Cells of the Innate Immune System (1 credit) [Tuesday/Thursday, 1.5hrs]

Dr. Mark Wallet - course coordinator

University of Florida, College of Medicine

I. Course Information for Year 2014 Number: GMS 5905, section 1F91

Semester: Fall

Graduate (GMS 5905): Section 1F91

II. General Information

Course director: Dr. Mark A. Wallet, PhD

Classroom location: D5-10 for all meetings except 9/2/2014 which will be in D11-32 due to a conflict

Office location & office hours: D6-18A, 9 AM – 10 AM Tuesday

Office phone number: 352-273-8164 E-mail: mawallet@pathology.ufl.edu

Teaching Assistant: None

III. Course Description

Course goals/ Educational goals of the course: Gain an understanding of the major cell types that make up the innate immune system. Become familiar with the concepts of innate immune cells in recognition of pathogens as well as tolerance of commensal organisms and self-tissues. Appreciate the interrelatedness of innate immune cells and the coordinated mechanisms required to thwart pathogenic microorganisms. Learn how genetic defects lead to alterations in innate immunity which cause human disease.

Course objectives: This course will utilize 1/3 didactic lectures and 2/3 review of historical/current literature to bridge basic concepts of innate immune cells with seminal findings in the field. Literature review will be driven by student participation.

Rationale and place in the curriculum

The current IDP graduate immunology program does not offer any similar courses. This course is designed to focus special attention on innate immune cells and their role in protective/tolerogenic immunity. While some existing courses are synergistic and address the overall immune processes that include innate and adaptive immune cells, no course provides in depth study of specific innate immune cells including macrophages, dendritic cells, neutrophils, and natural killer cells. This course will fill a major void in the curriculum by providing advanced understanding of these essential components of the human immune system so that students will have a solid foundation upon which to understand complicated immune processes.

Departmental Contact: Mark A. Wallet

Division Contact: Laurence Morel
IV. Course Materials
Reading material will be provided to the class in PDF format via eLearning. No Assigned Text. In some cases, especially for contemporary literature, new papers will be selected each year to ensure that important developments in the field are captured. Students will be required to lead literature review in the form of a journal club style PowerPoint presentation for each session except for the first class on 8/26/14. Each class session will consist of a 30 minute background lecture by instructor relevant to that day’s literature review. The following 60 minutes will be dedicated to presentation of assigned literature by students.

Course schedule (5 weeks, 10 sessions of 1.5 hours):

Week 1 (overview / innate sensing mechanism):

- Session 1 – Tuesday 8/26/2014, D5-10
  - [30 min] lecture: (MA Wallet) Organizational meeting and brief introduction to innate immune cells
  - [60 min] classical literature discussion (Presented by MA Wallet)
    - Excerpts from “Immunity in Infective Diseases”, by Elie Metchnikoff, 1907

- Session 2 – Thursday 8/28/2014, D5-10
  - [30 min] lecture: (MA Wallet) Innate sensing via pattern recognition receptors
  - [60 min] literature discussion (student-led, TBD)
    - 3 papers
      - Poltorak, et al. Defective LPS signaling in C3H/HeJ and C57BL/10ScCr mice: mutations in Tlr4 gene [PMID 9851930]

Week 2 (neutrophils):

- Session 3 – Tuesday 9/2/2014, D11-32
  - [30 min] lecture: (MA Wallet) Neutrophils
  - [60 min] literature discussion (student-led, TBD)
    - 3 papers
      - Page and Good. A clinical and experimental study of the function of neutrophils in the inflammatory response [PMID 13559398]
      - Babior, et al. Biological defense mechanisms. The production by leukocytes of superoxide, a potential bactericidal agent [PMID 4346473]
      - Reeves, et al. Killing activity of neutrophils is mediated through activation of proteases by K⁺ flux [PMID 11907569]

