Biology 37
Endocrinology
Dartmouth College, Spring 2024

Goitrous Valasians
From the Spiezer Chronik by Diebold Schilling, 1480

Professor Lee A. Witters
Dept of Biological Sciences, Dartmouth College &
Depts of Medicine, Medical Education & Biochemistry/Cell Biology,
Geisel School of Medicine at Dartmouth
Office: 122 Class of 1978 Life Sciences Center
e-mail: lee.a.witters@dartmouth.edu; Tel: 646-1909

Biology 37 s24 **Endocrinology** **Weekly Schedule 10A**

Lectures/Paper Discussions: Tuesday and Thursday 10:10 am-12:00 pm
X-hour:Friday 3:30-4:20 pm (Optional (but encouraged) problem-solving & patient/visiting faculty presentations)
Text/Reading:

1. **Text: None required.**
2. **Course Reading:** Collection of 34 manuscripts that are required course reading. All posted as .pdf files on the course Canvas site. Some papers have supplemental data; link from the Canvas site.

Faculty: Professor Lee Witters

Date	Topic
Tuesday, March 26	Lecture 1: Course Introduction and Overview of the Mammalian Endocrine System
Thursday, March 28	Lecture 2: Hormone Receptors/Nuclear Receptors
Friday, March 29	**NO X-HOUR**
Saturday, March 30	**Practice Quiz (Due Monday, April 1)**
Tuesday, April 2	Lecture 2 Reading; Lecture 3: Hormone Receptors/Cell-Surface Receptors
Thursday, April 4	Lecture 3 Reading; Lecture 4: Pituitary and Hypothalamus-An Overview
Friday, April 5	**X-Hour**: Sherlock Holmes & Problem-Solving in Endocrinology- Guide to Success
Saturday, April 6	**Quiz #1 (Topics #1, 2 & 3) Due Monday, April 8**
Tuesday, April 9	Lecture 4 Reading; Lecture 5: Hypothalamic/Pituitary/Gonadal Axis
Thursday, April 11	Lecture 5 Reading; Lecture 6: Sex Steroids; Hormones of Pregnancy & Lactation
Friday, April 12	**X-Hour**: Group Problem-Solving: A Mystery Case-The Case of the Irritable Infant
Saturday, April 13	**Quiz #2 (Topics #4 & 5) Due Monday, April 15**
Tuesday, April 16	Lecture 6 Reading; Lecture 7: The Adrenal Cortex and Its Hormones
Thursday, April 18	Lecture 7 Reading; Lecture 8: Sexual Differentiation, Gender and Puberty
Friday, April 19	**X-Hour**: Group Problem-Solving: Two Mystery Cases-The Cases of the Identical Twins
Saturday, April 20	**Quiz #3 (Topics #6 & 7) Due Monday, April 22**
Tuesday, April 23	Lecture 8 Reading; Lecture 9: Growth Hormone and Related Growth Factors
Thursday, April 25	Lecture 9 Reading; Lecture 10: Thyroid Hormones
Friday, April 26	**X-Hour**: Patient Visit and Presentation
Saturday, April 27, 6-8 PM	**Optional Mid-Term Exam Review Session**
Monday, April 29, 7-9 PM	**Mid-Term Exam (covers Topics # 1-9 & associated readings)**
Tuesday, April 30	Lecture 10 Reading; Lecture 11: Calcium-Regulating Hormones: PTH and Vitamin D
Thursday, May 2	Lecture 11 Reading; Lecture 12: Hormone Production by "Non-Endocrine" Tissue
Friday, May 3	**X-Hour**: Group Problem-Solving: Two Mystery Cases-Kids & Kalcium: Too Much & Too Little
Saturday, May 4	**Quiz #4 (Topics #10 & 11) Due Monday, May 6**
Tuesday, May 7	Lecture 12 Reading; Lecture 13: Fuel Homeostasis and Pancreatic Hormones
Thursday, May 9	Lecture 13 Reading; Lecture 14: Diabetes Mellitus: Pathogenesis & Celebrating Insulin@100
Friday, May 10	**X-Hour**: Patient/Faculty Visit and Presentation
Saturday, May 11	**Quiz #5 (Topics #12 & 13) Due Monday, May 13**
Tuesday, May 14	Lecture 14 Reading; Lecture 15: Body Weight: Obesity and Type 2 Diabetes
Thursday, May 16	Lecture 15 Reading; Lecture 16: Body Weight: Anorexia Nervosa
Friday, May 17	**NO X-HOUR**
Saturday, May 18	**Quiz #6 (Topics # 14 & 15) Due Monday, May 20**
Tuesday, May 21	Lecture 16 Reading; Lecture 17: Neoplasia & Immunoendocrinopathy
Thursday, May 23	Lecture 17 Reading; Lecture 18: What is a Hormone Anyway?
Friday, May 24	**X-hour:** Faculty Visit & Presentation
Tuesday, May 30	**Optional Final Exam Review Session**
Monday, June 3, 11:30 AM	**Final Exam (covers Topics # 10-18 & associated readings)**

