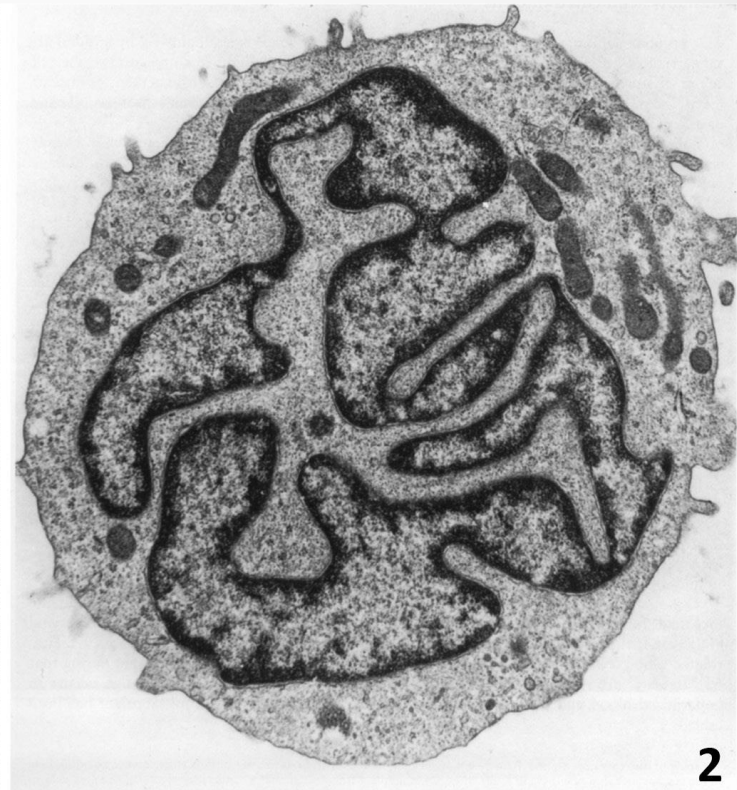
Reactive
lymphocyte
in necrotising
myopathy



Sézary cell

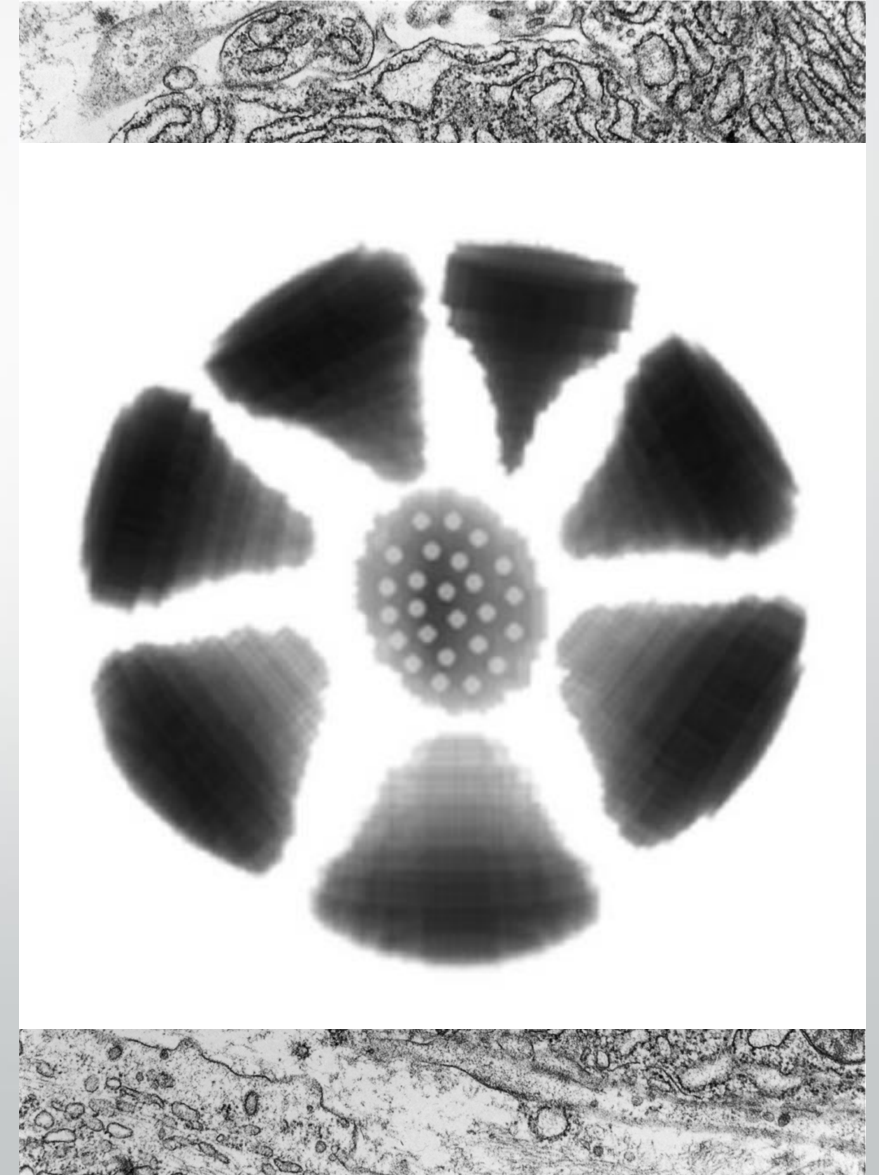
- Cerebriform nuclei in Sézary syndrome have deep grooves and convolutions, distinguishing them from other conditions with similar nuclear shapes. (Plate 1.5, Figure 2)

