

University of Florida

**Course GMS 5905/DEN 8290
(Revised Feb 3, 2017)**

RNA interference and microRNAs: from advances in cell biology to therapeutic applications in the treatment of human diseases

Schedule: all meetings Tuesday 2:00 pm, room D5-10, dental building

Date, time	Session/Topic	Paper presenters
First meeting Jan 10, 2017 Tuesday	Introduction to RNAi basics (Dr. EKL Chan)	
2 nd meeting Jan 17 Tuesday	miRNA-target mRNA prediction (Chan)	
3 rd meeting Jan 24 Tuesday	Methods in microRNA analyses (Dr. Thomas Schmittgen, Department of Pharmaceutics)	
4 th meeting Jan 31 Tuesday	Viral miRNA and function (Dr. Rolf Renne, Department of Molecular Genetics & Microbiology)	
5 th meeting Feb 7 Tuesday	Dominant miRNA in innate immune response (Chan)	
6 th meeting Feb 14 Tuesday	Introduction to RNAi therapy (Chan)	
7 th meeting Feb 21 Tuesday Paper #1	Scheel TK, Luna JM, Liniger M, Nishiuchi E, Rozen-Gagnon K, Shlomai A, Auray G, Gerber M, Fak J5, Keller I, Bruggmann R, Darnell RB, Ruggli N, Rice CM. A Broad RNA Virus Survey Reveals Both miRNA Dependence and Functional Sequestration. Cell Host Microbe. 2016 19:409-23 <i>Learning objective: Novel interaction of miRNA</i>	Primary: Secondary: Reader:
8 th meeting Feb 28 Tuesday Paper #2	Storchel PH, Thummler J, Siegel G, Aksoy-Aksel A, Zampa F, Sumer S, Schrott G. A large-scale functional screen identifies Nova1 and Ncoa3 as regulators of neuronal miRNA function. EMBO J. 2015;34:2237-54. <i>Learning objective: Complexity in miRNA regulatory mechanism</i>	Primary: Secondary: Reader:
9 th meeting March 7 Tuesday	Exosomes and their potential therapeutic applications (Dr. L. Shannon Holliday, Department of Orthodontics)	

10 th meeting March 14 Tuesday	Gene therapy using RNAi (Dr. Alfred S. Lewin, Department of Molecular Genetics & Microbiology)	
11 th meeting March 21 Tuesday	Deregulated miRNAs in (oral) cancer (Amani Harrandah, PhD Candidate, Department of Oral Biology)	
March 28 Tuesday	Reminder no meeting this week	
12 th meeting April 4 Tuesday Paper #3	Wu PH, Isaji M, Carthew RW. Functionally diverse microRNA effector complexes are regulated by extracellular signaling. Mol Cell. 2013;52:113-23. <i>Learning objective: Diversity in miRNA regulation</i>	Primary: Secondary: Reader:
13 th meeting April 11 Tuesday	Nanoparticles in RNAi-based therapy (Dr. Blanka Sharma, Department of Biomedical Engineering)	
14 th meeting April 18 Tuesday Paper #4	Valdmanis PN, Gu S, Chu K, Jin L, Zhang F, Munding EM, Zhang Y, Huang Y, Kutay H, Ghoshal K, Lisowski L, Kay MA. RNA interference-induced hepatotoxicity results from loss of the first synthesized isoform of microRNA-122 in mice. Nat Med. 2016;121:531-51. <i>Learning objective: Limitation on miRNA therapy</i>	Primary: Secondary: Reader:
15 th meeting April 25 Tuesday Paper #5	Thi EP, Mire CE, Lee AC, Geisbert JB, Zhou JZ, Agans KN, Snead NM, Deer DJ, Barnard TR, Fenton KA, MacLachlan I, Geisbert TW. Lipid nanoparticle siRNA treatment of Ebola-virus-Makona-infected nonhuman primates. Nature. 2015;521:362-5. <i>Learning objective: An example of nanoparticle therapeutic application</i>	Primary: Secondary: Reader:

Paper discussion format:

Each paper will be considered for its 1) overall scientific significance, 2) approach – methods and results, and 3) novel aspects etc. *relative* to our current concepts.

In brief, each paper will be assigned to three students as “primary”, “secondary”, and “reader”.

Individuals assigned as primary will take charge of the presentation and discussion and will spend 30 minutes discussing critical issues in the selected paper using the guideline below. In order to be effective, some selection may have to be made. For example, not discussing every figure in equal details. **[Everyone is expected to read the paper ahead of time and participate in discussion.]**

Individuals assigned as secondary will then spend 5-10 minutes to add points/comments not already discussed or take viewpoints different from the primary. Individuals assigned as reader will take brief notes/summary specifically related to strong positive/negative points/issues discussed during the meeting and submit a written Summary within **72 hours**. Two examples for Summary will be provided.

For Summary write-up:

The 1-2 page document should describe the general outline of the main findings of the paper we discussed and include comments about our discussion in class. Ideally it should serve as an editorial type document you read in a journal when someone discusses a new paper. After reading the editorial, readers should have some good ideas what this new paper is about including all the important points. A good editorial should serve to attract readers to read the new report in detail because it gives perspectives why the data are interesting and important. At the same time, readers should be aware of limitations of the new study as per discussion in class.

Evaluation 2017

50% - Oral and Powerpoint presentation of the assigned paper - **Grades will be based on organization, clarity of presentations, ability to explain key data, consideration of Suppl. Data provided, and other relevant information.**

Refer to Stanford's Susan K. McConnell guidelines at iBioSeminars:

<http://www.youtube.com/watch?v=Hp7ld3Yb9XQ>

This is an outstanding presentation on *how to present Powerpoint slides*. Highly recommended to review *multiple times*. The final powerpoint file is to be submitted for grades after presentation.

Additional points to consider during presentation/discussion:

- Overall scientific significance of the paper being discussed – What is the perceived significance, do you agree with it?
- Have a slide on Approach, if appropriate – what type of methods were used to get the interesting results?
- For papers published in high impact journals, what do you think is/are novel aspects that allowed this paper to be accepted?

30% - Written summary of discussions. See above. **Grades will be based on the quality of writing, ability to summarize key points during discussion, and additional insights applicable. The write up should be free of spelling errors and grammatical mistakes.**

Remaining 20% of the final grade will constitute active participation during class. Attendance to all is required.

Recent reviews for background reading:

1. Ha M, Kim VN. Regulation of microRNA biogenesis. Nat Rev Mol Cell Biol. 2014;15:509-24.
2. Jonas S, Izaurralde E. Towards a molecular understanding of microRNA-mediated gene silencing. Nat Rev Genet. 2015;16:421-33.
3. Lin S, Gregory RI. MicroRNA biogenesis pathways in cancer. Nat Rev Cancer. 2015;15:321-33.

General Information

Course Director: Dr. Edward K.L. Chan, Department of Oral Biology

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