Biology 37 Course Goals, Format & Expectations

I. General Course Goals

- To provide a broad overview of the endocrine signaling system and its function/dysfunction in humans
- To integrate aspects of molecular endocrinology and cellular biochemistry with *in vivo* physiology and pathophysiology
- To illustrate how the study of the molecular genetics, cell biology, biochemistry and pathobiology of an endocrine disorder reveals insights into the molecular/cellular mechanisms and physiology of normal endocrine function
- To introduce students to the biomedical literature and to learn some techniques of clinical/molecular investigation in a hypothesis-based, problem-solving paradigm

II. Course Format

The course will consist of 18 lectures/discussions on Tuesday and Thursday from 10:10-noon (with a break in the middle). **Attendance at all classes is expected of each student**; **attendance at X-hours is optional, but encouraged** (see below).

The discussion/lecture format will generally consist of an instructor-led discussion of manuscripts from the biomedical literature (reading based on the previous class lecture on the same subject) in the 1st hour followed in the 2nd hour by a lecture on a different subject to prepare students for reading for the next class. Powerpoint slides (annotated) for each lecture will be posted on our Canvas site at least a week in advance of each class; paper discussion PP will be posted at 8 AM the morning of the discussion to allow students to work on papers on their own in advance. These manuscripts, introduced with 'Preview Podcasts', are required reading for the course and should be read in advance of the class. All students will be expected to participate in the discussion of these papers. At the end of each class 2nd hour lecture, the papers for the next class will be introduced. The web site contains lecture outlines and a Powerpoint set on "What the Major Hormones Do". These slides may be helpful in summarizing in a "Notes' view the information about each of the major hormones to be studied. The web site also contains some "tips" documents for course success & on how to read papers, how to use Slack, group assignments for X-hour problem-solving sessions and a map to Professor Witters' office. Lastly, a short video ("Navigating Biology 37") is posted on the web site to introduce you to course organization & expectations.

On our Canvas site, navigating from the Syllabus page, there are several links to explore. Two of the most important are:

A. Course Topic Pages: There is a separate page for each course topic (1-18) Each page contains (or will contain) the following:

1. **Powerpoint (PP) slides** for each lecture which are annotated (use 'Notes Page' view in PP 'View' menu) and PP slides of paper discussion (the latter posted at 8 AM of the day of discussion)
2. **Lecture summary slide**
3. **Links for the readings**. **For each reading assignments, there are 2-3 papers for each topic. For papers indicated in RED FONT, students need read ONLY the paper's abstract, though are encouraged to skim the whole thing! A 'Preview Podcast' for topic readings and its PP slides are included.**
4. For some topics, **optional**, but interesting readings or video links
5. "**Scratch for Success" mini-quizzes** for a quick review/reflection of each lecture on the day of each class (to be explained)

B. Course Aids & Help Documents Page: On this web site page you will find a collation of the individual "Lecture Summary Slides' of all the lectures on a particular topic which indicate the major points (and serve as a study guide for lecture content) and slide sets called "Thinking Backwards" (indicate the thinking process around each of the papers we will read) & "Experimental Techniques" (updated after each class). These collated sets will be updated after every class. There is also a PP set on "What the Major Hormones Do". These latter

slides summarize the information about what are the major actions/roles of the major hormones to be studied. This page also contains two "tips" documents for course success & a PP sets on "How to Read Papers in Bio37".

