

LF210-18 Signalling and Integration in Health and Disease

20/21

Department

Life Sciences

Level

Undergraduate Level 2

Module leader

Kevin Moffat

Credit value

18

Module duration

11 weeks

Assessment

100% exam

Study location

University of Warwick main campus, Coventry

Description

Introductory description

Few cells exist in isolation and so organisms have evolved an elaborate network of signalling pathways that allow them to respond to their environment and communicate their level of activity with their immediate neighbours and cells far removed from the original stimulus. This module will examine the integrated response of hormonal and neuronal systems in detecting signals, interpreting information and modifying function accordingly in health and disease. Students will learn how a complex repertoire of extracellular signals is converted to a simpler set of electrical and chemical signals inside the cell and how these intracellular signals are subsequently used to evoke a whole tissue response. The module will introduce students to major areas of molecular endocrinology and underlying pathologies of endocrine diseases. This module provides a basic understanding of the molecular mechanism of hormone action and includes a description of the main hormone receptors and their signal transduction pathways. These provide a target for pharmacological intervention and the module takes basic concepts of pharmacodynamics and therapeutics and extrapolates these to physiological systems notably, the endocrine, the nervous systems. The over-arching aim is to bridge the gap between cell signalling, molecular biology and the complex patho-physiology of the disease state.

[Module web page](#)

Module aims

To understand general principles of human endocrine and neuronal signalling. To appreciate integration of these signalling elements both within the target cell and between systems to efficiently regulate function. To understand how pharmacology acts at the level of the receptor and to appreciate its use and limitations in the control of common disease conditions.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

General principles of cell signalling within the endocrine system

The HPA-axis (hypothalamus, pituitary and adrenals)

Insulin secretion and action, including the insulin receptor.

Integration of signals from the GI tract to regulate energy homeostasis

Calcium as a first messenger and the role of the thyroid and parathyroid glands

Sex hormones and endocrine control of fertility, reproduction and pregnancy.

Response mechanisms.

Structure and synthesis of cell signalling molecules

Intracellular receptors

Second messengers

Kinases

Integration of signalling pathways.

Principles of pharmacology

Principles of pharmacokinetics

Principles of pharmacodynamics

Pharmacology of the pancreas (hypoglycaemics), gastrointestinal tract (proton pump inhibitors), and the peripheral and central nervous systems.

General anesthetics.

Learning outcomes

By the end of the module, students should be able to:

- To understand general principles of human endocrine and neuronal signalling
- To appreciate integration of these signalling elements both within the target cell and between systems to efficiently regulate function
- To understand how pharmacology acts at the level of the receptor and to appreciate its use and limitations in the control of common disease conditions

Indicative reading list

Rang, H. P., Ritter, J. M.,
Flower, R. J. and Henderson, G.

Rang and Dale's Pharmacology
8th Edition 2016
Churchill Livingstone
ISBN: 978-0-7020-5362-7

Note: Thorough treatment of the subject and lecture module recommended for those pursuing biomedical subjects.

Dale, M. M. and Haylett, D. G.
Pharmacology Condensed
2nd Edition 2009
Churchill Livingstone
ISBN: 978-0-443-06773-0

Note: Alternative condensed version of Rang and Dale's Pharmacology with less detail.

Neal, M. J.
Medical Pharmacology at a Glance
8th Edition 2015
John Wiley and Sons Ltd.
ISBN: 978-0-470-65789-8

Note: Alternative lighter treatment of the subject with two-page summaries of the bare essentials for some topics.

Subject specific skills

Understand the general principles of cell signalling

Understand the basic organisation of the endocrine system

Understand the HPA-axis and the function of the pituitary in integrating hypothalamic-to-hormonal signals

Understand insulin secretion and signalling to regulate energy homeostasis and metabolism

Understand the role of various other endocrine signals, including PTH, thyroxine and sex hormones

Describe the major neurotransmitter systems for noradrenaline, acetylcholine, GABA, glutamate, purines, opioids, with reference to their receptors and role in physiological and pathological conditions

Understand drug metabolism, pharmacodynamics and pharmacokinetics

Understand the control of pain and induction of anaesthesia

Describe the general structure of the peripheral nervous system, the nature of the primary neurotransmitters and the type and location of their receptors

Understand how psychostimulants (eg amphetamine), antidepressants and antipsychotics act to influence brain and behaviour

Understand the mechanism of action of cannabinoids and psychedelic compounds, and their potential uses

Transferable skills

Adult learning, self directed learning, team based learning and quantitative skills

Study

Study time

Type	Required
Lectures	30 sessions of 1 hour (17%)
Tutorials	1 session of 1 hour (1%)
Private study	149 hours (83%)
Total	180 hours

Private study description

149 self directed learning, private study and revision

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group B1

	Weighting	Study time	Eligible for self-certification
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Assessment component

Online Examination	100%		No
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The examination for LF210 will be a 1.5 hr 'short answers' paper in June.

- Online examination: No Answerbook required

Reassessment component is the same

Feedback on assessment

Students receive cohort level feedback on the exam

[Past exam papers for LF210](#)

Availability

Courses

This module is Core for:

- UBSA-C700 Undergraduate Biochemistry
 - Year 2 of C700 Biochemistry
 - Year 2 of C700 Biochemistry
- ULFA-C1A2 Undergraduate Biochemistry (MBio)
 - Year 2 of C1A2 Biochemistry
 - Year 2 of C700 Biochemistry
- Year 2 of UBSA-C701 Undergraduate Biochemistry (with Intercalated Year)
- Year 2 of ULFA-C1A6 Undergraduate Biochemistry with Industrial Placement (MBio)