Reactive
lymphocyte
in necrotising
myopathy



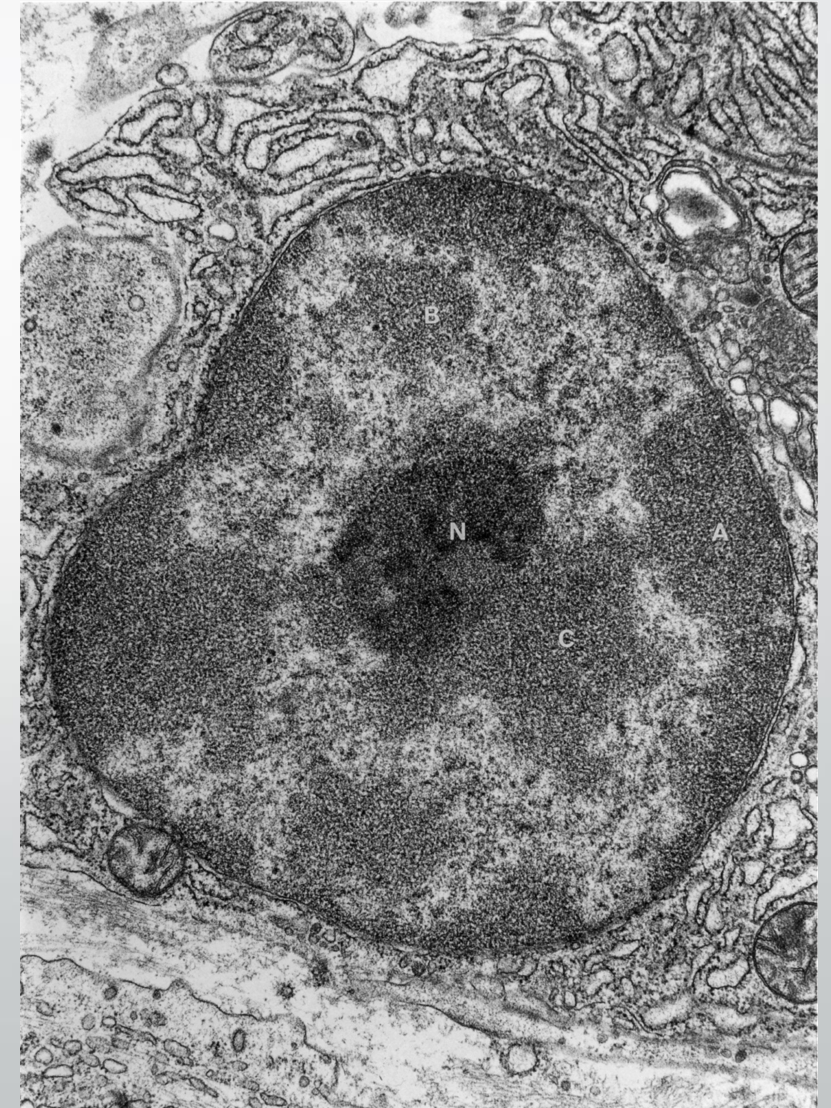
Sézary cell

- Plate 1.7: This is a cartwheel pattern of heterochromatin in a plasma cell. What does this pattern reveal about the cell's activity?



Tadrous, Paul. (2012). Subcellular Microanatomy by 3D Deconvolution Brightfield Microscopy: Method and Analysis Using Human Chromatin in the Interphase Nucleus. *Anatomy research international*. 2012. 848707. 10.1155/2012/848707.

- The cartwheel pattern of heterochromatin in plasma cells indicates active antibody production, reflecting the cell's role in immune response. (Plate 1.7)



- Plate 1.9: Why is the chromatin in the mouse spermatozoon head so densely compacted, and what functional advantage does this provide?

