



# MCIP Qualifying Exam Requirements

# Purpose of the QE

- Primary purpose is to evaluate the student's competence in physiology as a whole and the student's chosen area of specialization in particular.
- QE is usually scheduled within 1 quarter of completing coursework

# QE Committee

- Five faculty members, at least four of whom are members of MCIP
- The major professor and close collaborators will be excluded from serving
- Faculty are assigned by the CEP in Winter of 2<sup>nd</sup> Year after input from the student and major professor
- Chair of Graduate Council has final approval

# Timeframe for the QE

- You must take your QE after finishing your coursework (end of 2<sup>nd</sup> year or the beginning of the 3<sup>rd</sup>)
- YOU are responsible for scheduling the date, time and place of your exam
- Meet with your committee members 2 months prior to your QE date
- Give your committee your written proposal at least one week prior to your exam date

# Format of the QE

- The QE must include both of the following components with a greater proportion on the core and specialization areas emphasizing the integration of physiology in the student's area of emphasis:
  - A dissertation research proposal
  - An examination on the core physiological subject areas and specialization.
- As a reminder, "...Graduate Council policy is that neither the program nor the QE committee shall impose any expectation that the student will provide refreshments during the examination."

# Unavoidable Absences

- All committee members are required to stay for the entire exam. If there are any unanticipated or unavoidable absences, the chair will report them and provide specific details for a plan to complete the exam within 72 hours, when all committee members may attend.
- If the chair is absent, remaining members shall wait a reasonable time, attempt to contact the chair, and then suspend the exam. In this case, the chair shall report the result as “No Examination” and provide a detailed explanation of the circumstances. A rescheduled exam must be conducted in the same manner and format intended for the original exam.
- Remote participation by a member of the committee is allowable following the rules and procedures in the Policy on Service on Advanced Degree Committees (GC1998-01), found at <http://gradstudies.ucdavis.edu/gradcouncil/policiesall.html>.

# Timeframe for the Exam

- The total exam will not last longer than three hours
- The presentation of the research proposal should only take 15-20 minutes
- Discussion of research proposal should not last longer than 45 minutes
- The exam will be administered on a chalk/white board only (no PowerPoint)

# Dissertation Research Proposal

- Specific aims –the broad, long-term objectives of the work and the specific purposes of the proposed research)
- Background and significance - Critically evaluate existing knowledge, and identify the gaps that the project is intended to fill
- Preliminary studies and/or research design and methods
- References.
- The total length should not exceed 5 pages for all sections.



# Examination on the core physiological subject areas and specialization

- This will be the greater proportion of the Qualifying Exam

# Expectations of the student

- The student has acquired sufficient knowledge in breadth and depth to be conversant with the general principles of physiology
- The student should be able to integrate those principles around a physiological question or concept

# Expectations of Faculty

- The individual committee members' questioning on the core physiological subject areas and specialization should emphasize the integration of concepts learned through coursework rather than a restatement of facts already examined during the student's coursework.
- The QE chair is obligated to ensure that QE committee evaluates the student's capacity to integrate physiological principles as well as test fundamental knowledge of physiology

# Expectations of Faculty

- Prior to the QE, the committee will meet as a whole to coordinate the questioning of the student and clarify expectations during the exam.

# QE Training

- MCIP faculty may not be aware of what we mean by "integrative questions" -- in past QEs many such questions have missed the mark in some way -- sometimes by a mile.
- Our MCIP committee finally decided the best way to effectively address this recurring issue was to hold an annual meeting, a mini workshop.
- Thus, faculty assigned to QEs are to review this presentation and, if they have further questions, are expected to attend the workshop which will build on examples of integrative questions in this presentation.

# Goals of QE Training

- Help establish the level of detail expected for questions – at the level of the core MCIP physiology course
- Provide guidance on how to develop a set of integrative questions

# Depth of Knowledge

- The MCP 210 IORs agreed to adopt the Boron and Boulpaep (Medical Physiology) text as a universal reference in an effort to establish a standard level of presentation and to provide other faculty with an indication of the depth of knowledge they might expect from students in the qualifying exam.

