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Cell Biology: Membrane-Bound Organelles

Printable Flashcards — Pre-Med Biology

Master the structure and function of mitochondria, ER, Golgi, lysosomes, peroxisomes, and vacuoles with high-yield comparisons.

70 cards — Print double-sided, flip on long edge, then cut along dashed lines.

70 cards — Printable Flashcards

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1

What does "membrane-bound organelle" actually mean?

2

Name 5 membrane-bound organelles in a typical animal cell.

3

Which of these is NOT membrane-bound: mitochondrion, Golgi, ribosome, lysosome?

4

What's the endomembrane system? And what's the classic exclusion?

5

Nucleus: what's the main job?

6

Nuclear envelope: single membrane or double?

7

What do nuclear pores actually do?

8

Where is rRNA mostly made and ribosome subunits assembled?

2

Nucleus, mitochondria, rough ER, Golgi apparatus, lysosomes (also: peroxisomes, endosomes, vesicles).

1

An organelle that has its own lipid membrane around it, so it forms a separate compartment inside the cell.

4

The trafficking network: nuclear envelope + ER + Golgi + endosomes + lysosomes + vesicles + plasma membrane. The classic exclusion: mitochondria (and chloroplasts) are NOT part of it.

3

Ribosome

6

Double membrane (inner + outer), with nuclear pores.

5

Keep the DNA safe and control gene expression (what gets transcribed, when, and how much).

8

Nucleolus

7

They control what goes in and out of the nucleus (RNAs out, many proteins in).

9

The nuclear envelope is continuous with the {{c1::rough ER}}.

10

Rough ER vs smooth ER: what's the quick difference?

11

A protein that will be secreted ends up getting made where?

12

Why does rough ER look "rough" under a microscope?

13

Signal peptide: what is it and why do exams care?

14

Proteins for secretion usually enter the ER {{c1::while they are being translated}} ({{c2::co-translational}} import).

15

Smooth ER: name two high-yield functions.

16

What is the sarcoplasmic reticulum?

10

Rough ER handles proteins for secretion/membranes; smooth ER makes lipids, detoxifies drugs, and stores Ca^{2+}.

9

The nuclear envelope is continuous with the rough ER.

12

Because ribosomes are attached to its cytosolic surface.

11

On ribosomes attached to rough ER, entering the ER lumen as it's being made.

14

Proteins for secretion usually enter the ER while they are being translated (co-translational import).

13

A short amino-acid "address label" that sends a growing protein to the ER (via SRP) so it can enter the secretory pathway.

16

A specialized smooth ER in muscle cells that stores and releases Ca^{2+} to trigger contraction.

15

Lipid/steroid synthesis and drug detoxification (also Ca^{2+} storage).

17

What key processing steps happen in the ER?

18

Unfolded Protein Response (UPR): what's the idea?

19

Golgi apparatus: what's its main job?

20

Golgi: cis vs trans side (which is which)?

21

In the Golgi, cargo generally moves from the {{c1::cis}} side to the {{c2::trans}} side.

22

Quick trap: what does ER do that Golgi does NOT (and vice versa)?

23

How do lysosomal enzymes get sent to lysosomes instead of secreted?

24

Lysosome: what is it, in plain language?

18

Too many misfolded proteins in the ER -> the cell boosts chaperones, slows new protein production, and can trigger apoptosis if the stress doesn't stop.

17

Protein folding/quality control and early glycosylation (especially N-linked glycosylation).

20

Cis face receives from ER. Trans face ships out to final destinations.

19

Modify, sort, and package proteins/lipids that came from the ER.

22

ER: makes/folds proteins entering the secretory pathway. Golgi: modifies further and sorts/packages them for delivery.

21

In the Golgi, cargo generally moves from the cis side to the trans side.

24

An acidic compartment full of enzymes that digest macromolecules.

23

They get a mannose-6-phosphate (M6P) tag in the Golgi.

25

Why don't lysosomal enzymes destroy the whole cell?

26

What pump keeps lysosomes acidic?

27

Endosome vs lysosome: what's the clean difference?

28

A common route is: plasma membrane -> {{c1::early endosome}} -> {{c2::late endosome}} -> {{c3::lysosome}}.

29

Autophagy: what happens, and which organelle finishes the job?

30

Lysosome vs proteasome: don't mix these up. Who degrades what?

31

Peroxisome: what does it do?

32

Peroxisome vs lysosome: fastest way to tell them apart?

26

V-type H^+-ATPase (proton pump)

25

They work best at low pH (~5). The cytosol is near neutral, so if enzymes leak they're much less active.

28

A common route is: plasma membrane -> early endosome -> late endosome -> lysosome.

27

Endosome sorts incoming material; lysosome is where digestion happens.

30

Proteasome breaks down ubiquitin-tagged proteins in cytosol/nucleus. Lysosome breaks down endocytosed material, membrane proteins, and organelles (via autophagy).

29

The cell wraps its own damaged stuff in an autophagosome and delivers it to lysosomes for breakdown.

32

Peroxisome = oxidation + H2O2/catalase. Lysosome = acidic digestion with hydrolytic enzymes.

31

Runs oxidation reactions (including breakdown of very-long-chain fatty acids) and detoxifies hydrogen peroxide using catalase.

33

Peroxisomes contain {{c1::catalase}} to break down {{c2::hydrogen peroxide (H_2O_2)}}.

