LF303-12 Medical Virology

20/21

Department
Life Sciences
Level
Undergraduate Level 3
Module leader
Keith Leppard
Credit value
12
Module duration
20 weeks
Assessment
10% coursework, 90% exam
Study location
University of Warwick main campus, Coventry

Description

Introductory description

Our aim in this module is to consider some of the key processes and strategies that shape our interaction with medically significant viruses, things such as virus evolution and vaccination, in the context of some of the main viral pathogens that afflict us today.

The virology landscape is ever-changing and this module will address some of the reasons for that and consider how that change occurs.

Module web page

Module aims

The module covers important examples of human viral pathogens and some of the underlying principles that underpin our understanding of these pathogens. Its aim is to introduce students to the current and potential future pandemic viral pathogens and to provide insight into the principles that govern the emergence, evolution, transmission and control of these viruses.

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.

- HIV - evolution, quasispecies, transmission
- Hepatitis viruses – B, C and others
- Influenza A virus - shift, drift, emergence and zoonosis, evolution, vaccines
- A selection of other (incl emerging) viruses: rotaviruses, flaviviruses, dengue, WNV, Ebola, SARS, Nipah etc, considering emergence, spread, disease potential, prevention etc
- Cross-cutting themes of virus variation, evolution, vaccination and epidemiology

Learning outcomes

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

- An understanding of the major global viral health threats, and how further viruses can emerge to contribute to the human health burden.

Indicative reading list

D. L. Thomas (2013) Global control of hepatitis C: where challenge meets opportunity. Nat Medicine 19 (7) 850-858.
E. de Clercq (2015) Current treatment of hepatitis B virus infections. Revs Med Virol 25 (6) 354-365.
L. Botelho-Souza et al (2017) Hepatitis delta: virological and clinical aspects. Virology J 14, article 177.
WHO Global Hepatitis Report, 2017. http://www.who.int/hepatitis/publications/global-hepatitis-report2017/en/
W. Gelson and G. Alexander (2017) Is elimination of hepatitis C from the UK by 2030 a realistic goal? Brit Med Bull 123, 59-67.
Y. Nan et al. (2017) Zoonotic hepatitis E virus: an ignored risk for public health. Front Microbiol 8, article 2396.
Sharp PM and Hahn BH (2010) The evolution of HIV-1 and the origin of AIDS. Philosophical Transactions of the Royal Society 365: 2487.
Heeney JL et al (2006) Origins of HIV and the evolution of resistance to AIDS. Science 313: 462.
Kirchhoff F (2010) Immune evasion and counteraction of restriction factors by HIV-1 and other primate lentiviruses. Cell Host Microbe 8: 55.
O’ Connell K and Siliciano R (2008) Immune alteration fends off AIDS. Nature Medicine 14: 1016.
Faria NR et al (2014) The early spread and epidemic ignition of HIV-1 in human populations. Science 346: 56.
T. Watanabe and Y Kawaoka (2011). Pathogenesis of the 1918 pandemic influenza virus. PLoS Path 7: e1001218. doi:10.1371/journal.ppat.1001218
J.Taubenberger et al. (2001). Integrating historical, clinical and molecular genetic data in order to explain the origin and virulence of the 1918 Spanish influenza virus. Phil Trans R Soc Lond B 356: 1829-1839
WHO (2008) Update on avian influenza A (H5N1) virus infection in humans. New England J. Med. 358, 261-273
G. Neumann et al. (2009) Emergence and pandemic potential of swine-origin H1N1 influenza. Nature 459, 931-939. [An excellent review from early in the pandemic]

B.G.Hale et al. (2008) The multifunctional NS1 proteins of influenza A viruses. J Gen Virol 89, 2359-2376
D.M.Morens et al. (2013) H7N9 Avian Influenza A Virus and the Perpetual Challenge of Potential Human Pandemicity. MBIO 4: e00445-13 (DOI:10.1128/mBio.00445-13)
M.Worobey, G-Z.Han and A.Rambaut (2014) Genesis and pathogenesis of the 1918 pandemic H1N1 influenza A virus. PNAS 111: 8107-8112
Lorrot M and Vasseur M (2007). How do the rotavirus NSP4 and bacterial enterotoxins lead differently to diarrhea? Virology Journal 4, 31 (doi: 10.1186/1743-422X-4-31)
Arnold M M (2016). The rotavirus interferon antagonist NSP1: many targets, many questions. J Virol 90, 5212-5215
Yen C, Tate JE, Hyde TB, et al. Rotavirus vaccines: Current status and future considerations. Human Vaccines & Immunotherapeutics. 2014;10(6) 1436-1448.
Desselberger U (2014) Rotaviruses. Virus Research 190, 75-96. Sections 3, 7-11 are relevant, other sections provide a useful reference for look-up if needed.
Tate JE et al (2016) Global, regional and national estimates of rotavirus mortality in children <5 years of age, 2000-2013. Clin Infect Dis 62 (suppl2) S96-S105.
Delwart E (2013) A Roadmap to the Human Virome. PLoS Pathog 9(2): e1003146.
Wu Z et al (2016) Deciphering the bat virome catalog to better understand the ecological diversity of bat viruses and the bat origin of emerging infectious diseases. The ISME Journal: 10, 609-620
Foxman E.F. and Iwasaki, A. (2011) Genome-virome interactions: examining the role of common viral infections in complex disease. Nature Reviews Microbiology 9:254

Subject specific skills

a. Demonstrate clear understanding of the scientific topic

b. Contain evidence of extended reading and lateral integration of material not covered in the lectures

c. Demonstrate independent thought and deep understanding

d. Specifically answer the set question using information from multiple lectures and sources

e. Be structured and formatted in a way that demonstrates understanding and logical flow

f. Use multiple sources to construct complex scientific arguments and integrating these to build and develop the student's own scientific conclusions.

Transferable skills

1. Critical appraisal of source material
2. Self directed learning
3. Adult learning

Study

Study time

Type	Required
Lectures	14 sessions of 1 hour (12%)
Work-based learning	6 sessions of 1 hour (5%)
Private study	100 hours (83%)
Total	120 hours

Private study description

Independent learning, self directed learning and revision for final year exams

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group D

	Weighting	Study time	Eligible for self-certification
Assessment component			
Group activity	10%		No
Two workshops and Virology Diary (forum contributions) & (written group contributions)			
Reassessment component is the same			
Assessment component			
Written Examination	90%		No
1.5 hour examination (April): 2 essay- style questions from a choice of 4.			
Reassessment component is the same			

Feedback on assessment

Group-level feedback on workshop contributions.
Class-level feedback on examination answers.

Past exam papers for LF303

Availability

Courses

This module is Core for:

- Year 3 of UBSA-3 Undergraduate Biological Sciences

This module is Core optional for:

- Year 3 of UBSA-C1B9 Undergraduate Biomedical Science
- Year 3 of ULFA-C1A3 Undergraduate Biomedical Science (MBio)

This module is Optional for:

- Year 3 of ULFA-C1A7 Undergraduate Biomedical Science with Industrial Placement (MBio)

This module is Option list A for:

- Year 3 of UBSA-C1B9 Undergraduate Biomedical Science
- ULFA-C1A3 Undergraduate Biomedical Science (MBio)
    - Year 3 of C1A3 Biomedical Science
    - Year 3 of C1B9 Biomedical Science