Mouse spermatozoon head



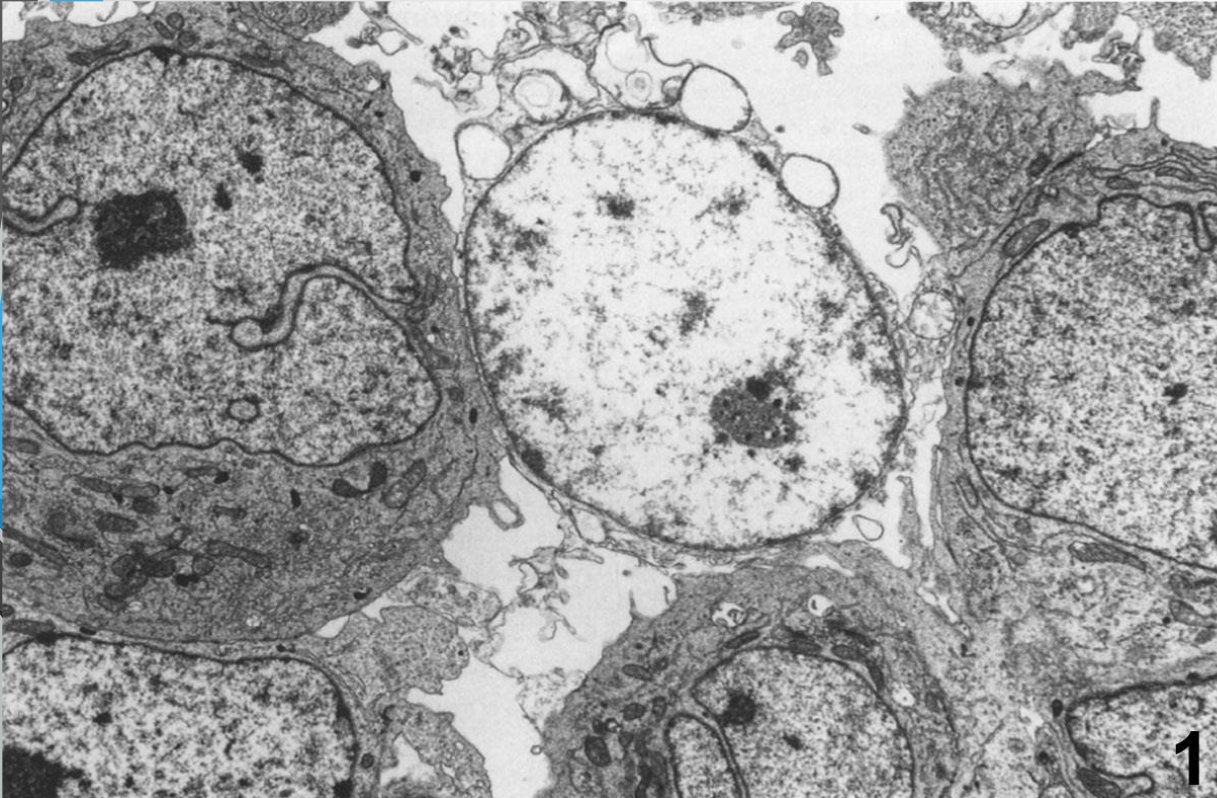
- The dense compaction of chromatin in mouse spermatozoon head ensures genetic material is protected and efficiently transmitted during fertilisation. (Plate 1.9)

Mouse spermatozoon head

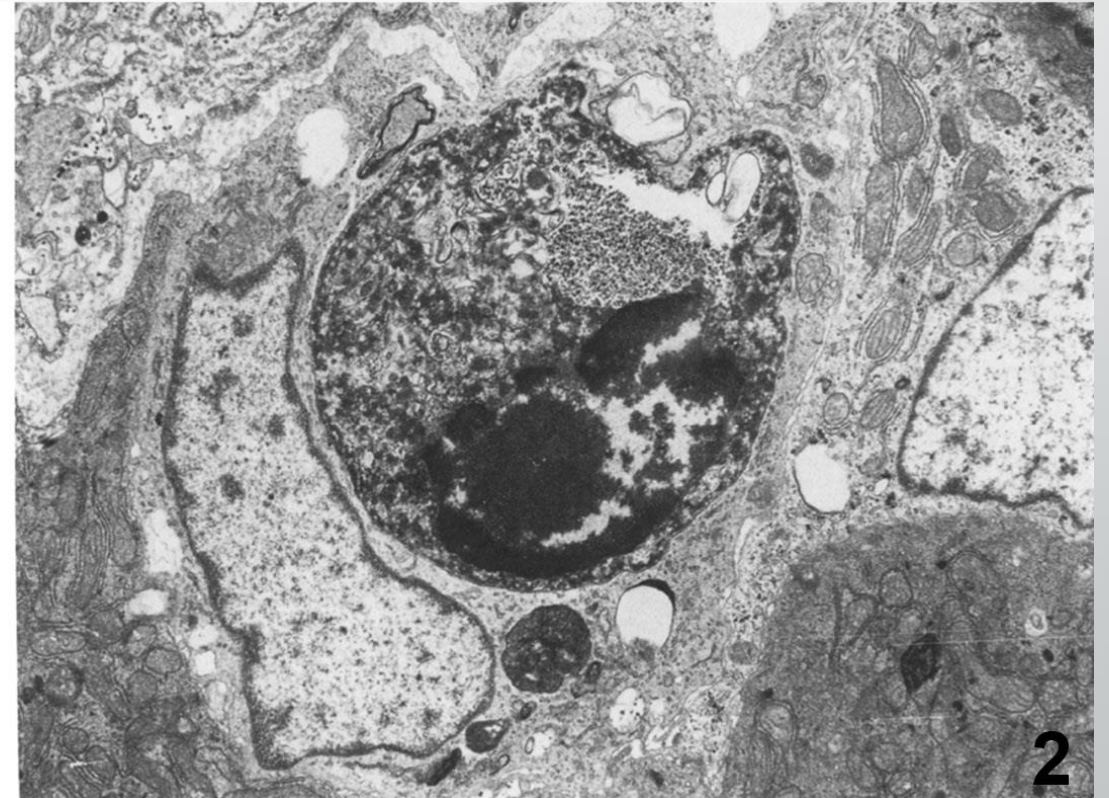


- Plate 1.13: These 2 images show cell death - how do these changes reflect different stages or types of cell death?