# Textbooks

- Title: Cardiovascular Physiology  
Author: MOHRMAN  
Publisher: MCG  
Edition: 7TH 11  
ISBN: 9780071701204
- Title: Renal Physiology  
Author: VANDER  
Publisher: MCG  
Edition: 7TH 09  
ISBN: 9780071613033
- Title: Medical Physiology  
Author: BORON  
Publisher: ELSEVIER  
Edition: 2ND 12  
ISBN: 9781437717532
- Title: EBK Medical Physiology  
Author: BORON  
Publisher: ELSEV COUR  
Edition: 2ND 12  
ISBN: 9781455733286
- Supplemental Text:  
Title: Cellular Physiology and Neurophysiology  
Authors: Blaustein, Kao, & Matteson  
Publisher: Elsevier Mosby  
Edition: 2<sup>ND</sup> 11  
ISBN: 9780323057097



# Integrative Questions

- “Integrative” is a major component of the MCIP name, but many do not know how to define what it is.
- How does MCIP integrate coursework?
- How do you develop integrative questions?
- Are there examples of integrative questions that can help student prepare for their QE?

# Dictionary

- 1 : to form, coordinate, or blend into a functioning or unified whole : unite
- 2 : to find the integral of (as a function or equation)
- 3 a : to unite with something else b : to incorporate into a larger unit
- 4 a : to end the segregation of and bring into equal membership in society or an organization b : desegregate  
<integrate school districts>

# Integrative physiology can have many meanings

- Multidisciplinary research – especially by having collaborative work among labs with very different emphases.
- Using a diversity of techniques to study one topic
- Understanding how basic knowledge in one discipline can apply to a different discipline.
- Vertical integration from molecular to/from whole animal physiology

# Integration in MCP 210

- Recurring themes are brought up throughout the year.
- Physiology of exercise: Dr. Adams in the Endocrine section; Dr. Jones during his lectures on allometry; The impact of strenuous exercise on the reproductive process by Dr. Conley. Exercise physiology is also a topic addressed by Drs. Raybould and Lloyd in the context of GI physiology and Dr. Calvert in dealing with metabolism.
- The same repeated thematic approach characterizes the discussion of glucose homeostasis, stress and environmental physiology and immunology.

# Developing Integrative Questions

- The depth of knowledge expected should be geared to the current MCP 210 series for all areas except the specific area of research.
- Think about a specific concept or topic that you want to test.
- How does that concept relate to other areas of physiology?

# Example #1

- Inappropriate
- “Diagram glycolysis, identify the control points, and the effectors of those control points.”
- Very detailed, and requires memorization, not integration

# Example #1

- **Appropriate**
- **The high-protein, low-carbohydrate diet is recognized as a dietary regime that allows for body weight and body fat loss. Describe the difference in the hormonal milieu in the liver relative to a “normal” diet compared to the high-protein, low-carbohydrate diet and detail the effects on the control points for hepatic gluconeogenesis, glycolysis, Fatty acid synthesis and beta-oxidation and use these points to develop a hypothesis for the mechanism of action of the high-protein diet on body fat and weight loss.**

# Example #2

- Inappropriate
- “Describe how bile is synthesized.”
- No integration



# Example #2

- **Appropriate (good level and integrative)**
- **Contrast the gastrointestinal, cardiovascular, and pulmonary characteristics of the fight or flight responses.**
- **Physiological regulation of gastric function is mediated by neurocrine, endocrine, and paracrine pathways. Pick a gastric function, and give examples of the specific mediators for each of the 3 pathways regulating it.**

# Example #3

- Inappropriate
- Explain how Hodgkin and Huxley, winners of the Nobel prize in physiology and medicine, related conduction velocity and the traveling wave equation to their model of membrane permeability changes for an action potential. (Requires an advanced understanding of traveling waves and the relationship of these waves to a model based on voltage-clamp measurements, material not covered in core course. Moreover, this is not an integrative question.)

# Example #3

- **Appropriate**
- **Contrast physiological signaling mechanisms of neurons and endocrine cells. Based on this comparison, speculate on whether it is likely or unlikely that mammals will ever evolve that have only neurons or only endocrine cells.**

# Example #4

- Inappropriate
- Draw a representative neuron, label its components, and describe the principle function of each component. (This is again not an integrative question, and is pitched at an inappropriate elementary level.)

# Example #4

- **Appropriate**
- **Describe the physiological responses to a meal, including the mechanisms that regulate the cephalic, gastric, and intestinal phases of digestion.**