**Biology 78 w19  Molecular Mysteries of Human Biology**

**Lectures:** Monday, Wednesday & Friday 8:50-9:55  **X-hour:** Thursday 9:05-9:55  
**Text/Reading:**

1. **Recommended text:** Any biochemistry text (e.g. Voet, Voet & Pratt, Berg, Tymoczko & Stryer, or Garrett & Grisham) may provide important background information. Copies on Dana Library Course Reserve.

2. **Course Readings:** 16 research manuscripts (and external links) that are required course reading are on web site. Additional background information (also required) and helpful reviews (optional) for each topic posted as .pdfs on web site OR available in Dana Biomedical Library, the former in textbooks.

**Course Web Site:** [http://canvas.dartmouth.edu](http://canvas.dartmouth.edu)

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<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Prob Set Posted</th>
<th>Prob Set Due</th>
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<tbody>
<tr>
<td>Watch on Thurs Jan 3</td>
<td><strong>Video:</strong> The Hidden Epidemic: Heart Disease in America</td>
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<td>Fri, Jan 4</td>
<td>Atherosclerosis: The Loch Ness Monster and John Hunter’s Ossified Arteries</td>
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<td>Mon, Jan 7</td>
<td>Plasma Lipoproteins: The Legacies of Michel-Eugène Chevruel and Mona Lisa</td>
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<td>Wed, Jan 9</td>
<td><strong>Dr. John Butterfly:</strong> A Patient with Atherosclerosis</td>
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<tr>
<td>Thurs, Jan 10 X-hour</td>
<td><strong>NO CLASS</strong></td>
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<td>Fri, Jan 11</td>
<td>Readings: Schoenheimer Effect Explained: Cholesterol Regulates Itself</td>
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<td>Mon, Jan 14</td>
<td>Readings: Targeting PCSK9 To Inhibit LDL Receptor Degradation</td>
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<td>Wed, Jan 16</td>
<td><strong>NO CLASS</strong></td>
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<td>Thurs, Jan 17 X-Hour</td>
<td><strong>NO CLASS</strong></td>
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<td>Fri, Jan 18</td>
<td>Otto Warburg and the Mysterians: Metabolism in Cancer Cells</td>
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<td>Mon, Jan 21</td>
<td><strong>NO CLASS: MLK Day</strong></td>
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<td>Wed, Jan 23</td>
<td>Readings: Targeting the Warburg Effect &amp; Lipogenesis</td>
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<td>Thurs, Jan 24 X-Hour</td>
<td>Readings: CyclinD3-CDK6 Complex Regulates Metabolism in Cancer</td>
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<td>Fri Jan 25</td>
<td>Cachexia: Agostino Levanzin, the Irish Republican Army and Steve Jobs</td>
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<td>Mon, Jan 28</td>
<td>Readings: The “Browning” of White Adipose Tissue in Cancer Cachexia</td>
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<td>Wed, Jan 30</td>
<td>Readings: Skeletal Muscle Loss in Lung Cancer</td>
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<td>Thurs, Jan 31 X-hour</td>
<td><strong>NO CLASS</strong></td>
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<td>Fri, Feb 1</td>
<td>Bathsheba’s Breast: Hendrickje Stoffels, Anne of Austria, Susan Sontag and Jill Ireland</td>
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<td>Mon, Feb 4</td>
<td>Readings: Glycolysis in Breast Cancer: A Novel Role for Phosphofructokinase-2</td>
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<td>Wed, Feb 6</td>
<td>Readings: Phosphocreatine Energy Shuttle: Druggable Target in Her2+ Breast Cancer</td>
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<td>Thurs, Feb 7 X-hour</td>
<td><strong>NO CLASS</strong></td>
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<td>Fri, Feb 8</td>
<td>Exercise: Sled Dogs, Toadfish, Frogs, Geese, Bats &amp; Lance Armstrong</td>
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<td>Mon, Feb 11</td>
<td>Readings: PPARdelta and Promotion of Exercise Endurance</td>
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<td>Wed, Feb 13</td>
<td>Readings: Carnitine Acetyltransferase, Metabolic Inertia and Muscle Fatigue</td>
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<td>Thurs, Feb 14 X-hour</td>
<td><strong>NO CLASS</strong></td>
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<td>Fri, Feb 15</td>
<td>Diabetes Mellitus: Paul Cezanne’s Vision and Shirley Horn’s Feet</td>
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<tr>
<td>Mon, Feb 18</td>
<td>Readings: CaMKII, O-linked Glycosylation and Cardiac Disease</td>
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<td>Wed, Feb 20</td>
<td>Readings: VEGF-B Signalizing and Diabetic Nephropathy</td>
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<td>Thurs, Feb 21 X-hour</td>
<td><strong>Dr. Richard Comi:</strong> Patients with Type 1 Diabetes Mellitus</td>
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<td>Watch on Thurs, Feb 21</td>
<td><strong>Video:</strong> The Forgetting: A Portrait of Alzheimer’s Disease</td>
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<td>Fri, Feb 22</td>
<td>Alois Alzheimer and Auguste D: Sailing Into Darkness</td>
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<td>Mon, Feb 25</td>
<td>Readings: Modeling Alzheimer’s Disease <em>In Vitro</em></td>
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<td>Mon, Feb 25, evening</td>
<td>Movie/Dinner/Discussion with Dr. Robert Santulli: Iris: A Tale of Iris Murdoch</td>
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<td>Wed, Feb 27</td>
<td>Readings: apoE4 and Tau in Neurodegeneration</td>
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<td>Thurs, Feb 28 X-hour</td>
<td><strong>NO CLASS</strong></td>
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<td>Fri, Mar 1</td>
<td>Aging: In Vino Veritas: Luigi Cornaro &amp; <em>Discorsi della Vita Sobria</em></td>
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<td>Mon, Mar 4</td>
<td>Readings: Reversing NAD+ Decline in Aging</td>
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<td>Wed, March 6</td>
<td>Readings: Ketogenic Diet, Longevity and Health Span</td>
<td>#7**</td>
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<td>Wed, Mar 13</td>
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**Problem set #7 covers both Alzheimer’s and Aging**
Readings for Biology 78

