

Seminars & lectures in

MEDICINAL CHEMISTRY I

(summer semester of the 2nd year of study)

•your teachers:

- doc. PharmDr. Oldřich Farsa, PhD. (7 times)
- Mgr. Aleš Kroutil (ones)
- PharmDr. Tomáš Goněk, PhD. (3 times)

Course timetable

Academic Year: 2011/2012

Semester: LS

Course: 3150/FAFB1

Name: Medicinal Chemistry I

	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	
	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	
Mon																
Tues	07:30-8:15 44-37 Farsa	08:30-10:45 44-37 Farsa														
Wed																
Thurs																
Fri																
Sat																
Sun																

Key: Lecture Tutorial Seminar

Seminars in Medicinal Chemistry (MC)

- **in seminar room at the basement of Pharmacy Pavilion (door No. 37)**
- **every Tuesday 7.30 – 8.12** (except May 1st and 8th which are state holidays); **seminars are compulsory!**
- presentations: 29 topics randomly taken from both general and special MC
- length of presentation at least 15 min; discussion and teacher's evaluation will follow
- topics will be balloted and presented according to the alphabetic order of students in the list; 3 topics per one seminar
- every presentation will be created and presented in *.ppt (PowerPoint), *.pdf (Adobe Reader) or *.odp (OpenOffice.org Impress) formats
- every particular presentation will be evaluated by the teacher and will given 0 – 10 marks, accuracy, integrity, contemporarity, comprehensibility and lucidity will be the evaluation criteria
- a student with 7 marks or more will pass the seminars successfully otherwise he/she will write an additional test from the whole matter of seminars
- seminars will be closed by the final credit test

Requirements on a structure of a presentation (with exception of topic History of MC)

- basic characterization of activity of compounds in a particular group
- common structure or structures of compounds (if possible)
- SAR = (qualitative) structure-activity relationships: structural fragments which are essential for the activity, additional moieties or substituents and how they influence the activity
- mechanism of action
- significant chemical properties (namely those which are important for activity, application or stability)
- overview of basic compounds with their INN (and/or USAN, BAN) names
- list of used literature resources

Instruments for drawing of structure formulas

- Structural formula editors are strongly recommended for structural formulas instead of common graphic programs or simple copying of structures as pictures
- **Freeware structural formulas editors**
 - ACD ChemSketch: version 12 now actual – download from www.acdlabs.com after registration
 - supports several structural formulas formats
 - enables „translation“ of SMILES codes (text files which encode chemical structure in one line) into formulas
 - OLE function: inserting of formulas directly from within presentation editor: Insert – Object – (OLE Object) – ACD ChemSketch; after finishing the structure File – Update - Close and return to app name
 - ISIS Draw: popular, but download and support discontinued (the last version 2.5), replaced with Symyx Draw, which is not fully integrated into all the presentation editors
- ChemDraw: payed professional editor, installed on some computers in computer room in opposite of this seminar room

Where to find particular information?

- recommended literature (listed thereafter)
- data bases:
 - ChemId Plus at chem.sis.nlm.nih.gov (provided by U.S. National Library of Medicine), freely accessible, enables searching of biologically active compounds by chemical, INN (USAN, BAN ...) or trade name or CAS number, or by chemical structure or substructure
 - possibility of transfer of structures into structural formulas (and presentations) editors by means of SMILES codes, molfiles or directly into ISIS Draw by means of Chime utility
 - linked with Medline, FDA and other data bases
 - Medline at <http://www.ncbi.nlm.nih.gov/pubmed/> (provided by U.S. National Library of Medicine), freely accessible, enables searching of medical journals including those from the field of MC, gives abstracts
 - links to many fulltexts; some of them accessible by means of University subscription of particular journals or freely

Where to find particular information? (Data bases continued)

- Web of Knowledge – payed data base of article abstracts from renowned journals from all the fields of science provided by Thomson Reuters accesible at <http://apps.webofknowledge.com> or via <http://sis.vfu.cz/eiz/placene/>
- Reaxys Data Base – searchable chemical data base originated from Beilstein's Handbook of Organic Chemistry available from within University network at <https://www.reaxys.com> or via <http://sis.vfu.cz/eiz/placene/>
 - search by structures, chemical names, CAS or similar BRN (now Reaxys Nos) numbers, physical properties and many other
 - links to full texts of articles

Where to find particular information? (Data bases continued)

- SciFinder – a data base form of Chemical Abstracts (CA), the oldest chemical referate journal of the world
 - published by American Chemical Society
 - CA Service, which is part of its Editorial Board, has been giving the unique CAS numbers to all known (and described) compounds
 - search by structures, chemical names, CAS numbers, physical properties, author names and many other
 - links to full texts of articles including patents
 - **not freely accessible**; limited number of accesses at the University only