III. Course Schedule. The course schedule indicates the lecture topic/reading discussions and dates of the quizzes/examinations & pre-exam review sessions Note that the reading discussion corresponding to a particular lecture subject occurs in the 1st hour of the next class.

IV. Required Readings. One to three manuscripts from the biomedical literature are assigned to correspond to the topics of Lectures 2-17. These papers have been chosen for their seminal nature and, most importantly, their integration of molecular and physiologic information. All are based on a central aspect of endocrine physiology or pathophysiology in humans and are meant to illustrate important principles of endocrinology and the techniques used to discover them. Student should do the best they can in the initial reading of these papers and utilize other resources, (e.g. reference texts, medical dictionary) as necessary, to address unfamiliar details. We will discuss an overall approach to reading papers at the end of our 2nd class (**review the following document; also posted on our web site ('Syllabus'>>'Course Aids & Help">>'How to Read Papers in Bio 37'**). All will be previewed in class, are accompanied by a "**Preview Podcast**' on the Canvas site and then discussed in the following class with Professor Witters. **ALL students should be prepared to participate in those discussions.**

Participation, not the "right" answer(s), through comment or questions is the desired goal of these paper discussions. The **principles** that these manuscripts illustrate and the general content, methods of analysis & the modes of data display of each will be represented on the quizzes & examinations. The papers illustrate a number of **techniques** used in the analysis of the endocrine system and you will need to be familiar with what each technique measures and how and with the interpretation of data obtained from its application**. Simply said, you will have more success in the class & get more out of our course if you actually do the reading & participate in the discussions! Re-reading the papers after the class discussion is an excellent idea!** "Sticky" details of each reading can be reviewed during class or office hours.

All the papers are available as .pdf files on the course web site. Some have supplemental data which could also be looked at on the web site from a link.

V. Course Assessments and Grading

A. Quizzes (40 possible points): There will be **6 on-line quizzes** beginning at end of Week 2 accessible in the 'Assignments' link in the course menu. **I have already uploaded a practice quiz ("silly questions'), just so that everyone gets familiar with the format.** Quizzes will be posted on Saturday at 10 AM (after group Zoom office hours) and will be due at 10 AM on the following Monday (48 hours to complete). Each quiz will consist of 10 single-answer multiple choice, multiple answer or matching questions worth 1 point each (**10 points per quiz; your two lowest grades will be automatically dropped, thus 40 possible points for the term**). All quizzes can be taken "**open book/notes**" (though not in consultation with anyone else verbally or by messaging) and you will have **ONE ATTEMPT and 40 MIN** to complete. Note, however, that the quiz will disappear at the due date/time from the web site, *even if you are in the middle of taking it*, so plan in advance. The answers will be revealed after the due time. **Study in advance** is strongly encouraged. Regardless of the number of questions answered correctly, **it is required that ALL SIX quizzes will be completed to satisfy the course requirement**. **Again, your two lowest grades will be automatically dropped. Any deviation from these policies must be discussed (e.g illness, internet access issues) with Professor Witters IN ADVANCE of the due date, i.e. not after its due date/time.**

B. Examinations: There will be **two "in person" exams** (mid-term and "final"). Each will count equally toward the class grade (**40 points each**). The "final" exam is non-cumulative, emphasizing only the material in the second half of the course, though principles & experimental techniques we have covered in the first

half of the course are 'fair game'. My policy is to only grant exemptions from scheduled exam time for a direct time conflict with other classes, for illness or for unavoidable absence from campus.

The **general format of the exams** will consist of narrative-style questions (with some use of matching/fill-in-the-blank/true-false/multiple choice/answer format) that will be designed to assess the application (not just memorization) of course material in unique problem-solving situations & will include, in some instances, crafting experimental design. Data interpretation of graphs/figures is also an element. **Sample questions from prior exams will be posted in the 'Course Aids & Help' section.** Material for the exams will be drawn from class lectures/notes, Powerpoint slides accompanying each lecture/paper discussion **AND** the assigned manuscripts. Pre-exam review sessions will be offered prior to both the mid-term and final.