karyolysis

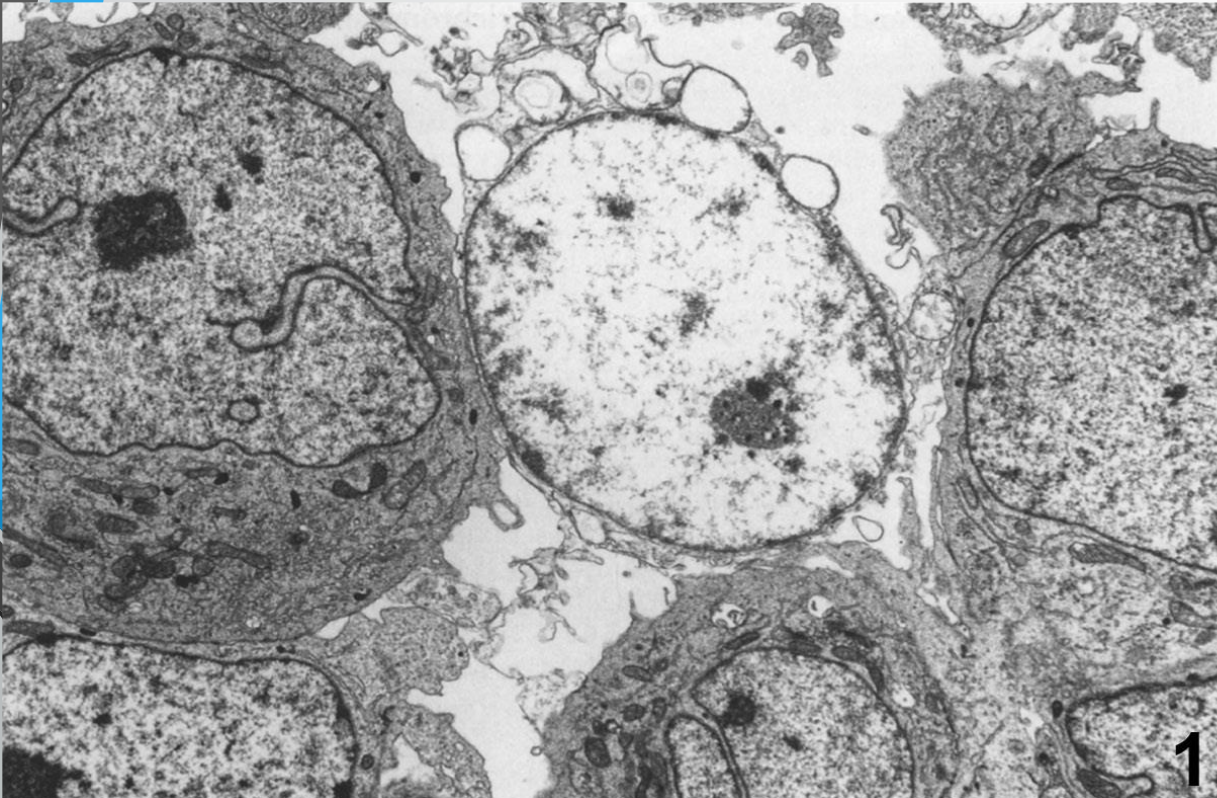


pyknosis

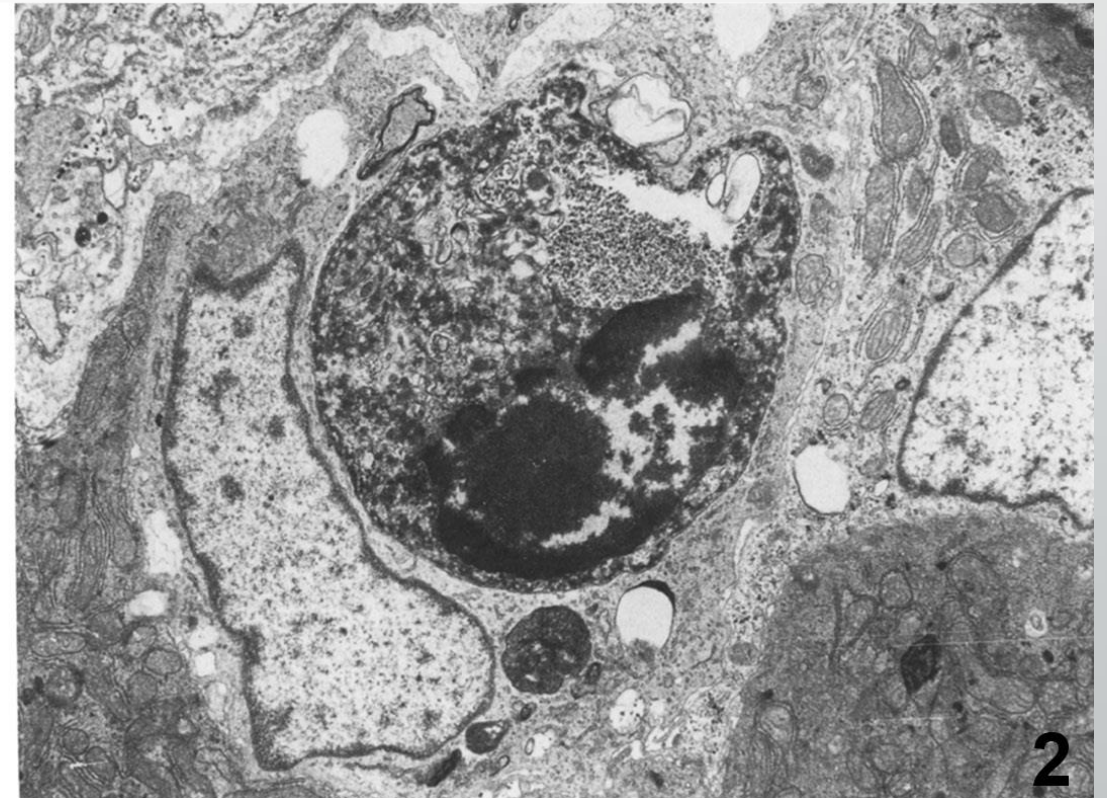


- Karyolysis shows chromatin dissolution, while pyknosis shows chromatin condensation. These changes reflect different stages of cell death, with karyolysis indicating necrosis (disorganised/uncontrolled/harmful) and pyknosis indicating apoptosis (programmed/orderly/beneficial). (Plate 1.13)