Recommended literature

Printed books in English suitable for your study available in the Central University Library at the Study and Information Centre

- activated ISIC as a reader's identity card needed
- Basic literature:
 - Ashutosh Kar: Medicinal Chemistry. Third edition. Anshan, Tunbridge Wells, UK, 2006
- Complementary
 - Camille Georges Wermuth: The practice of Medicinal Chemistry. Third Edition, Elsevier, 2008

Recommended literature - continued

Resources in English available via faculty network in electronic form at <http://sis.vfu.cz/eiz/e-books/ebooklist.html>:

- Basic:
 - János Fischer, C. Robin Ganelin (eds.): Analogue-based Drug Discovery. ISBN: 3-527-31257-9. Willey-VCh, Weinheim, 2006
 - further referred as Fischer 2006
 - Camille G. Wermuth: The Practice of Medicinal Chemistry (Second Edition). ISBN: 978-0-12-744481-9. Elsevier, 2003
- Complementary:
 - R.S. Vardanyan and V.J. Hruby: Synthesis of Essential Drugs. ISBN: 978-0-444-52166-8. Elsevier, 2006
 - Rick Ng: Drugs: From Discovery to Approval, Second Edition. ISBN: 978-0-470403587. John Wiley & Sons, Inc., 2009
 - further referred as Rick 2009
 - Walter Sneader: Drug Discovery. A History. ISBN 978-0-471-89979-2. John Wiley & Sons, Inc., 2005
 - further referred as Sneader 2005
 - James Devillers: Neural Networks in QSAR and Drug Design. ISBN: 978-0-12-213815-7. Elsevier, 1996

Topics of your choice for your presentations, their scheduled dates and recommended literature

1. Platinum Antineoplastics (Fischer 2006 Chapter 19 pp. 385-394; Kelland L., Nature Reviews/Cancer **7**, 573 – 583 (2007))
2. Anti-HIV Drugs (Mehellou Y., De Clerq E., J. Med. Chem. **53**, 521 – 538 (2010))
3. History of Medicinal Chemistry (Rick 2009 Appendix 1 pp. 391 – 397; Sneader 2005)
4. New Drugs for Insomnia (Hardeland R., Neuropsychiatric Disease and Treatment 2009:5 341–354)
5. Drugs for Cytomegalovirus Diseases (Biron K. K., Antiviral Research 71 (2006) 154–163; Mercorelli B. et al., Rev. Med. Virol. 2008; **18**: 177–210)
6. Opioid Receptors Ligands (Fischer 2006 Chapter 14 pp. 259-296)
7. H₁-Antihistamines (Fischer 2006 Chapter 21 pp. 401 - 418)
8. Stigmines (Fischer 2006 Chapter 15 pp. 277 - 295)
9. Bisphosphonates (Fischer 2006 Chapter 18 pp. 371 - 384)
10. Statins (Fischer 2006 Chapter 7 pp. 137 - 155)
11. Dihydropyridines (Edraki N. et al., Drug Discovery Today **14**, 1058 – 1066 (2009))
12. Potential Drugs acting on H₃-Histamine Receptor (Berlin M. et al., J. Med. Chem. **54**, 26 – 53 (2011))
13. Anti-ageing drugs (Kapoor V. K. et al., Drug Discovery Today **14**, 899 – 903 (2009))
14. H₂-Receptor Histamine Antagonists (Fischer 2006 Chapter 4 pp. 69 - 80)

15. Organic nitrates for coronary heart disease

Resource: János Fischer, C. Robin Ganelin (eds.): Analogue-based Drug Discovery. ISBN: 3-527-31257-9. Willey-VCh, Weinheim, 2006, chapter 10 pp. 247-268 available in electronic form at <http://sis.vfu.cz/eiz/e-books/ebooklist.html>

16. Proton pump inhibitors. Resource: János Fischer, C. Robin Ganelin (eds.):

Analogue-based Drug Discovery. ISBN: 3-527-31257-9. Willey-VCh, Weinheim, 2006, chapter 3 pp. 115-136 available in electronic form at <http://sis.vfu.cz/eiz/e-books/ebooklist.html>

17. Calcium antagonists. Resource: János Fischer, C. Robin Ganelin (eds.):

Analogue-based Drug Discovery. ISBN: 3-527-31257-9. Willey-VCh, Weinheim, 2006, chapter 7 pp. 181-192 available in electronic form at <http://sis.vfu.cz/eiz/e-books/ebooklist.html>

18. Clozapine and its analogues for treatment of schizophrenia. Resource:

János Fischer, C. Robin Ganelin (eds.): Analogue-based Drug Discovery. ISBN: 3-527-31257-9. Willey-VCh, Weinheim, 2006, chapter 13 pp. 297-313. available in electronic form at <http://sis.vfu.cz/eiz/e-books/ebooklist.html>