D. Completion of Course Assignments. It is expected that students will complete ALL course assignments on the date and time that they are scheduled. My policy is to give deferral only for illness, unavoidable absence from campus or a direct conflict with a scheduled activity of another class (in the case of the exams). **Communication by the student with me about any deviation from this policy is expected of all students before the fact, not afterwards**.

E. Course Grading The course grade will be determined by (1) **required completion** of **all** course assignments (6 quizzes; 2 exams), (2) the number of accumulated course points and (3) by course "engagement" (see below). The policy of the Biology Department is that a minimum of 50% of total possible points must be earned to achieve a passing grade. Anyone with ≥ 90% of possible points will receive "some kind of A". Historically, the median grade in this course has been in the B+ range, but I do not feel held to that, depending on overall class performance (in either direction). **Exam grading is done by me; on-line quizzes are "automatically" graded and you will see the correct answers after the quiz deadline is passed. Exams will be returned in class or in my office (122 LSC) and can be picked up during my office hours. Note: You will have one week after I announce their availability to pick them up and to request any re-grading then. After that, they will be discarded and grades are then final.**

Breakdown of course points (total 120 possible)

1. 6 quizzes: 40 points (10 points each); **required to complete all 6 (2 lowest grades dropped).**
2. Mid-term examination: 40 points (covers Topics 1-9)
3. Final examination: 40 points (covers Topics 10-18; not cumulative)

While I will not assign a specific point value to it, I do take into account what I term "active engagement and participation" in the course in assigning the final letter grade. Is there evidence that the student is intellectually engaged with the course, is providing interesting insights to peers and is contributing to the general learning atmosphere of the course? **This will be used only to raise your letter grade, not lower it.** Ways students can demonstrate this include:

- **active participation** in class (through questions or comments, particularly during discussion of our papers)
- **regular use** of office hours and the X-hour for same
- **posting of comments or questions** about class material on 'Slack' on the web site
- **bringing new or recent insights** to the attention of us all (e.g. posting an interesting article, image or URL in 'Slack'); commentary from others on these postings.

Taken together, this does provide you an opportunity to influence your final letter grade, but I will look for evidence that you have done these things **throughout the course** and not just intermittently or towards the end of the course. **Note:** this also means that course points yielding your "numerical" standing relative to the class DO NOT guarantee a certain letter grade.

VI. Laptop/Phone Policy. I have no objection to your using laptops to take notes and the laptops/phones will be useful during our interactive X-hour sessions (in fact, plan to bring them). **However, if you are going to use your laptop (or phone) for any purpose other than notes/interactive problems (such as checking e-mail, Facebook, Instagram, Twitter/X, TikTok, etc.), I am going to ask you to sit on the periphery of the class by yourself so as not to disrupt others.** Studies tell us that students who are focused on the class are disrupted by someone nearby using their computers/phones for other purposes. Parenthetically, there are studies that show that taking notes on a computer is inferior to written notes. In the past, some students have either taken note directly on the PP slides or on a printout of the slides.

VII. Course Text, Readings, Web Sites, Lecture Video & Lecture Tools

A. Course Textbook: I am not recommending or requiring a course text. There are reference texts available on-line as eResources (see below; Williams text) that can be linked to from our web page ('Syllabus'>>'Useful Web Links & Textbooks').

B. Required Manuscript Readings are available on the Canvas site as .pdf files. Some have supplemental data also on the course web site. Use of reference texts, medical dictionaries and other supplementary sources is encouraged; vocabulary may be an issue during reading and these other sources could prove helpful. We will review in class a strategy for reading/studying papers at end of our 2nd lecture (see document "How to Read Papers in Bio37' in 'Syllabus'>>'Course Aids & Help Documents' section of web site).

C. Valuable Reference Materials: eBooks & Dana Library Research Guide. Via the 'Useful Web Links & Texts' of our web site ('Syllabus') you can access The Williams' Textbook of Endocrinology, 14th edition (Melmed et al, eds.), Saunders Elsevier, 2015 can be linked to directly from that page. I am asking you to read the 1st chapter from that text coincident with our first lecture (details **not important**; intended to get you "thinking like an endocrinologist". Note also a link from the Syllabus page to a Dana Library Research Guide to assist you in literature searching.

