Malaria

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Learning outcomes

- Knowledge of malaria pathogenesis and clinical presentation
- Understand *principles* of malaria control, prophylaxis and treatment
- Understand how to diagnose malaria
- Know how to approach fever in the returning traveller and some differential diagnoses
- Knowledge of the commoner conditions seen in returning travellers

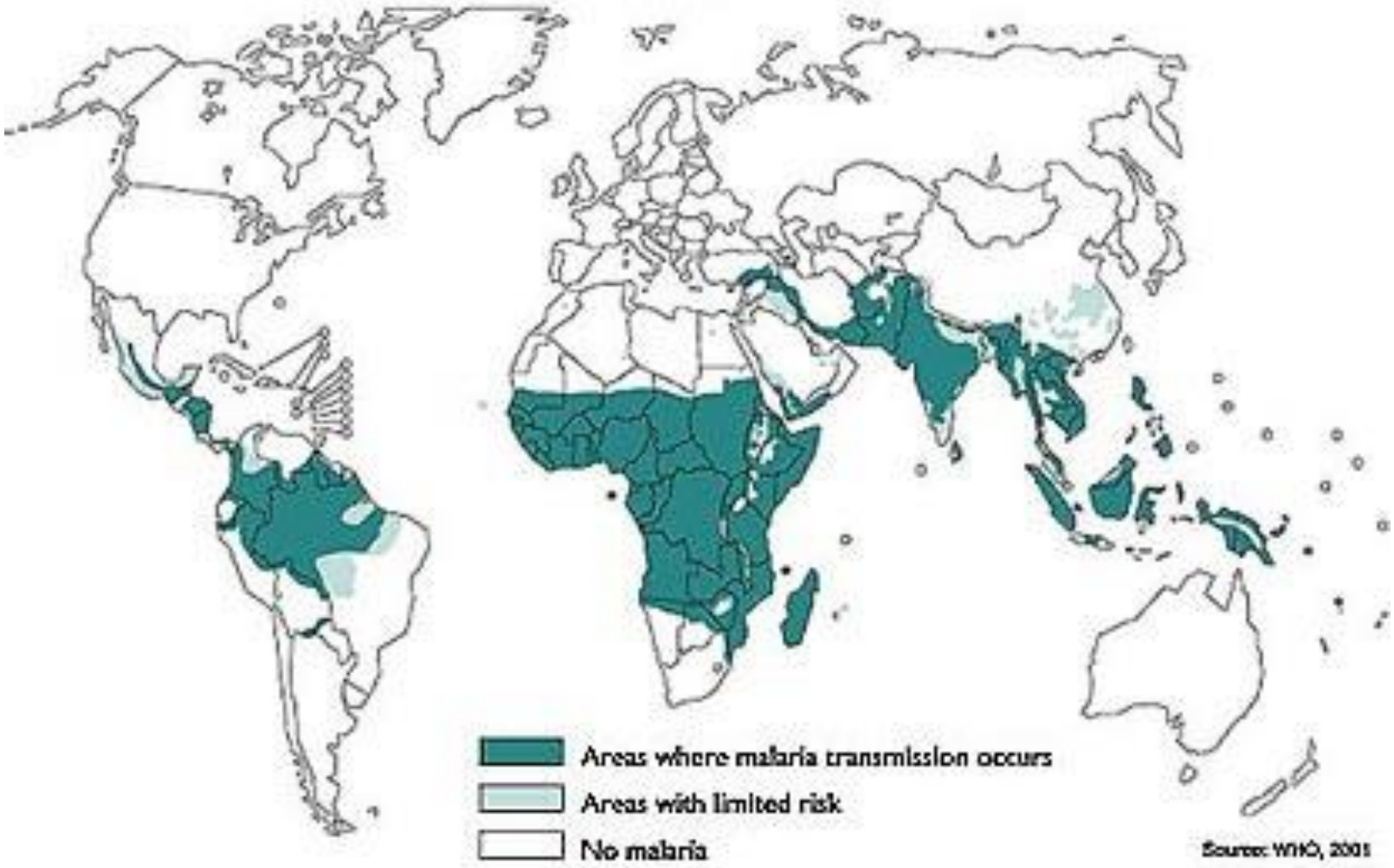
Malaria

- Vector-borne protozoan parasite, *Plasmodium spp*
- Vector is the female Anopheles mosquito

Anopheles mosquitoes

- 430 species, worldwide except Antarctica
- Only 30-40 species transmit malaria in nature
- *An. gambiae* and *An. funestus*

