

Contrast Agents and Biomarkers for Imaging and Therapy (E092852)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size (nominal values; actual values may depend on programme)
Credits 3.0 Study time 90 h Contact hrs 30.0 h

Course offerings and teaching methods in academic year 2020-2021

| | | | | |
|----------------|---------|------|-------------------------------|--------|
| A (semester 1) | English | Gent | self-reliant study activities | 5.0 h |
| | | | microteaching | 5.0 h |
| | | | lecture | 25.0 h |

Lecturers in academic year 2020-2021

| | | |
|--------------------|------|--------------------|
| Vanhove, Christian | TW06 | lecturer-in-charge |
| Devoogdt, Nick | VUB | co-lecturer |

Offered in the following programmes in 2020-2021

| | crdts | offering |
|---|-------|----------|
| Master of Science in Biomedical Engineering | 3 | A |
| International Master of Science in Biomedical Engineering | 3 | A |
| Master of Science in Biomedical Engineering | 3 | A |

Teaching languages

English

Keywords

Molecular Imaging
Biomarkers
Radiopharmaceuticals
Nanoparticles
Optical Imaging (Bioluminescence & Fluorescence)

Position of the course

Contrast agents, also called imaging probes, radio-pharmaceuticals, tracers or dyes, are used in conjunction with medical imaging devices such as magnetic resonance imaging (MRI), computed tomography (CT), optical imaging, and nuclear imaging technologies like position emission tomography (PET) and single-photon emission computed tomography (SPECT). Contrast agents are used to provide the necessary signals to these image devices (SPECT, PET), or to improve signals to these imaging devices (CT, MRI).

Until recently, methods for diagnostic imaging provide predominantly anatomical information and/or functional information at a macroscopic level. The current diagnostic imaging revolution (=molecular imaging) change into a more disease-oriented one. In contrast to classical diagnostic imaging, molecular imaging sets forth to probe molecular and/or cellular abnormalities that are the basis of disease rather than to image the end results of these molecular alterations.

The importance of molecular targets, and probes aimed at these specific targets, for diagnosis and therapy has been recognized and different imaging procedures are introduced to visualize and quantify these molecular processes.

Contents

- The importance of contrast in medical imaging
- Evolution of diagnostic imaging
 - Anatomical imaging
 - Functional imaging
 - Multi-modality imaging
 - Molecular imaging
 - Small animal imaging

- Introduction to nano-particles
 - The importance of imaging biomarkers
 - Overview and use of the most important radiopharmaceuticals
 - Anti-body imaging
 - In-vivo optical Imaging
 - Bioluminescence imaging
 - Fluorescence imaging
 - Reporter gene imaging
 - Preclinical study examples
- Microteaching: A recent publication in the field of molecular imaging should be presented in 15-20min to the fellow students. The presentation will be evaluated by the lecturer and fellow students. The presentation is followed by a session of questions. Students are encouraged to ask questions.

Initial competences

Physical principles of different medical imaging techniques

Final competences

- 1 Critical evaluation of the advantages and disadvantages of the different image modalities that are available within the field of molecular imaging
- 2 Capability to understand the physical principles behind optical imaging
- 3 Capability to understand the different classes of imaging probes employed in molecular imaging
- 4 Critical evaluation of the advantages and disadvantages of the different classes of contrast agents and imaging probes
- 5 Relate different contrast agents and imaging probes to different imaging modalities
- 6 Comparison of different contrast agents and imaging probes

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, microteaching, self-reliant study activities, online lecture

Extra information on the teaching methods

Classroom lectures
 Independant work: Discuss a publication
 Visit small-animal imaging facility

Learning materials and price

Course "Contrast Agents and Biomarkers for Imaging and Therapy"

References

- Spekowius, Gerhard and Wendler, Thomas, Advances in healthcare technology: shaping the future of medical care, Dordrecht : Springer, 2007. ISBN: 978-1402043833
- Semmler, Wolfgang and Schwaiger, Markus and Blankenberg, F., Molecular imaging, Berlin : Springer, 2008. ISBN: 978-3-540-72717-0
- Semmler, Wolfgang and Schwaiger, Markus and Blankenberg, F., Molecular imaging, Berlin : Springer, 2008. ISBN: 978-3-540-77449-5
- Kiessling, Fabian. and Pichler, Bernd J., Small animal imaging: basics and practical guide, Berlin ; London : Springer, 2011. ISBN: 978-3-642-12944-5 Location: TBBS.RC.2011
- Weissleder, Ralph., Molecular imaging: principles and practice, Shelton, Conn. : P1661287--USA, 2010. ISBN: 9781607950059 Location: TBBS.QP519.92.2010

Course content-related study coaching

Support through e-learning platform the electronic learning environment and e-mail

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Oral examination

Examination methods in case of periodic evaluation during the second examination period

Oral examination

Examination methods in case of permanent evaluation

Skills test

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

Extra information on the examination methods

Oral examination with written preparation.

Because of COVID19 modified forms of work can be rolled out if necessary.

Calculation of the examination mark

Oral examination = 15/20

Presentation of a publication (journal club) = 5/20