D. Valuable Web Sites (links on course web site in 'Useful Web Links & Textbooks' ('Syllabus' page)) There are a number of very useful web sites for this course. Please let me know if you find other sites that you think would be useful for this course.

E. Course Web Site

http://canvas.dartmouth.edu

On Day One of the course, please set up your desired contact information, as I will be using this mode through 'Announcements" to communicate with you during the course. To do this, click on 'Account' in upper left green bar —> 'Settings'. Under 'Notifications' in menu, I recommend choosing 'Notify me right away', so you receive any announcements promptly. To choose this, click the check mark in the 'Announcement' line.

Also register for Slack, the course Q&A module. If you have registered for Slack in another course, you shouldn't have to do it again. If not, you will be asked to create a password (don't use your Net ID or Dartmouth PW). **Review the document 'Using Slack in Bio37'** (accessible from Canvas site 'Syllabus" page) to see how access and the channels that are set up.

On Day One: take a tour of the Canvas site to see how it is organized. The site is organized with a 'Syllabus' page (which has several links to general course pages and course aids), a 'Calendar', individual pages devoted to each course lecture topic (each of which, in turn, contains .pdf files of the readings, a lecture summary slide, lecture Powerpoint slides, Preview Podcasts, Scratch for Success mini-quizzes), 'Course Aids & Help Documents' with summary PP slides, tips documents, Panopto recordings of

Saturday group Zoom office hours & sample exam questions, a 'Calendly' link for scheduling individual office hour appointments and a link for the course Zoom access (to be used in group office hours). In the Canvas menu, note an 'Assignments' section for quizzes, a 'Slack' link for asking questions and posting interesting material, a 'Panopto Video' link for class recordings and a 'Grades' section.

I STRONGLY encourage the viewing of the Powerpoint files on your computer (the animation and color can be very helpful). Note that many of the lecture slides are **annotated**, so also view in 'Notes" version to see highlights of main points. Some folks also like to print these out and take notes on them during class. They will be up-loaded prior to each class, typically the week before the lectures for the coming week. **PP sets for reading discussions will be uploaded only on the morning of the discussion (8 AM)**; I want you to have "a crack" at the papers without them.

.

F. Lecture Recording/Podcasts

We will be using the Panopto lecture capture recording system this term. These files will be available within a few hours of the lecture in a link from the course Canvas menu. The video will capture my computer screen, not the room, me or you! Any laser pointing will not be seen. **While I do NOT regard this as a substitute for class attendance**, it might be helpful for several of you if you have an unavoidable absence from class or would simply like to review aspects of a lecture or discussion (you can start and stop me!). Historically, many students have found these useful as a course study adjunct. However, there are things we do in class that are not easily captured with these technologies (especially classroom discussions, student questions). **Preview podcasts for all the readings are posted on the Course Topic pages along with the PP slides used in them**

Keep in mind that there is NO GUARANTEE that this Panopto technology will work to effectively capture every lecture, so DO NOT rely on this system as a substitute for class attendance!

G. Poll Everywhere Audience Response System

This term we will also be using a learning element, Poll Everywhere, in our X-hours. This platform is an interactive program that allows extended faculty-student engagement, providing, among other things, platforms for asking/answering questions. You will be able to use it with your laptop, pad or phone. We will use it during our first scheduled X-hour. You can answer questions either through your phone or laptop following the instructions on the displayed PP slides during the session. Some find that the app is also useful in replying to questions: PollEverywhere app.

VIII. Office Hours; Use of X- hour

Weekday Individual Office Hours: offered 5 days a week generally (excluding Saturday/Sunday). Students are asked to sign up for 20 minute appointments (no double booking on same day, please) at indicated times using **Calendly** (see link from 'Syllabus' page) up to 7 days in advance. **My office is located in the Class of 1978 Life Sciences Center (Room 122; map on web site).** Students are encouraged to drop by to ask questions, review material, discuss papers or just chat about life, career plans, Red Sox vs Yankees, politics, art history, the cosmos, music/movie favorites, etc! It is very important to me to "make the class smaller" by encouraging students to come by, even for seemingly minor issues and questions or for going beyond course material. **Every one of you is important to me regardless of your background in biology & your present/future plans. I value very much these interactions and want to get to know you all better!** Office hours also offer you the opportunity of being PROACTIVE AND CURIOUS in your approach to your education, even if you feel in command of the material we are covering, is important. **If you don't feel in command (or even if you feel okay), don't wait till you "see how you do" on the first quiz or mid-term!**

Saturday AM Office Hours: I am offering a **group office hour via Zoom on Saturday morning (9-10 AM)** prior to release of the weekly on-line quiz. Join anytime during that hour for your own questions and

to listen to the questions of others. Use the "All-Purpose Bio37 Zoom Link' on the Canvas site 'Syllabus' page.

