NUTRITIONAL ASPECTS OF LIPIDS

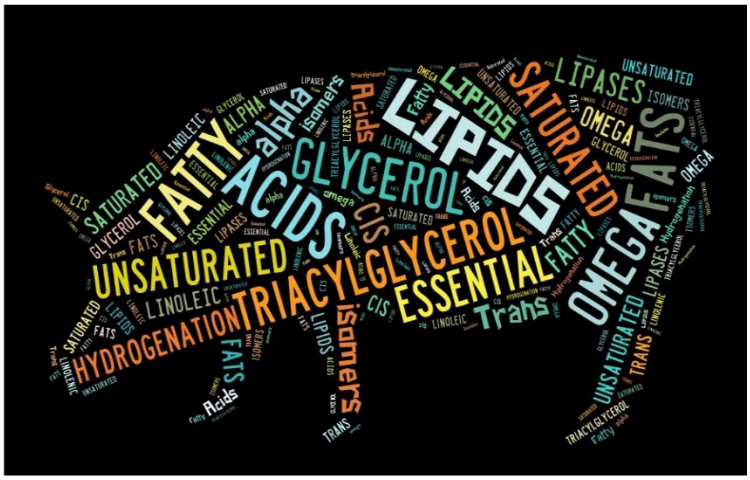
HUN 6301

3 CREDIT HOURS

SPRING 2023

ZOOM
(HTTPS://UFLPHI.ZOOM.US/J/4742141397)

TWO 75 MINUTE PERIODS BEGINNING AT
3:00 PM ON TUESDAY AND FRIDAY



middleearthbiochem.wordpress.com

INSTRUCTOR: Peggy R. Borum, Ph.D.
409 FSHN Building
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OFFICE HOURS: By appointment.

COURSE WEBSITE: http://lss.at.ufl.edu

COURSE COMMUNICATIONS: Communication is important to all of us. For email communication, use of the Canvas email is probably the better choice because the instructor's regular email box is often overflowing.

Required Text: INSTEAD OF A REQUIRED TEXT, WE WILL USE ARTICLES PUBLISHED IN 2022 IN THE FOLLOWING JOURNALS:

- Progress in Lipid Research
- Current Opinion in Clinical Nutrition & Metabolic Care
- European Journal of Nutrition
- Mucosal Immunology
- Endocrinology
- Biochimica et Biophysica Acta - Molecular and Cell Biology of Lipids
- EMBO Molecular Medicine
- International Journal of Molecular Sciences
- Biochemical Pharmacology

The specific articles and the presenters are listed I the following table.

Presenter	Article #	Citation
Clary	Article 1	90896 **Polyunsaturated fatty acids and fatty acid-derived lipid mediators: Recent advances in the understanding of their biosynthesis, structures, and functions** S. C. Dyall, L. Balas, N. G. Bazan, J. T. Brenna, N. Chiang, F. da Costa Souza, et al. Prog Lipid Res 2022 Vol. 86 Pages 101-165
Jake	Article 2	90894 **New understandings of the pathway of long-chain polyunsaturated fatty acid biosynthesis** J. T. Brenna and K. S. D. Kothapalli Curr Opin Clin Nutr Metab Care 2022 Vol. 25 Issue 2 Pages 60-66
Tamanna	Article 3	90893 **Very long chain fatty acids** L. Kyselova, M. Vitova and T. Rezanka, Prog Lipid Res 2022 Vol. 87 Pages 101-180
Sofia	Article 4	90799 **The FADS1 genotypes modify the effect of linoleic acid-enriched diet on adipose tissue inflammation via pro-inflammatory eicosanoid metabolism** M. Vaittinen, M. A. Lankinen, P. Kakela, J. Agren, C. E. Wheelock, M. Laakso, et al. Eur J Nutr 2022 Vol. 61 Issue 7 Pages 3707-3718
Clary	Article 5	90908 **The gut microbiota-artery axis: A bridge between dietary lipids and atherosclerosis?** Q. Zhang, L. Zhang, C. Chen, P. Li and B. Lu Progress in Lipid Research 2023 Vol. 89 Pages 101-209
Jake	Article 6	90898 **Regulation of intestinal immunity by dietary fatty acids** J. Qiu, Y. Ma and J. Qiu Mucosal Immunol 2022 Vol. 15 Issue 5 Pages 846-856
Tamanna	Article 7	90815 **Targeting mTOR in the Context of Diet and Whole-body Metabolism** N. Koundouros and J. Blenis Endocrinology 2022 Vol. 163 Issue 6
Sofia	Article 8	90875 **The impact of fasting on adipose tissue metabolism**