karyolysis

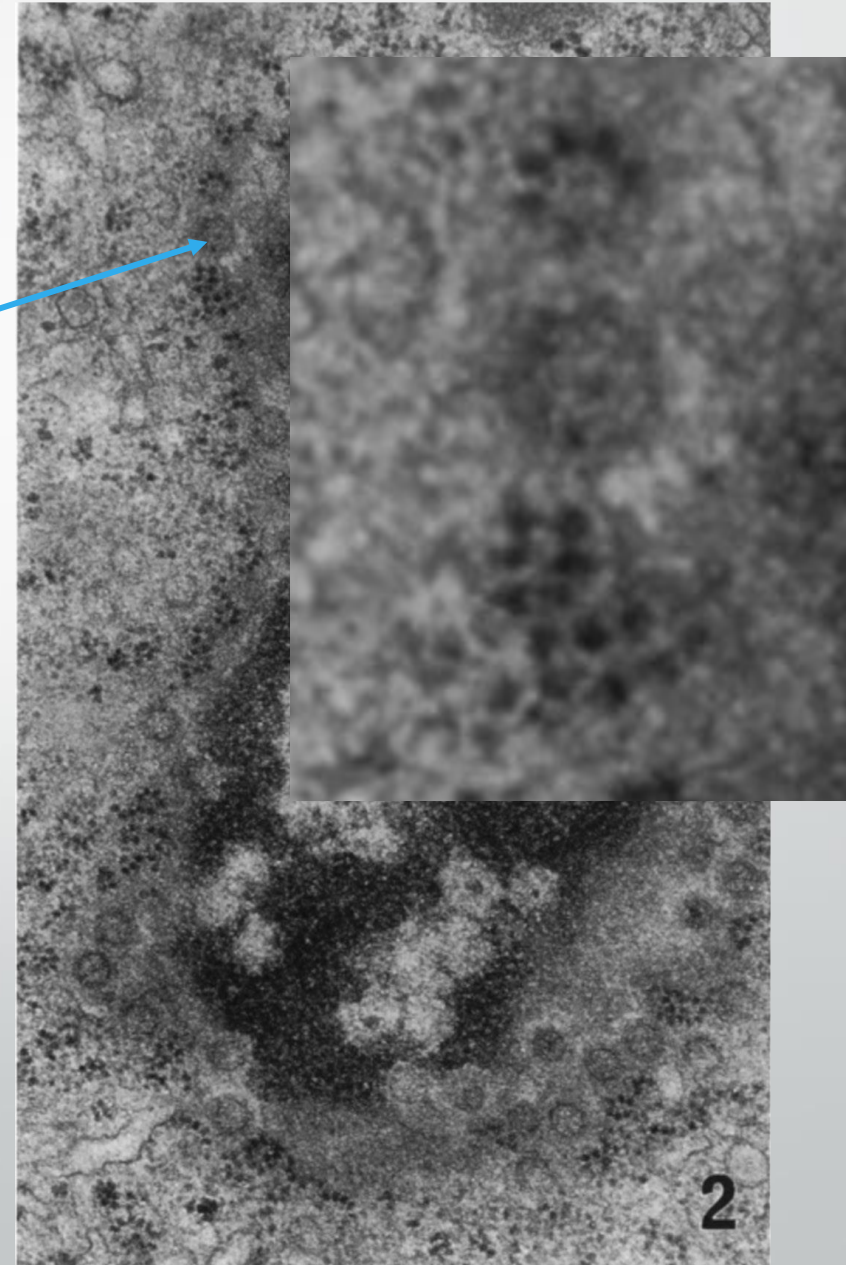


pyknosis



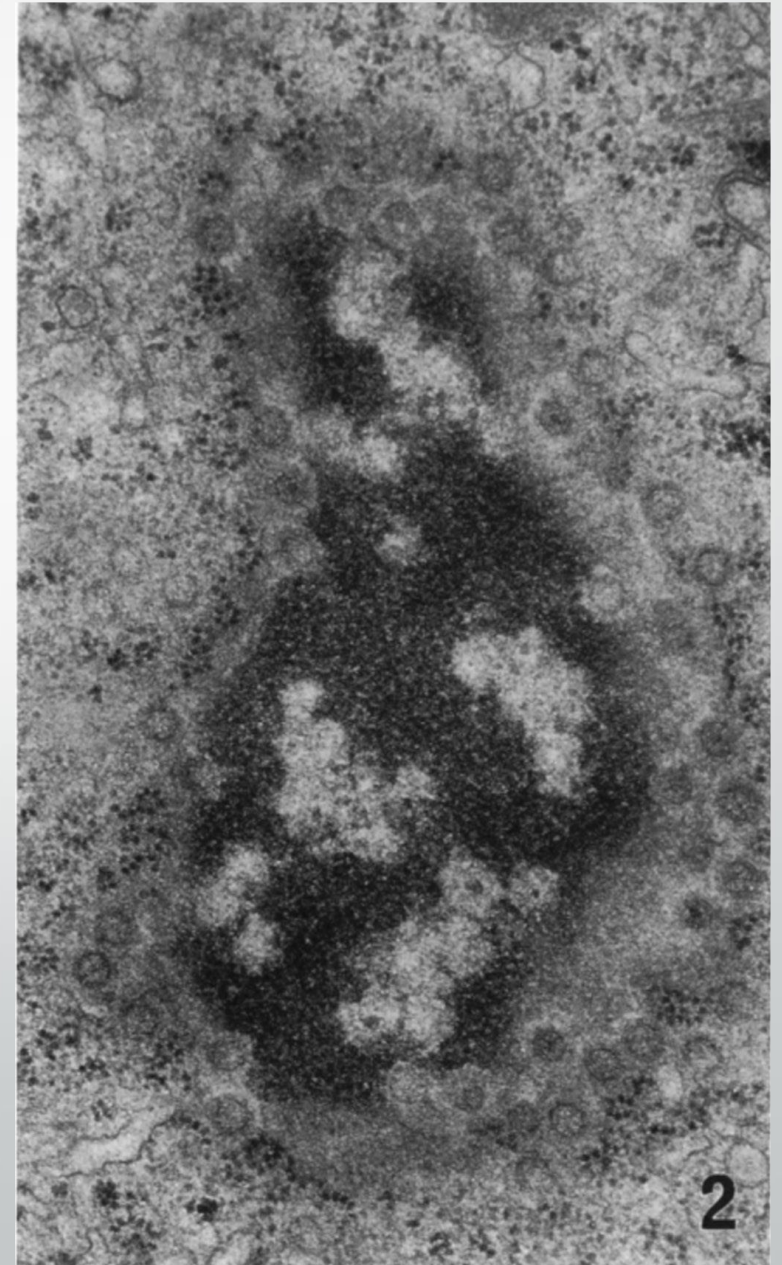
rat hepatocyte nucleus showing
en face view of nuclear pores

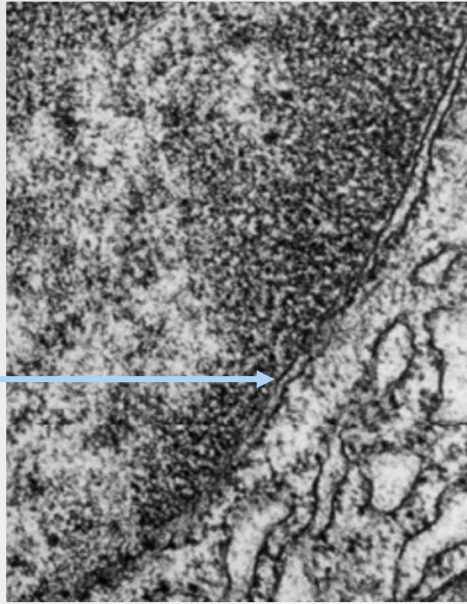
- Plate 1.19, Figure 2: What is the significance of the central dot seen in the en face view of nuclear pores, and what does it represent structurally?



