

LF303-15 Medical Virology

21/22

Department

Life Sciences

Level

Undergraduate Level 3

Module leader

Keith Leppard

Credit value

15

Module duration

10 weeks

Assessment

Multiple

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 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
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Study

Study time

Type	Required
Lectures	14 sessions of 1 hour (8%)
Work-based learning	6 sessions of 1 hour (3%)
Private study	130 hours (72%)
Assessment	30 hours (17%)
Total	180 hours

Private study description

130 hrs of self-study and directed reading to prepare for the open book assessment

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 A

	Weighting	Study time	Eligible for self-certification
Group Activity	10%	10 hours	No
Two workshops and Virology Diary (forum contributions) & (written group contributions)			
Open Book Assessment	90%	20 hours	No
Final assessment for the module will be on open book assessment. This is an essay based assessment consisting of 4 questions- students need to answer 2. The essays cannot be answered using lecture notes alone- students will need to perform background research and essays will need to be fully referenced.			

Assessment group R

	Weighting	Study time	Eligible for self-certification
Open Book Assessment	100%		No
Final assessment for the module will be on open book assessment. This is an essay based assessment consisting of 4 questions- students need to answer 2. The essays cannot be answered using lecture notes alone- students will need to perform background research and essays will need to be fully referenced.			

Feedback on assessment

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

Availability

Courses

This module is Optional 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

- Year 3 of ULFA-C1A7 Undergraduate Biomedical Science with Industrial Placement (MBio)
- Year 4 of ULFA-CB18 Undergraduate Biomedical Science with Placement Year
- Year 3 of ULFA-B140 Undergraduate Neuroscience (BSc)
- Year 3 of ULFA-B142 Undergraduate Neuroscience (MBio)
- Year 3 of ULFA-B143 Undergraduate Neuroscience (with Industrial Placement) (MBio)