		S. Kersten Biochim Biophys Acta Mol Cell Biol Lipids 2022 Vol. 1868 Issue 3 Pages 159-262
Clary	Article 9	90863/90866 **Ketone body oxidation increases cardiac endothelial cell proliferation** E. M. Weis, P. Puchalska, A. B. Nelson, J. Taylor, I. Moll, S. S. Hasan, et al. EMBO Mol Med 2022 Vol. 14 Issue 4 Pages e14753 **Ketones regulate endothelial homeostasis** G. D. Lopaschuk, D. A. Hess and S. Verma Cell Metab 2022 Vol. 34 Issue 4 Pages 513-515
Jake	Article 10	90877 **Ketone Bodies as Metabolites and Signalling Molecules at the Crossroad between Inflammation and Epigenetic Control of Cardiometabolic Disorders** N. Bendridi, A. Selmi, A. Balcerczyk and L. Pirola Int J Mol Sci 2022 Vol. 23 Issue 23
Tamanna	Article 11	90880 **Molecular Mechanisms for Ketone Body Metabolism, Signaling Functions, and Therapeutic Potential in Cancer** C. Y. Hwang, W. Choe, K. S. Yoon, J. Ha, S. S. Kim, E. J. Yeo, et al. Nutrients 2022 Vol. 14 Issue 22
Sofia	Article 12	90878 **Fat not so bad? The role of ketone bodies and ketogenic diet in the treatment of endothelial dysfunction and hypertension** L. Pirola, O. Ciesielski and A. Balcerczyk Biochem Pharmacol 2022 Vol. 206 Pages 115346

Feel like you many need a little background review and update on the current knowledge concerning the nutritional aspects of lipids? There are PowerPoint files on the course Canvas account about the following topics using mainly material from the book entitled "**The Molecular Nutrition of Fats**" edited by Vinood B. Patel and published in 2018 by Elsevier:

Classes, Nomenclature, and Functions of Lipids and Lipid-Related Molecules and the Dietary Lipids

Lipid Metabolism: An Overview

Fatty Acids, Gut Bacteria, and Immune Cell Function

Omega-3 Fatty Acids and Epilepsy

Docosahexaenoic Acid (DHA): A Dietary Supplement With Promising Anticancer Potential

Strategies to Counter Saturated Fatty Acid (SFA)-Mediated Lipointoxication

You may be interested in reviewing the following two eBooks in the UF library:

Biochemistry of lipids, lipoproteins and membranes
edited by Neale Ridgway and Roger McLeod.
Published: Amsterdam : Elsevier, 2017.
http://www.sciencedirect.com/science/book/9780444634382
The fats of life: essential fatty acids in health and disease
Glen D. Lawrence.
Author: Lawrence, Glen D. 1948-
Published: New Brunswick, N.J. : Rutgers University Press, c2010.
http://lib.myilibrary.com/Open.aspx?id=256241

PURPOSE OF COURSE: The purpose of the course is to provide opportunities for students to increase their knowledge of the nutritional aspects of lipids, to critically read the current literature, to communicate the author's ideas, and to communicate their own ideas using traditional techniques and social media. A project addressing a real world nutrition problem will replace the traditional exams.

COURSE GOALS AND/OR OBJECTIVES: By the end of this course, students will:

- Practice reading and evaluating, in an organized written format, the current literature concerning the nutritional aspects of lipids.
- Demonstrate their skills at leading and participating in oral discussions concerning nutritional aspects of lipids.
- Apply some nutritional aspect of lipids to a current research problem facing the nutritional community.

INSTRUCTIONAL METHODS: This class is designed to increase our knowledge of the nutritional aspects of lipids, to facilitate our critical thinking and application of our knowledge to a real world nutrition issue, and to provide opportunities for us to communicate our ideas.

Class presentation and participation - You will be assigned 3 recent articles which will be read by all the class before your presentations. Each article addresses a current

question about the nutritional aspects of lipids. You will present the information in the article and any relevant information that you choose. You will be graded on your presentation of the information and your ability to lead a discussion among your classmates on the topic.

For the class periods that you are a reader, you will post to the assignment tool in Canvas your review of the article using the following outline:

I. Questions being addressed by authors
II. Why the authors did what they did
III. What the authors did
IV. What the authors found
V. Authors' take-home message
VI. My comments
VII. Contribution to our understanding of the nutritional aspects of lipids

You will also be graded on your verbal participation in the class discussion.