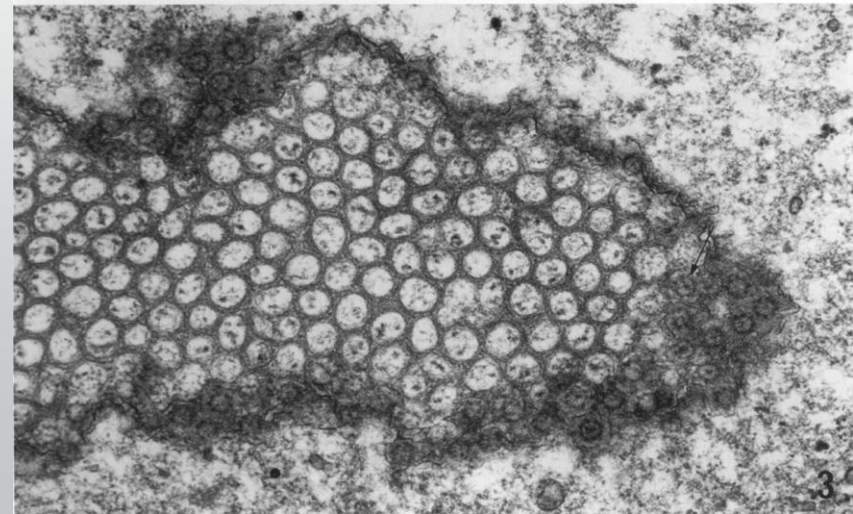
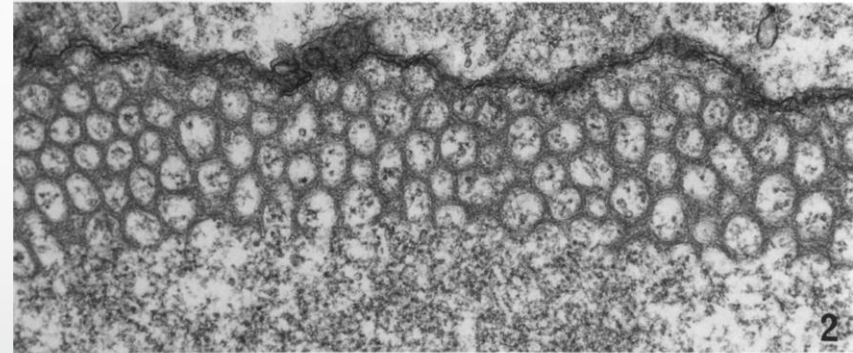
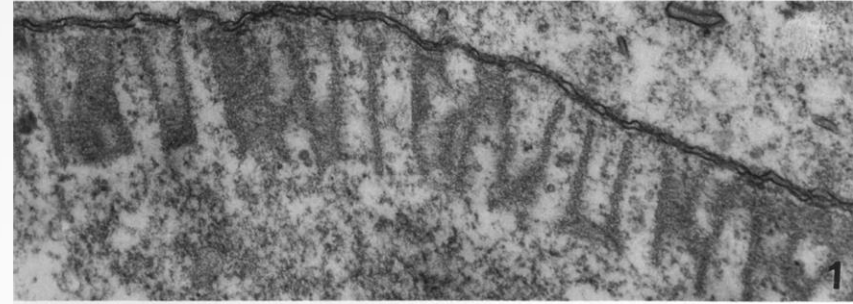
- The central dot in the en face view of nuclear pores represents the central transporter, crucial for selective transport between the nucleus and cytoplasm. (Plate 1.19, Figure 2)

rat hepatocyte nucleus showing
en face view of nuclear pores





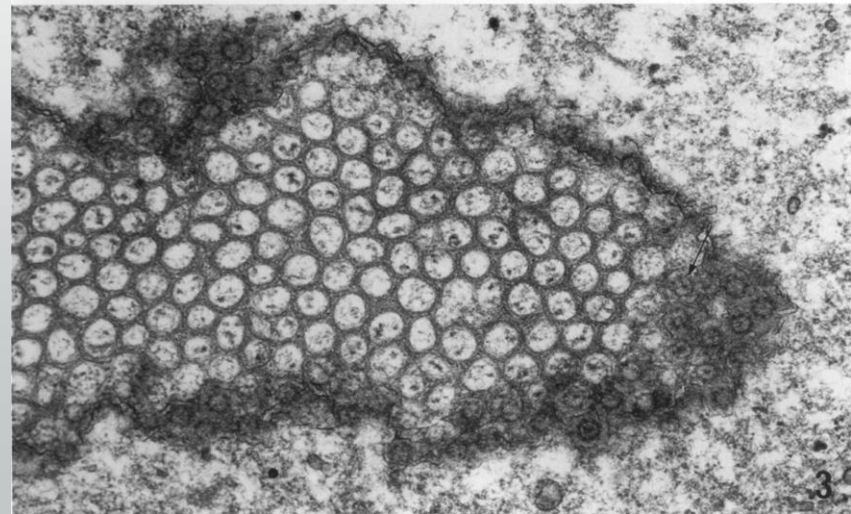
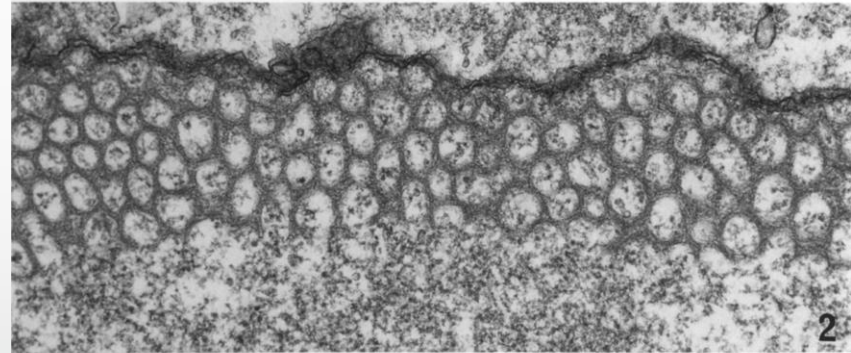
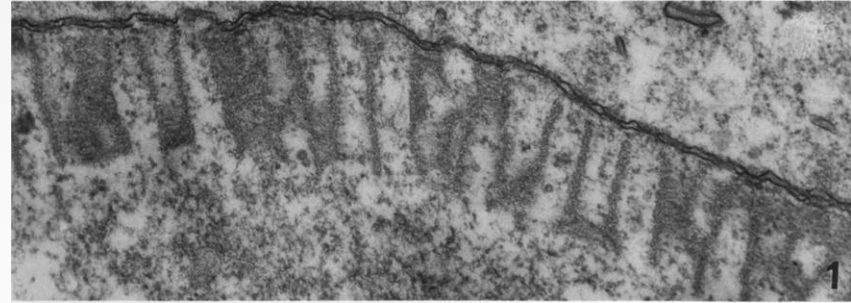
nuclear lamina in *Amoeba proteus*