The **X-hours are optional, but attendance encouraged** and will be used for group problem-solving of clinical cases that I will present and for patient/faculty visits. Students will be "grouped for X-hour problem solving sessions. I will post some PP slides about the cases **before** the sessions & **then update** with "answers" after each session. No new material that might appear on a quiz/exam that is not otherwise covered in class will be introduced during these sessions. **However, nearly all past students who have taken this course have said they have found the X-hour to be VERY enjoyable & useful to their study to help you work on problem-solving skills.** These sessions will be recorded, but experience tells me that student comments are not well-picked up on the classroom recording system.

H. Commitments Toward Your Success in This Course

As course designer and instructor, I care about each of you & am committed to your successful achievement of your goals in this course. I also understand that you may encounter challenges during the term. Resources are available to help you. These may include:

- **Accessibility support**. Students requesting disability-related accommodations and services for Bio78 are encouraged to schedule a meeting with me as early in the term as possible. This conversation will help to establish how your accommodations will be implemented in this course and what role Student Accessibility Services (SAS) or its Testing Center may play in assisting. In order for accommodations to be authorized, students are required to register with SAS.

Use this link or phone number:

(https://students.dartmouth.edu/studentaccessibility/students/where-start; 603-646-9900) and request an accommodation email be sent to me in advance of the need for an accommodation. If students have questions about whether they are eligible for accommodations, they should contact the SAS office. All inquiries and discussions will remain confidential. It is **very important that we then continue to communicate over the term** to assure that your needs are being met. Receiving accommodations **does NOT** relieve you of the responsibility of communicating with me about any deviations from course requirements **BEFORE the fact.**

- **Mental health and wellbeing support**. The academic & social environments at Dartmouth are challenging, our terms are intensive, and classes are not the only demanding part of your life. There are a number of resources available to you on campus to support your wellness, including: your undergraduate dean (http://www.dartmouth.edu/~upperde/), the Counseling Center (http://www.dartmouth.edu/~chd/), and the Student Wellness Center (http://www.dartmouth.edu/~healthed/). The student-led Dartmouth Mental Health Union and their Peer Support Programs may additionally be helpful to you.

Find phone numbers for emergency mental health support, information on how to make a counseling appointment, and links to mental health and wellness resources across the institution at
https://home.dartmouth.edu/mental-health-resources

- **Financial support**. Some courses may require purchases of course materials, though this is likely not the case for Bio 37. If help needed, consult with your dean, review Financial Aid Policies and Resources, and keep me informed.
- **Support around issues of sex or gender-based harassment, sexual assault, and their after-effects**. The Sexual Respect Website (sexual-respect.dartmouth.edu) provides information on your rights and obligations with regard to sexual respect and resources that are available to all in our community. Please keep in mind that if you report prohibited conduct as detailed in the Sex and Gender-based Misconduct policy, I am obliged to share your concern with the Title IX Coordinator.

****

Please make me aware of anything that will hinder your success in & enjoyment of this course.

I will help and I will put you in touch with others who can help even more.

The earlier I am aware of issues, the more I can do to assist you.

Companion Required Reading for Biology 37 Lecture Series

Each set corresponds to the subject of the lecture topic in the previous class.
The papers in BLACK FONT should be read in their entirety.
For papers in RED FONT, need read ONLY the abstract (encouraged, though, to read all of it).
Some papers have supplemental data (access via the web site).
View the 'Preview Podcasts' prior to engaging the papers.
I will be discussing both papers.

