

**Exam MOL3015
Nanomedicine II - Therapy**

Friday June 11th 2010, 9.00 am - 13.00 pm

ECTS credits: 7.5

Number of pages (included front-page):

Examination support: English/ Norwegian or Norwegian/ English dictionary
Answers can be in Norwegian or English

Contact person during the exam:
Øyvind Halaas, 97790870

Exam results: July 2nd

Examination results are announced on <http://studweb.ntnu.no/>

Please do not exceed to indicated lengths. Illustrations do not count. Letter size will be considered. Weight of questions is listed. Good luck.

1) Biomaterials used for implantables and in vivo tissue engineering (20 pts)

- a) How has our understand by biocompatibility changed later years? (5 pts, 1/2 page)
- b) List the general prerequisites for any biomaterial to be clinically useful. (5 pts, 1/2 page)
- c) For tissue engineering and the use of biomaterials in combination with cells - what types of material characteristics are important to consider and why? (10 pts, 1 page)

2) Drug delivery systems (40 pts)

Most drug targets are intracellular posing a problem since the lipid bilayer membranes of cells are largely impermeable.

- a) What are the cellular uptake mechanisms and what are the approximate particle sizes these routes of internalization can handle? (10pts, 1 page)
- b) What mechanisms may be responsible for disruption and release of content to cytosol from internalized micro- and nanosized drug delivery vehicles (10pts, 1 page)
- c) What classes of drug delivery vehicles are available for researchers, and what are their limitations and advantages? (20pts, 2-4 pages)

4) Theragnostics (15pts)

What are contrast agents for ultrasound made of? How can ultrasound aid in drug delivery?