- Session 4 – Thursday, 9/4/2014, D5-10
  - [30 min] lecture: (MA Wallet) Neutrophil-associated diseases (CGD, cancer TANs, Neutrophil nets in disease)
  - [60 min] literature discussion (student-led, TBD)
    - 3 papers
      - Holmes, et al. Studies of the metabolic activity of leukocytes from patients with a genetic abnormality of phagocytic function [PMID 6036538]
      - Wislez, et al. Hepathocyte growth factor production by neutrophils infiltrating bronchoalveolar subtype pulmonary adenocarcinoma: Role in tumor progression and death [PMID 12649206]
      - Behen, et al. Immobilized immune complexes induce neutrophil extracellular trap release by human neutrophil granulocytes via FCyRIIIB and Mac-1 [PMID 25024378]
Week 3 (macrophages):

- Session 5 – Tuesday 9/9/2014, D5-10
  - [30 min] lecture: (MA Wallet) Macrophages
  - [60 min] literature discussion (student-led, TBD)
    - **3 papers**
      - Nakahara W. The function of macrophages in local resistance to bacterial infections [PMID 19869046]
      - Cohn ZA. The fate of bacteria within phagocytic cells I. The degradation of isotopically labeled bacteria by polymorphonuclear leucocytes and macrophages [PMID 14022146]
      - Nogueira N. et al. Trypanosoma Cruzi: Modification of macrophage function during infection [PMID 327012]

- Session 6 – Thursday 9/11/2014, D5-10
  - [30 min] lecture: (MA Wallet) Macrophages: Functions in metabolic disease and cancer
  - [60 min] literature discussion (student-led, TBD)
    - **2 papers**
      - Weisberg SP, et al. Obesity is associated with macrophage accumulation in adipose tissue [PMID 14679176]

Week 4 (dendritic cells):

- Session 7 – Tuesday 9/16/2014, D5-10
  - [30 min] lecture: (MA Wallet), Dendritic cells
  - [60 min] literature discussion (student-led, TBD)
    - **3 papers**
      - Steinman and Cohn. Identification of a novel cell type in peripheral lymphoid organs of mice. I. Morphology, quantitation, tissue distribution [PMID 4573839]
      - Steinman and Cohn. Identification of a novel cell type in peripheral lymphoid organs of mice. II. Functional properties *in vitro* [PMID 4589990]
      - Steinman and Cohn. Identification of a novel cell type in peripheral lymphoid organs of mice. III. Functional properties *in vivo* [PMID 4598015]

- Session 8 – Thursday 9/18/2014, D5-10
  - [30 min] lecture: (MA Wallet), Specialized dendritic cells (relationship between murine and human DC subsets)
  - [60 min] literature discussion (student-led, TBD)
    - **3 papers**
      - Schuler and Steinman. Murine epidermal Langerhans cells mature into potent immunostimulatory dendritic cells *in vitro*. [PMID 3871837]
      - Cella M, et al. Plasmacytoid monocytes migrate to inflamed lymph nodes and produce large amounts of type I interferon. [PMID 10426316]

Week 5 (natural killer cells):

- Session 9 – Tuesday 9/23/2014, D5-10
  - [30 min] lecture: (MA Wallet) Natural killer cells
  - [60 min] literature discussion (student-led, TBD)
    - **2 papers**
      - Inverardi L., et al. CD3 negative "small agranular lymphocytes" are natural killer cells. [PMID 1827820]
• Session 10 – Thursday 9/25/2014, D5-10
  ▪ [30 min] lecture: (MA Wallet) NK cells mechanisms of killing
  ▪ [60 min] literature discussion (student-led, TBD)
  ▪ 3 papers
    ▪ Liao NS, et al. MHC class I deficiency: susceptibility to natural killer (NK) cells and impaired NK activity
    ▪ Karlhofer et al. MHC class I alloantigen specificity of Ly-49+ IL-2-activated natural killer cells [PMID 1614533].
    ▪ Perussia et al. Murine natural killer cells express functional Fc gamma receptor II encoded by the Fc gamma R alpha gene [PMID 2526196].

V. Evaluation/ Grading/ Testing: Grades will be based on participation and presentations. As a paper-based course, students will present selected articles from the scientific literature (chosen by instructor). For the Performance and Knowledge of Subject Area criterion, each paper assignment will include a list of 5-10 key concepts that must be covered in the presentation. The student’s ability to present these concepts and answer questions from the group will be assessed by the instructor.