Topic 1: Course Introduction and Overview

Chapter 1, Principles of Endocrinology, in Williams Textbook of Endocrinology, Melmed, Auchus, Goldfine, Koenig, Rosen, Larsen, Polonsky & Kronenberg, eds, 13th edition, 2016

Topic 2: Hormone Receptors ; Mechanisms of Hormone Action I

Bochukova, E et al (2012) A mutation in the thyroid hormone receptor alpha gene, *New Engl J Med*, 366, 243-249 [supplemental data on web site].

Topic 3: Hormone Receptors ; Mechanisms of Hormone Action II

Swords, F.M. et al (2002) Impaired desensitization of a mutant adrenocorticotropin receptor associated with apparent constitutive activity, *Mol Endo*, 16, 2746-2753

Jiang, S. et al (2011) Functional characterization of insulin receptor gene mutations contributing to the Rabson-Mendenhall syndrome—phenotypic heterogeneity of insulin receptor gene mutations, *Endocrine J*, 58, 931-940

Topic 4: Pituitary and Hypothalamus: An Overview

Kelberman, D et al (2009) Molecular analysis of novel *PROP1* mutations associated with combined pituitary hormone deficiency (CPHD), *Clin Endo*, 70, 96-103

Siggaard, C. et al (1999) Clinical and molecular evidence of abnormal processing and trafficking of the vasopressin preprohormone in a large kindred with familial neurohypophyseal diabetes insipidus due to a signal peptide mutation, *J Clin Endo Metab*, 84, 2933-2941

Topic 5: Hypothalamic/Pituitary/Gonadal Axis

Bouligand, J et al (2009) Isolated familial hypogonadotropic hypogonadism and a *GNRH1* mutation, *New Engl J Med*, 360, 2742-2748

Zariñan T et al (2021) A novel mutation in the FSH receptor (I423T) affecting receptor activation and leading to primary ovarian failure, *J Clin Endo Metab*, 106, e534-e550.

Topic 6: Sex Steroids; Hormones of Pregnancy and Lactation

Quaynor, SD et al (2013) Delayed puberty and estrogen resistance in a woman with estrogen receptor α variant, *New Engl J Med*, 369, 164-171 [+supplemental data on web site]

Shozu, M. et al (2003) Estrogen excess associated with novel gain-of-function mutations affecting the aromatase gene, *New Engl J Med*, 348, 1855-1865

Topic 7: The Adrenal Cortex and Its Hormones

Geller, D.S. et al (2000) Activating mineralocorticoid receptor mutation in hypertension exacerbated by pregnancy, *Science*, 289, 119-123

Samuels, ME et al (2013) Bioinactive ACTH causing glucocorticoid deficiency, *J Clin Endo Metab,* 98, 736-742 [+supplemental data on website]

Topic 8: Sexual Differentiation, Gender and Puberty

Mystery case for discussion: A case of mistaken gender identity (includes study guide)

Teles, MG et al (2008) A GPR54-activating mutation in a patient with central precocious puberty, *New Engl J Med,* 358, 709-715 [+on-line supplemental data].

Liu, G. et al (1999) Leydig-cell tumors caused by an activating mutation of the gene encoding the luteinizing hormone receptor, *New Engl J Med*, 341, 1731-1736

Topic 9: Growth Hormone and Related Growth Factors

Besson, A et al (2005) Short stature caused by a biologically inactive mutant growth hormone (GH-C53S), *J Clin Endo Metab*, 90, 2493-2499

Woods, K.A. et al (1996) Intrauterine growth retardation and postnatal growth failure associated with deletion of the insulin-like growth factor I gene, *New Engl J Med,* 335, 1363-1367

Abuzzahab, M.J. et al (2003) IGF-1 receptor mutations resulting in intrauterine and postnatal growth retardation, *New Engl J Med*, 349, 2211-2222

Topic 10: Thyroid Hormones

Liu, Z et al (2011) Constitutive activation of the thyroid-stimulating hormone receptor (TSHR) by mutating Ile^{691} in the cytoplasmic tail segment, *PLoS ONE*, 6, e16335

Koulouri, O et al (2016) A Novel Thyrotropin-releasing Hormone Receptor Missense Mutation (P81R) in Central Congenital Hypothyroidism, *J Clin Endo Metab*, 101, 847-851