REQUIRED readings are indicated by inclusive dates we will be covering each subject area in class. EVERYONE is expected to have done the reading. Background reading on the physiology/pathophysiology, the molecular/biochemically-oriented research papers to be presented in class and optional, but helpful, review articles for each topic are included in this list. All readings are available on the Canvas site OR in the Dana Biomedical Library (texts). External links are also provided on the Canvas site for each of the research papers. In addition, there may be additional supplemental on-line material for many of the research papers (e.g. supplemental figures, videos, some tables) other than those included on our web site; students should directly link to the paper to access this information.

January 3-14: Atherosclerosis
The Loch Ness Monster and John Hunter’s Ossified Arteries
Plasma Lipoproteins: The Legacies of Michel-Eugène Chevruel and Mona Lisa

Physiologic/Pathophysiologic/Historical Background:


Goldstein, JL and Brown, MS (2015) A century of cholesterol and coronaries: from plaques to genes, Cell, 161, 161-172

Molecular Aspects:

Weider, E, Susan-Resiga, D, Essalmani, R et al (2016) Proprotein convertase subtilisin/kexin type 9 (PCSK9) single domain antibodies are potent inhibitors of low density lipoprotein receptor degradation, J Biol Chem, 291, 16659-16671

OPTIONAL, BUT HELPFUL

Brown, MS and Goldstein, JL (2009) Cholesterol feedback: from Schoenheimer’s bottle to Scap’s MELADL, J Lipid Res, April supplement, S15-S27


Dullaart, RPF (2017) PCSK9 inhibition to reduce cardiovascular events, New Eng J Med, 376, 1790-1791
January 18-24: Otto Warburg and the Mysterians: Metabolism in Cancer Cells

Physiologic/Pathophysiologic/Historical Background:

Ward, PS and Thompson, CB (2012) Metabolic reprogramming: a cancer hallmark even Warburg did not anticipate, Cancer Cell, 21, 297-308

Molecular Aspects:


OPTIONAL, BUT HELPFUL

Pavola, NN & Thompson, CB (2016) The emerging hallmarks of cancer metabolism, Cell Metab, 23, 27-47


Steffensen, KR (2015) Are synthetic compounds that silence the liver-X-receptor the next generation of anti-cancer drugs, Cancer Cell, 28, 3-4


Ingham, M & Schwartz, GK (2017) Cell-Cycle therapeutics come of age, J Clin Oncology, 25, 2949-2959

January 25-30: Cachexia: Agostino Levanzin, the Irish Republican Army & Steve Jobs

Physiologic/Pathophysiologic/Historical Background:

Fearon, K, Strasser, F, Anker, SD et al (2011), Definition and classification of cancer cachexia; an international consensus, Lancet Oncology, 12, 489-495.

Molecular Aspects:


**OPTIONAL, BUT HELPFUL**


**February 1-6: Bathsheba’s Breast: Hendrickje Stoffels, Anne of Austria, Susan Sontag and Jill Ireland**

*Physiologic/Pathophysiologic/Historical Background:*


*Molecular Aspects:*


**OPTIONAL, BUT HELPFUL**


Goncalves, MD & Cantley, LC (2018) A glycolysis outsider steps into the cancer spotlight, *Cell Metabolism*, 28, 3-4
February 8-13: Sled Dogs, Toadfish, Frogs, Geese, Bats & Lance Armstrong

Physiologic/Pathophysiologic/Historical Background:


Molecular Aspects:


**OPTIONAL, BUT HELPFUL**


February 15-21 Diabetes Mellitus: Paul Cezanne’s Vision and Shirley Horn’s Feet

Physiologic/Pathophysiologic/Historical Background:


Molecular Aspects:


**OPTIONAL, BUT HELPFUL**

Erickson, JR (2014) Mechanisms of CaMKII activation in the heart, Frontiers Pharmacology, 5, 1-5


**February 22-27: Alois Alzheimer and Auguste D: Sailing Into Darkness**

*Physiologic/Pathophysiologic/Historical Background:*


*Molecular Aspects:*


**OPTIONAL, BUT HELPFUL**
Hane, FT, Lee BY & Leonenko, Z (2017) Recent progress in Alzheimer’s disease research, part I: Pathology, J Alz Disease, 57, 1-28


**March 1-6: Aging: In Vino Veritas-Luigi Cornaro & Discorsi della Vita Sobria**

*Physiologic/Pathophysiologic/Historical Background:*

*Molecular Aspects:*


**OPTIONAL, BUT HELPFUL**


