

Spring 1-2003

PHAR 644.01: Fundamentals of Immunotoxicology

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Shepherd, David M., "PHAR 644.01: Fundamentals of Immunotoxicology" (2003). *Syllabi*. 4282.
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PHAR644: Fundamentals of Immunotoxicology

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Course Outline

Basic Immunology:

Week 1

Lecture 1	Jan. 27-31	General course info. and immunology survey
Lecture 2		Innate vs Adaptive/Tissues & Organs/Hematopoiesis
Lecture 3		Cellular players, secreted molecules & their functions

Week 2 Feb. 3-7

Lecture 4	Cell surface molecules
Lecture 5	Intracellular interactions and signaling
Lecture 6	Inter-cellular signaling & Immune networks

Week 3 Feb. 10-14

Lecture 7	Inflammation
Lecture 8	Acute phase response/liver connection
Lecture 9	Miscellaneous immunology (skin, lungs, gut)

Week 4 Feb. 17-21

Exam	<u>No class</u> on Monday—President's Day
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Midterm#1

Immunotoxicology:

Lecture 10	Immune Dysfunction/Basic Toxicology Review
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Week 5 Feb. 24-28

Lecture 11	Immunotoxicological methods
Lecture 12	Assessment of Immunotoxicity (Tier testing)
Journal Club 1	

Week 6 March 3-7

Lecture 13	Immunosuppression I: Intentional Modulation of the Immune System
Lecture 14	Immunosuppression II: Dioxin
Journal Club 2	

Week 7 March 10-14

No class-- annual SOT meeting in Salt Lake City

Week 8 March 17-21

Lecture 15	Immunosuppression III: Benzene
Lecture 16	Overview of other immunosuppressive compounds
Journal Club 3	

Week 9	March 24-28	<u>No class</u> — Spring break
Week 10	March 31- April 4	
Lecture 17		Chemicals Related to Autoimmunity (J. Pfau)
Lecture 18		Chemicals Related to Autoimmunity (cont.)
Journal Club 4		
Week 11	April 7-11	
Lecture 19		Chemicals Related to Hypersensitivity (J. Pfau)
Lecture 20		Chemicals Related to Hypersensitivity (cont.)
Exam		Topics must be selected and <u>approved</u> by this date! Midterm #2
Week 12	April 14-18	
Lecture 21		Immunotoxicology in Non-mammalian Models (Chris Bayne)
Lecture 22		Developmental Immunotoxicology
Journal Club 5		
Week 13	April 21-25	
Lecture 23		Use of Immunotoxicological Data in Risk Assessment
Lecture 24		Neuro/Endocrine/Immune Interactions (C. Johnston)
Journal Club 6		
Week 14	April 28-May 2	
Lecture 25		Immunopharmacology of Cytokines (V. Grund)
Lecture 26		Human Immunotoxicology (J. Schumpert)
Journal Club 7		
Week 15	May 5-9	
Lecture 27		Effects of Oxidative Stress on Immune Function
Lecture 28		Immunomodulation by Edible Things
Journal Club 8		
Week 16	May 12-16	Finals week--Research proposals are due!

PROPOSALS ARE DUE BY 5 PM ON TUES., MAY 13th.

COURSE GRADING:

Midterm #1	25%
Midterm #2	25%
Journal club assignments and participation	25%
Research proposal	<u>25%</u>
	100%

Some useful books (NOT required):

Basic Immunology

Janeway, C and Travers, P. (2001) **Immunobiology**. Garland Publishing
Kuby, J. (2000) **Immunology**. W.H. Freeman Co.--note: this text is currently used in the basic Immunology course taught at UM.
Abbas, A.K., Lichtman, A.H., and Pober, J.S. (2000) **Cellular and Molecular Immunology**. W.B. Saunders Co.
Roitt, I.M., Brostoff, J., and Male, D.K. (2001) **Immunology**. Mosby, Inc.
Alberts, A., et al. (2002) **Molecular Biology of the Cell**. Garland Pub.
Annual Reviews of Immunology

Immunotoxicology

Casarett & Doull's **Toxicology** (2001), Chapter 12. McGraw-Hill Companies, Inc.
Pulmonary Immunotoxicology (2000) [Cohen, Zelikoff, and Schlesinger, Eds.], Kluwer Academic Publishers.
Flaherty, D.K. (1999) **Immunotoxicology and Risk Assessment**. Kluwer Academic Publ.
Descotes, J. (1999) **An Introduction to Immunotoxicology**. Taylor & Francis.
Immunotoxicology of Environmental and Occupational Metals (1998) [Zelikoff and Thomas, Eds.], Taylor & Francis.
Baliga, S.S. and Repetto, R.C. (1996) **Pesticides and the Immune System: The Public Health Risks**. World Resources Inst.
Immunotoxicology and Immunopharmacology (1994), from the Target Organ Tox Series. [Dean, Luster, Munson and Kimber, Eds.], Raven Press.
Biologic Markers in Immunotoxicity (1992) National Research Council, National Acad. Press.

Methods in Immunotoxicology (1995) [Burleson, Dean, and Munson, Eds.] Wiley-Liss.
Annual Reviews of Pharmacology and Toxicology

PROPOSALS ARE DUE BY 5 PM ON TUES., MAY 13th.

• **RESEARCH PROPOSALS**

You have just been hired by the government as an immunotoxicologist. Your first assignment is to assess the (potential) immunotoxicity of a compound that the government has received a mandate to regulate. You may assume that you have 2 years and unlimited financial support.

The outcome of this written project should be your proposed research plan. For this plan, you need to investigate what is known about the general toxicity and immunotoxicity of a chemical, including what is known as well as what is hypothesized regarding the impact this chemical has or could have on the immune system. A simple review of the literature is unacceptable. You will be expected to take the available information, combined with your understanding of the immune system and the principles of immunotoxicology, and determine what questions remain to be answered about the effects this compound has or may have on the immune system. You should then propose how you would conduct the research to answer these questions. That is, your final product should contain a research plan that could ultimately be used to conclude that, based on what you have found, this compound is or is not immunotoxic. Therefore, it is important that you also summarize for the government how your research plan, when combined with the information that is currently in the literature, will lead to a clearer understanding of effects of this chemical on the immune system.

To save paper for the government, your report must be brief (5-7 pages not including references), and you should use the standard proposal format, including:

- Background and Significance
- Specific Aims
- Proposed Research
- Summary
- Literature Citations (INCLUDING TITLES)

• **SUGGESTED TOPICS:** You may either choose a chemical from the list of suggested topics below or come up with one on your own.*

arsenic

asbestos

benzo(a)pyrene

cigarette smoke

cocaine

dihaloethanes

ethanol

heavy metals (a specific one, eg., lead, cadmium, methylmercury)

pentachlorophenol

pesticides (either a specific one or a class)

ozone

“xenoestrogens” (either a specific one or a subgroup)

***NOTE:** While it is okay to get ideas from lecture topics, cyclosporin A, dioxin and benzene are not topics available for your research proposal as they will be thoroughly covered in class. Also, topics must be approved by the instructor on or before April 9th.