CLASS PROJECT – DISRUPTIVE SCIENTIFIC THINKING –

On January 5, 2023, Nature published the following paper:

Papers and patents are becoming less disruptive over time
M. Park, E. Leahey and R. J. Funk
Nature 2023 Vol. 613 Issue 7942 Pages 138-144
Accession Number: 36600070 DOI: 10.1038/s41586-022-05543-x
https://www.ncbi.nlm.nih.gov/pubmed/36600070

Theories of scientific and technological change view discovery and invention as endogenous processes (1,2), wherein previous accumulated knowledge enables future progress by allowing researchers to, in Newton's words, 'stand on the shoulders of giants'(3-7). Recent decades have witnessed exponential growth in the volume of new scientific and technological knowledge, thereby creating conditions that should be ripe for major advances (8,9). Yet contrary to this view, studies suggest that progress is slowing in several major fields (10,11). Here, we analyse these claims at scale across six decades, using data on 45 million papers and 3.9 million patents from six large-scale datasets, together with a new quantitative metric-the CD index (12)-that characterizes how papers and patents change networks of citations in science and technology. We find that papers and patents are increasingly less likely to break with the past in ways that push science and technology in new directions. This pattern holds universally across fields and is robust across multiple different citation- and text-based metrics (1,13-17). Subsequently, we link this decline in disruptiveness to a narrowing in the use of previous knowledge, allowing us to reconcile the patterns we observe with the 'shoulders of giants' view. We find that the observed declines are unlikely to be driven by changes in the quality of published science, citation practices or field-specific factors. Overall, our results suggest that slowing rates of disruption may reflect a fundamental shift in the nature of science and technology.

Question – What is our disruptive scientific thinking about nutritional aspects of lipids?

In the writing below, the authors words are in black, and my words are in blue.
Current understanding of how science moves forward:
Theories of scientific and technological change:

- **discovery** and invention = endogenous processes
- previous accumulated **knowledge** = future progress by allowing researchers to, in Newton's words, 'stand on the shoulders of giants' (confirm or somewhat extend previous ways of thinking)

What has been happening:

- Recent decades have witnessed **exponential growth in the volume of new scientific and technological knowledge**, thereby creating conditions that should be ripe for major advances.
- Yet contrary to this view, studies suggest that **progress is slowing in several major fields**.

What the authors did:

- Here, we analyse these claims at scale across six decades, using data on 45 million papers and 3.9 million patents from six large-scale datasets, together with a new quantitative metric—the CD index12—that characterizes how papers and patents change networks of citations in science and technology.

What the authors say they found:
We find that papers and patents are increasingly less likely to break with the past in ways that push science and technology in new directions.

- This pattern holds universally across fields and is robust across multiple different citation- and text-based metrics.
- Subsequently, we **link this decline in disruptiveness to a narrowing in the use of previous knowledge**, allowing us to reconcile the patterns we observe with the 'shoulders of giants' view. We find that the observed declines are **unlikely to be driven by changes in the quality of published science, citation practices or field-specific factors.**

Overall, our results suggest that slowing rates of disruption may reflect a **fundamental shift in the nature of science and technology. (yikes!!!)**

Wonderment -

- Wonder if we read more broadly and listened to more perspectives, our disruptive thinking about the nutritional aspects of lipids would break with the past in ways that push science and technology in new directions.
- Wonder if we focused on the short chain fatty acids and the long chain poly unsaturated fatty acids (instead of palmitate and stearate), our thinking could disrupt current approaches to push science forward.

Action Plan

Let's spend some time this semester finding out and then present our ideas for nutritional aspects of brain, heart, liver, and intestine. Each student will discuss one of the organs. The ideas should be presented in the format of a PowerPoint presented orally to the class and a type of white paper for scientists posted on the web.

COURSE POLICIES:

ATTENDANCE POLICY*:* You have to be present in class in order to participate in class discussion

COURSE TECHNOLOGY: HUN 6301 is a blended course utilizing both Canvas and face to face lectures.

UF POLICIES:

UNIVERSITY POLICY ON ACCOMMODATING STUDENTS WITH DISABILITIES: Students requesting accommodation for disabilities must first register with the Dean of Students Office (http://www.dso.ufl.edu/drc/). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

UNIVERSITY POLICY ON ACADEMIC MISCONDUCT: Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at http://www.dso.ufl.edu/students.php.

****NETIQUETTE: COMMUNICATION COURTESY:** All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats. [Describe what is expected and what will occur as a result of improper behavior] http://teach.ufl.edu/docs/NetiquetteGuideforOnlineCourses.pdf

GETTING HELP:

For issues with technical difficulties for E-learning in Sakai, please contact the UF Help Desk at:

- Learning-support@ufl.edu
- (352) 392-HELP - select option 2
- https://lss.at.ufl.edu/help.shtml

** Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from LSS when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request a make-up.

Other resources are available at http://www.distance.ufl.edu/getting-help for:

- Counseling and Wellness resources
- Disability resources
- Resources for handling student concerns and complaints
- Library Help Desk support

Should you have any complaints with your experience in this course please visit http://www.distance.ufl.edu/student-complaints to submit a complaint.