Topic 11: Calcium-Regulating Hormones

Malloy, PJ et al (2002) A novel mutation in helix 12 of the Vitamin D receptor impairs coactivator interaction and causes hereditary 1, 25-dihydroxyvitamin-D- resistant rickets without alopecia, *Mol Endo*, 16, 2538-2546

Pallais, J.C. et al (2004) Acquired hypocalciuric hypercalcemia due to autoantibodies against the calcium-sensing receptor, *New Engl J Med*, 351, 362-369

Topic 12: Hormone Production by "Non-Endocrine" Tissue

Stewart, A.F. et al (1980) Biochemical evaluation of patients with cancer-associated hypercalcemia: evidence for humoral and nonhumoral groups, *New Engl J Med*, 303, 1377-1383.

Burtis, W.J. (1990) Immunochemical characterization of circulating parathyroid hormone-related protein in patients with humoral hypercalcemia of cancer, *New Engl J Med,* 322, 1106-1112.

Desai AS et al (2023) Zilbesiran, an RNA interference agent for hypertension, *New Engl J Med,* 389, 228-238

READ ALSO OP-ED PIECE: Touyz, RM (2023) Silencing angiotensinogen in hypertension, *New Engl J Med*, 389, 278-281

Topic 13: Fuel Homeostasis and Pancreatic Hormones

Taschenberger, G. et al (2002) Identification of a familial hyperinsulinism in the sulfonylurea receptor I that prevents normal trafficking and function of K_{ATP} channels, *J Biol Chem*, 277, 17139-17146

Féry, F. et al (1999) Impaired counterregulation of glucose in a patient with hypothalamic sarcoidosis, *New Engl J Med*, 340, 852-856.

Topic 14: Diabetes Mellitus: Molecular Pathogenesis & Celebrating Insulin@100

Girard, CA et al (2009) Expression of an activating mutation in the gene encoding the K_{ATP} channel subunit Kir6.2 in mouse pancreatic β cells recapitulates neonatal diabetes, *J Clin Invest*, 119, 80-98\

Kahleova, H et al (2020) Effect of a low-fat vegan diet on body weight, insulin sensitivity, postprandial metabolism and intramyocellular and hepatocellular lipid levels in overweight adults, *JAMA Network Open*, e2925454; doi.10.1001/jamanetworkopen.2020.25454

Topic 15: Body Weight: Obesity and Type 2 Diabetes

Funcke, J-B et al (2023) Rare antagonistic leptin variants and severe, early-onset obesity, *New Engl J Med*, 388, 2253-2261

READ ALSO OP-ED PIECE: Rosen, CJ (2023) Antagonizing the leptin receptor in obesity, *New Engl J Med*, 388, 2291-2293

The "BlockBuster Drugs"

Jastreboff, AM et al (2022) Tirzepatide one weekly for the treatment of obesity, *New Engl J Med,* 387, 205-216

Jastreboff, AM et al (2023) Triple-hormone-receptor agonist retatrutide for obesity-a phase 2 trial, *New Engl J Med,* 389, 514-526

Wharton, S et al (2023) Daily oral GLP-1 agonist orforglipron for adults with obesity, *New Engl J Med*, 389, 877-888

Topic 16: Body Weight: Anorexia Nervosa and Endocrine Dysfunction

Caronia, LM et al (2011) A genetic basis for functional hypothalamic amenorrhea, *New Engl J Med*, 364, 215-225

Singhal, V et al (2021) Effect of transdermal estradiol and insulin-like growth factor-1 on bone endpoints of young women with anorexia nervosa, *J Clin Endo Metab,* 106, 2021-2035

Topic 17: Neoplasia of Endocrine Glands/ Immunoendocrinopathy

Michiels, F-M et al (1997) Development of medullary thyroid carcinoma in transgenic mice expressing the RET protooncogene altered by multiple endocrine neoplasia type 2A mutation, *Proc. Natl. Acad. Sci. USA*, 94, 3330-3335.

Knauf, JA et al (2005) Targeted expression of $BRAF^{V600E}$ in thyroid cells of transgenic mice results in papillary thyroid cancers that undergo dedifferentiation, *Cancer Res*, 65, 4238-4245