- Plate 1.26, Figure 2: What does the honeycomb pattern of the nuclear lamina in *Amoeba proteus* suggest about its structural organisation and function?

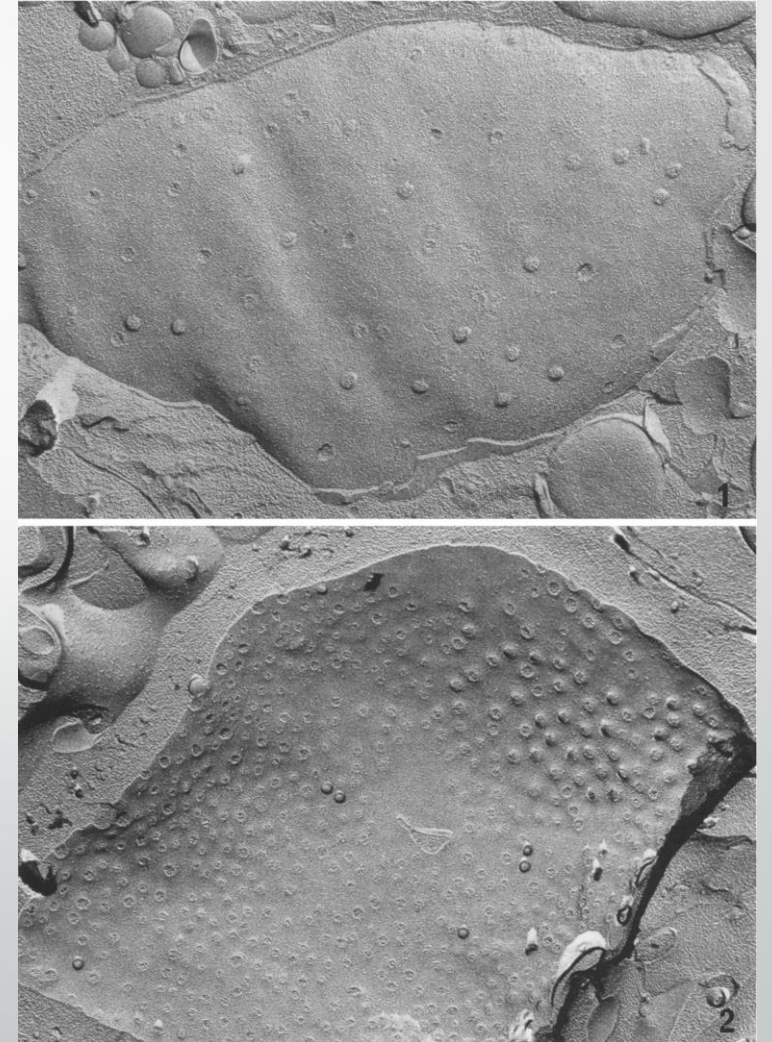
- The honeycomb pattern of the nuclear lamina in *Amoeba proteus* suggests a highly organised and flexible structure, supporting the dynamic nature of the nucleus. (Plate 1.26, Figure 2)

nuclear lamina in *Amoeba proteus*



- Plate 1.21: What might explain this variation in nuclear pore density?

freeze-fractured specimens from a normal mouse small intestine



- The number of nuclear pores could correlate with the metabolic activity of the cell (to facilitate rapid exchange of RNA and proteins between the nucleus and cytoplasm) or the type of cell (Plate 1.21)

freeze-fractured specimens from a normal mouse small intestine