34

Mitochondrion: core function?

35

Mitochondria have how many membranes, and why does that matter?

36

What's in the mitochondrial matrix? Name two things.

37

Why do mitochondria have their own DNA?

38

Most mitochondrial proteins are made where?

39

Mitochondria and apoptosis: what's the link?

40

The electron transport chain is located on the {{c1::inner mitochondrial membrane}}.

34

Make ATP during cellular respiration, mainly via oxidative phosphorylation.

33

Peroxisomes contain catalase to break down hydrogen peroxide (H_2O_2).

36

Citric acid cycle enzymes and mitochondrial DNA/ribosomes.

35

Two membranes. The inner membrane holds the electron transport chain and lets the cell build a proton gradient to make ATP.

38

In the cytosol from nuclear genes, then imported into mitochondria.

37

Because they likely evolved from bacteria living inside an ancestral eukaryotic cell (endosymbiosis).

40

The electron transport chain is located on the inner mitochondrial membrane.

39

Mitochondria can release cytochrome c, which helps activate caspases and triggers programmed cell death.

41

Chloroplast: main job?

42

In a chloroplast, what's a thylakoid?

43

In chloroplasts, the {{c1::light reactions}} occur in the {{c2::thylakoid membrane}}.

44

Why are chloroplasts NOT part of the endomembrane system?

45

Plant central vacuole: what does it do?

46

Contractile vacuole (protists): why do they need it?

47

Vesicles: what's their job?

48

Membrane orientation trap: after secretion, the side that faced the ER lumen ends up where?

42

A membrane sac where the light reactions occur.

41

Photosynthesis: convert light energy into chemical energy and build sugars from CO_2.

44

Like mitochondria, they came from endosymbiosis and import proteins differently. They don't do ER^{-}>Golgi vesicle trafficking.

43

In chloroplasts, the light reactions occur in the thylakoid membrane.

46

To pump out extra water so the cell doesn't burst in fresh water.

45

Stores water/solutes, helps with waste storage, and maintains turgor pressure (keeps the cell firm).

48

Facing outside the cell (extracellular side).

47

Move cargo (proteins/lipids) between organelles and to/from the plasma membrane.

49

Three vesicle coat proteins to know: COPII, COPI, clathrin. What do they usually do?

50

{{c1::COPII}} vesicles usually carry cargo from {{c2::ER}} to {{c3::Golgi}}.

51

{{c1::COPI}} vesicles typically mediate {{c2::Golgi -> ER}} retrograde transport.

52

How do ER-resident proteins avoid getting secreted by accident?

53

Which organelles have their own DNA (besides the nucleus)?

54

Why does the cell bother with compartments instead of one big soup?

55

High-yield: where are most membrane lipids made?

56

Which organelle is the main "modify/sort/package" station for proteins?

50

COPII vesicles usually carry cargo from ER to Golgi.

49

COPII: ER -> Golgi. COPI: Golgi -> ER (and within Golgi). Clathrin: plasma membrane -> endosome and Golgi -> endosome.

52

They have retention/retrieval signals (classic: KDEL) that bring them back to the ER if they reach the Golgi.

51

COPI vesicles typically mediate Golgi -> ER retrograde transport.

54

Because different reactions need different conditions, and compartments make processes faster and easier to control.

53

Mitochondria (and chloroplasts in plants/algae).

56

Golgi apparatus

55

Mainly in the smooth ER.

57

A cell that secretes a lot of protein will have a lot of which organelles?

58

A cell that makes lots of steroid hormones will have lots of what?

59

Why is the inner mitochondrial membrane folded into cristae?

60

Double-membrane organelles: which ones, and what does that suggest?

61

Micrograph ID: a stack of flattened sacs with small vesicles budding off = ?

62

Micrograph ID: a membrane network covered in tiny dots = ?

63

Concept check: why don't lysosomes just bud directly from the ER?

64

Receptor recycling: after receptor-mediated endocytosis, where do receptors often go?

58

Smooth ER (and often plenty of mitochondria too).

57

Rough ER + Golgi + lots of secretory vesicles.

60

Nucleus, mitochondria, chloroplasts. It can suggest endosymbiosis (mitochondria/chloroplasts) or a protective envelope (nucleus).

59

To increase surface area for the electron transport chain and ATP synthase, so the cell can make more ATP.

62

Rough endoplasmic reticulum

61

Golgi apparatus

64

Back to the plasma membrane after sorting in early endosomes.

63

Because lysosomal enzymes need Golgi processing/sorting (like M6P tagging) and delivery through endosomes before becoming functional lysosomes.

65

The {{c1::outer nuclear membrane}} is continuous with the {{c2::ER}} and can have {{c3::ribosomes}} attached.

66

Main Ca^{2+} storage organelle in many cells?

67

If a question mentions "very long chain fatty acid" oxidation, think which organelle?

68

If a question mentions "acid hydrolases" and low pH, think which organelle?

69

Why do secretory cells have a big Golgi?

70

Which organelle is basically packed with digestive enzymes?

66

Smooth ER (called sarcoplasmic reticulum in muscle).

65

The outer nuclear membrane is continuous with the ER and can have ribosomes attached.

68

Lysosome.

67

Peroxisome.

70

Lysosome.

69

Because they are constantly modifying and sorting proteins into vesicles for export.