GRADING POLICIES:

Grades will be determined by adding the points obtained for each activity listed in the following table.

Assignment	Points
3Class Presentations	45
9 journal article notes and class participation	27
Disruptive thinking oral presentation – Dietary Lipid and Metabolism in Tissue of Interest	15
White paper for scientists posted on the web– Dietary Lipid and Metabolism in Tissue of Interest	13
Total	100

GRADING SCALE:

Final Grade	**Total Points**
A	93-100
A-	90-92

B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62

There will be no curve in this course. Final grades will be simply calculated from the total accumulated points.

COURSE SCHEDULE:

Spring 2023 Course Schedule

Week 1	
Tuesday January 10, 2023	**Course introduction and personalized planning for each student**
Friday –, January 13, 2023	Individual reading and planning
Week 2	
Tuesday January 17, 2023	Wonderments / Thinking outside the box / Disruptive thinking – Plan for disruptive thinking - Peggy
Friday –, January 20, 2023	Article 1 – **Clary** Polyunsaturated fatty acids and fatty acid-derived lipid mediators: Recent advances in the understanding of their biosynthesis, structures, and function**s**
Week 3	
Tuesday January 24, 2023	Wonderments / Thinking outside the box / Disruptive thinking - Peggy
Friday – January 27, 2023	Article 2 – **Jake** New understandings of the pathway of long-chain polyunsaturated fatty acid biosynthesis
Week 4	
Tuesday January 31, 2023	Wonderments / Thinking outside the box / Disruptive thinking – Health Education and Behavior Interns What can you eat if 90% of calories needs to be fat?
Friday – February 03, 2023	Article 3 – **Tamanna** Very long chain fatty acids
Week 5	
Tuesday February 07, 2023	Wonderments / Thinking outside the box / Disruptive thinking - Peggy

Friday – February 10, 2023	Article 4 – **Sofia** The FADS1 genotypes modify the effect of linoleic acid-enriched diet on adipose tissue inflammation via pro-inflammatory eicosanoid metabolism
Week 6	
Tuesday February 14, 2023	Wonderments / Thinking outside the box / Disruptive thinking - Peggy
Friday – February 17, 2023	Article 5 – **Clary** The gut microbiota-artery axis: A bridge between dietary lipids and atherosclerosis?
Week 7	
Tuesday February 221, 2023	Wonderments / Thinking outside the box / Disruptive thinking - Peggy
Friday – February 24, 2023	Article 6 – **Jake** Regulation of intestinal immunity by dietary fatty acids
Week 8	
Tuesday February 28, 2023	Wonderments / Thinking outside the box / Disruptive thinking - Peggy
Friday – March 03, 2023	**Spring break sneak peak** 😊
Week 9	
Tuesday March 7, 2023	Wonderments / Thinking outside the box / Disruptive thinking - Peggy
Friday – March 10, 2023	Article 7 – **Tamanna** Targeting mTOR in the Context of Diet and Whole-body Metabolism
Week 10	
March 13-17, 2023	**Have a great Spring Break!!**
Tuesday March 14, 2023	Wonderments / Thinking outside the box / Disruptive thinking - Peggy
Week 11	

Tuesday March 21, 2023	Article 8 – **Sofia** The impact of fasting on adipose tissue metabolism
Friday - March 24, 2023	Article 9 – **Clary** Ketone body oxidation increases cardiac endothelial cell proliferation & Ketones regulate endothelial homeostasis
Week 12	
Tuesday March 28, 2023	Article 10 – **Jake** Ketone Bodies as Metabolites and Signalling Molecules at the Crossroad between Inflammation and Epigenetic Control of Cardiometabolic Disorders
Friday – March 31, 2023	Article 11 – **Tamanna** Molecular Mechanisms for Ketone Body Metabolism, Signaling Functions, and Therapeutic Potential in Cancer
Week 13	
Tuesday April 04, 2023	Article 12 – **Sofia** Fat not so bad? The role of ketone bodies and ketogenic diet in the treatment of endothelial dysfunction and hypertension
Friday – April 07, 2023	Wonderment round robin
Week 14	
Tuesday April 11, 2023	Disruptive Thinking concerns dietary lipid and lipid metabolism in intestine - **Clary**
Friday – April 18, 2023	Disruptive Thinking concerns dietary lipid and lipid metabolism in brain - **Jake**
Week 15	
Tuesday April 19, 2023	Disruptive Thinking concerns dietary lipid and lipid metabolism in liver - **Tamanna**
Friday – April 21, 2023	Disruptive Thinking concerns dietary lipid and lipid metabolism in heart - **Sofia**
Week 16	
Tuesday April 25, 2023	**Celebration of Disruptive Thinking**

	Have a fantastic Summer 2023

Disclaimer: This syllabus represents my current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.