90% Performance & Knowledge of Subject Area
10% Participation and attendance

A  94 - 100
A  93.9 - 90
B+  89.9 - 87
B  86.9 - 83
B  82.9 - 80
C+  79.9 - 77
C  76.9 - 73
C  72.9 - 70
D+  69.9 - 67
D  66.9 - 63
D  62.9 - 60
E  59.9 - 0

For more information on grades and grading policies, please visit:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx
**Attendance Policy**
Class attendance is mandatory. Excused absences follow the criteria of the UF Graduate Catalog (e.g., illness, serious family emergency, military obligations, religious holidays), and should be communicated to the instructor prior to the missed class day when possible. The UF Graduate Catalog is available at [http://gradcatalog.ufl.edu/](http://gradcatalog.ufl.edu/).

Regardless of attendance, students are responsible for all material presented in class and meeting the scheduled due dates for class assignments. Personal issues with respect to class attendance or fulfillment of course requirements will be handled on an individual basis.

[https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx](https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx)

Writing assignments will require independent thought and proper citation of sources. This is a link to a video on citing sources and avoiding plagiarism (Dr. Martin Simpson, UF)

[http://mediasite.video.ufl.edu/mediasite/Viewer/?peid=adaa44500eaf460a84f238e6b9a558919](http://mediasite.video.ufl.edu/mediasite/Viewer/?peid=adaa44500eaf460a84f238e6b9a558919)  This is a link to a website on avoiding plagiarism
[http://web.uflib.ufl.edu/msl/subjects/Physics/StudentPlagiarism.html](http://web.uflib.ufl.edu/msl/subjects/Physics/StudentPlagiarism.html)  This is a link to APA formatting  [http://owl.english.purdue.edu/owl/resource/560/01/](http://owl.english.purdue.edu/owl/resource/560/01/)

**Online course evaluations**
Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at [https://evaluations.ufl.edu](https://evaluations.ufl.edu). Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at [https://evaluations.ufl.edu](https://evaluations.ufl.edu).

**UF Counseling Services**
Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include: UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services. Career Resource Center, Reitz Union, 392-1601, career and job search services.

Many students experience test anxiety and other stress related problems. “A Self Help Guide for Students” is available through the Counseling Center (301 Peabody Hall, 392-1575) and at their web site: [http://www.counsel.ufl.edu/](http://www.counsel.ufl.edu/)

**Honesty Policy**
All students registered at the University of Florida have agreed to comply with the following statement: “I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University.” In addition, on all work submitted for credit the following pledge is either required or implied: “On my honor I have neither given nor received unauthorized aid in doing this assignment.” If you witness any instances of academic dishonesty in this class, please notify the instructor.
or contact the Student Honor Court (392-1631) or Cheating Hotline (392-6999). For additional information on Academic Honesty, please refer to the University of Florida Academic Honesty Guidelines at:
http://www.dso.ufl.edu/sccr/honorcodes/conductcode.php

Accommodation for Students with Disabilities

Students who will require a classroom accommodation for a disability must contact the Dean of Students Office of Disability Resources, in Peabody 202 (phone: 352-392-1261). Please see the University of Florida Disability Resources website for more information at: http://www.dso.ufl.edu/drc/. It is the policy of the University of Florida that the student, not the instructor, is responsible for arranging accommodations when needed. Once notification is complete, the Dean of Students Office of Disability Resources will work with the instructor to accommodate the student.

If comfortable, please also contact the instructor directly after registering for this course so we can ensure accommodations are met in a timely manner.

Software Use

All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.

Class demeanor

This is an advanced course and the environment will be one of open communication and scholarly discussion. It is expected that participants exercise professionalism and judgment when using electronic devices. Participants should arrive on time and be prepared to begin at the scheduled hour. Tardiness will be reflected in the attendance category of grading. Every effort should be made to notify the instructor of planned absences, tardiness or early exit from course meetings.