

MOLECULAR BIOLOGY

QUESTIONS HS 2011

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Please be aware that the following exam questions are only written down out of the memory of examined students. So don't count on the completeness and accuracy.

- How does the cell cycle control work?
 - Which proteins are involved?
 - What do they do in the cell?
 - How can you recognize cell in the S-phase? → BrdU
 - What properties do stem cells have?
 - What are iPS cells?
 - How are they made?
 - Which medical application could they have?
 - What are the factors needed to get iPS cells? → transcription factors
 - What are transcription factors?
 - How do they work?
 - Binding motifs? → helix-turn-helix, zinc fingers, leucine zipper
 - How do reporter genes work?
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- Zeichne eine Säugerzelle so, wie sie unter dem Lichtmikroskop erscheint.
 - Was sind die Hauptunterschiede zwischen der Plasmamembran und der Kernhülle?
 - Was wird in den Kern importiert was wird exportiert und wie funktioniert das genau?
 - Ran-cycle zeichnen.
 - Was für Moleküle werden durch die Plasmamembran transportiert und wie funktioniert das?
 - Beispiele ATP-Synthase und Glucosetransporter erklären.
 - Ein Schema über Umwelteinflüsse auf Krebsentstehung erklären (Alberts Abb. 20-20)
 - Ames-Test erklären.
 - "Wo" wirken Mutagene?
 - Unterschiede von Oncogen, Protooncogen, Tumorsuppressorgen erklären.
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- How is cell-stability sustained? → Microtubules, Actin fibers, intermediate filaments
- How are Microtubules built on? → Tubulin units, ATP-Cap, Catastrophe and Rescue
- How to unwind DNA during Mitosis?
 - Topoisomerase I to relieve stress, cuts one strand
 - Topoisomerase II needed to unwind Chromosomes during Mitosis, cuts both strands

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- How do Microtubules work, what's their role during Mitosis? → Astrale, Kinetochore and Overlapping Microtubules, separating
 - How is the cell-cycle controlled? → Cycline dependent Kinases, 3 Checkpoints
 - How does the DNA Proofreading? (first checkpoint) p53 will activate p21 which inhibits CdK
 - Picture, how is this produced?
(X)
→ Thymin analog: Br-U Brom-Uracil. Only added for a short time! So only cells which replicated at this moment inserted the Brom Uracil, elsehow all cells would insert Br-U and look the same

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- Picture of nuclear pore: explain what you see and explain ran cyce.
 - Where else do G-Proteins play a role?
 - Explain Ras/MAPK pathway
 - Cancer: tumor suppressor and oncogenes, loss- and gain of function, dominant recessiv, examples
 - Cell cycle: draw cycle, explain phases and check points
 - How do checkpoints work → cdKs
 - Trick they used to find cdKs → conditional Mutations
 - How did they find cyclins ?→ biochemically