19. Antibacterial quinolones. Resource: János Fischer, C. Robin Ganelin (eds.):

Analogue-based Drug Discovery. ISBN: 3-527-31257-9. Willey-VCh, Weinheim, 2006, chapter 17 pp. 315-370 available in electronic form at <http://sis.vfu.cz/eiz/e-books/ebooklist.html>

20. Selective Beta-Adrenergic Receptor Blocking Agents. Resource: János Fischer, C. Robin Ganelin (eds.): Analogue-based Drug Discovery. ISBN: 3-527-31257-9. Willey-VCh, Weinheim, 2006, chapter 8 pp. 193-226 available in electronic form at <http://sis.vfu.cz/eiz/e-books/ebooklist.html>
21. Biologic therapeutics: monoclonal antibodies which target EGFR. Resource: Friedländer E., Barok M., Szöllosi J., Vereb G.: ErbB-directed immunotherapy: Antibodies in current practice and promising new agents. *Immunology Letters* 116, 126 (2008)
22. Biologic therapeutics: Antibody-based therapeutics which were aims of interest in 2011. Resource: Reichert J. M.: Antibody-based therapeutics to watch in 2011. *mAbs* 3,76 (2011)
23. Drugs for treatment of MRSA infections. Resource: Angelo Pan, Silvia Lorenzotti, Alessia Zoncada: Registered and Investigational Drugs for the Treatment of Methicillin-Resistant *Staphylococcus aureus* Infection. *Recent Patents on Anti-Infective Drug Discovery*, 3, 10-33 (2008)
24. Pegylated interferones α in therapy. Resource: Bruno R., Sacchi P., Cima S., Maiocchi L., Novati S., Filice G., Faggioli S.: Comparison of peginterferon pharmacokinetic and pharmacodynamic profiles. *Journal of Viral Hepatitis* 19, Suppl. 1, 33 (2012); doi:10.1111/j.1365-2893.2011.01519.x
25. Peptide and non-peptide hematopoietic growth factors. Resource: Steensma D. P.: Hematopoietic growth factors in myelodysplastic syndromes. *Seminars in Oncology*, 38, 635 (2011)
26. GLP-1 receptor agonists in the treatment of diabetes. Resource: Madsbad S., Kielgast U., Asmar M., Deacon C. F., Torekov S. S., Holst J. J.: An overview of once-weekly glucagon-like peptide-1 receptor agonists—available efficacy and safety data and perspectives for the future. *Diabetes, Obesity and Metabolism* 13, 394 (2011).

27. Small molecule tyrosine kinase inhibitors in treatment of cancer. Resource: Roy V., Perez E.A.: Beyond trastuzumab: small molecule tyrosine kinase inhibitors in HER-2-positive breast cancer. *Oncologist*. 14, 1061-9 (2009)
28. Insulin analogues. Resource: Sheldon B., Russell-Jones D., Wright J.: Insulin analogues: an example of applied medical science. *Diabetes, Obesity and Metabolism*, 11, 5, (2009)
29. Chemistry of drugs for treatment of attention deficit and hyperactivity disorders. Resource: Helmut Buschmann, José Luis Díaz, Jörg Holenz, Antonio Párraga, Antoni Torrens, José Miguel Vela (eds.): Antidepressants, Antipsychotics, Anxiolytics: From Chemistry and Pharmacology to Clinical Application. Part 4: Attention Deficit and Hyperactivity Disorders. Chapter 4.4.: Jörg Holenz, José Luis Díaz and Helmut Buschmann: *Chemistry*. 1183 – 1196. Wiley VCh, 2007;
<http://onlinelibrary.wiley.com/doi/10.1002/9783527619337.ch19/pdf>
30. Antituberculotics. Resource: Lynn G. Dover, Geoffrey D. Coxon: Current Status and Research Strategies in Tuberculosis Drug Development. *J. Med. Chem.* 2011, 54, 6157–6165; available at pubs.acs.org/jmc or via dx.doi.org/10.1021/jm200305q
31. Angiotensin-converting enzyme (ACE) inhibitors as antihypertensive agents. Resource: *Analogue-based Drug Discovery*. ISBN: 3-527-31257-9. Wiley-VCh, Weinheim, 2006, chapter 9 pp. 169-179
available in electronic form at <http://sis.vfu.cz/eiz/e-books/ebooklist.html>
32. Angiotensin receptor blockers as antihypertensive agents. Resource: *Analogue-based Drug Discovery*. ISBN: 3-527-31257-9. Wiley-VCh, Weinheim, 2006, chapter 8 pp. 157-168; available in electronic form at
<http://sis.vfu.cz/eiz/e-books/ebooklist.html>