Malaria – geographical distribution



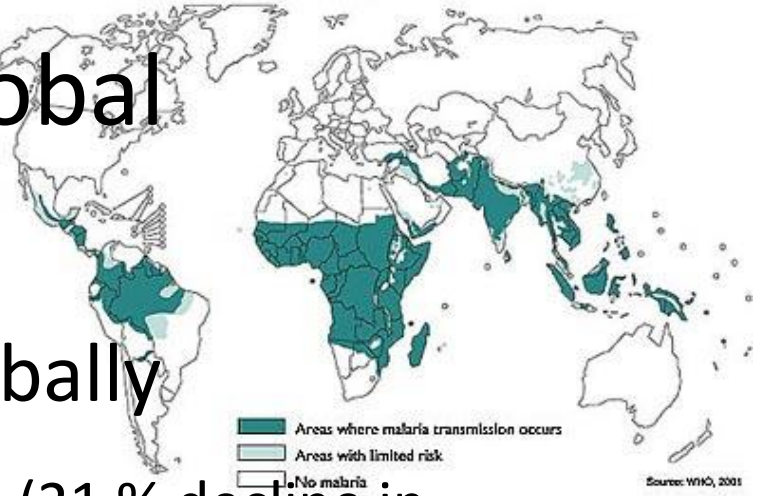
Malaria control is one of the highest priorities on the international health agenda

Millennium Development Goal 6 (UN) (expired 2015)

WHO Global Technical Strategy for Malaria 2016–2030

Roll Back Malaria Partnership (WHO, UNICEF, UNDP and the World Bank)

Malaria – global burden



- 3.3 billion people at risk globally
- ~212* million cases in 2015 (21 % decline in incidence since 2010 and 29% decline in mortality)
- 429 000** deaths in 2015
  - 303 000 were aged <5
- > 90% of deaths in sub-Saharan Africa
- Malaria is no longer the leading cause of death among children in sub-Saharan Africa

WHO World Malaria Report 2016

***later revised down to 211m**

****later revised to 446 000 (estimated)**

World malaria report 2017

29 November 2017

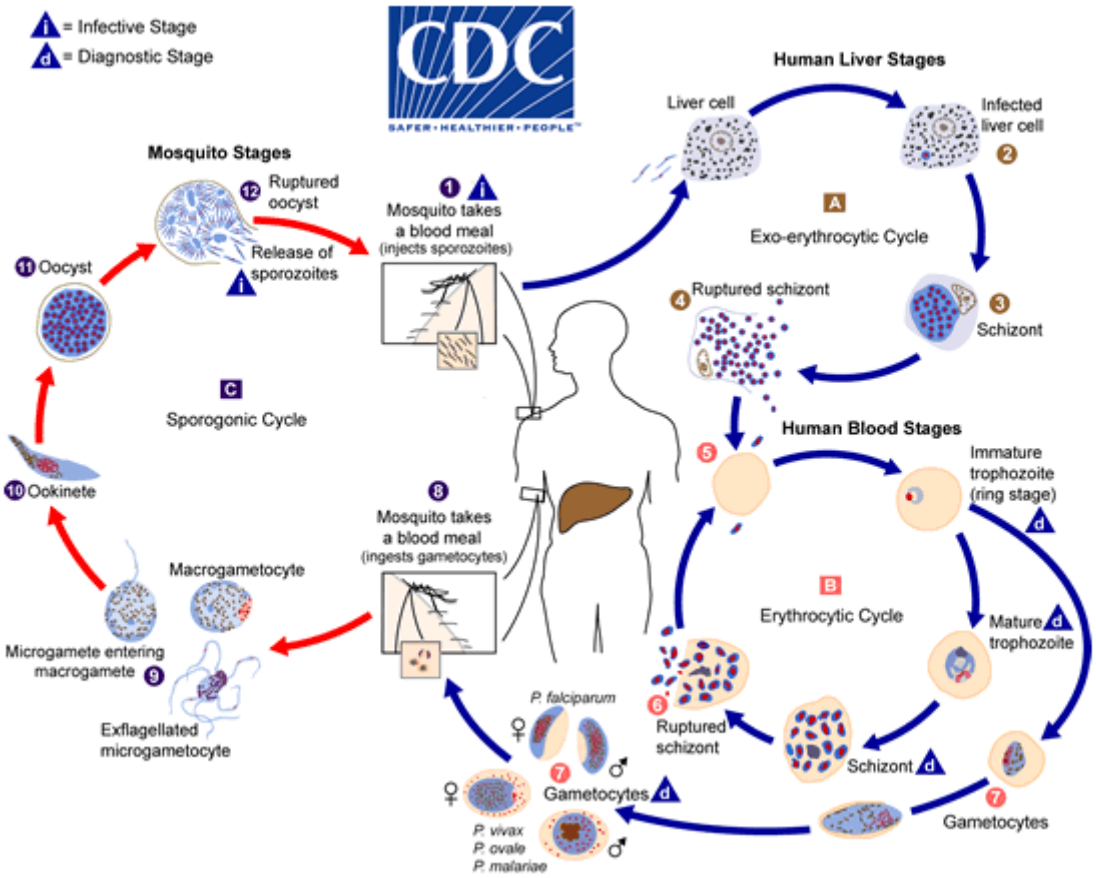
The *World malaria report 2017* draws on data from 91 countries and areas with ongoing malaria transmission. The information is supplemented by data from national household surveys and databases held by other organizations.

This year's report shows that after an unprecedented period of success in global malaria control, progress has stalled. In 2016, there were an estimated 216 million cases of malaria, an increase of about 5 million cases over 2015. Deaths reached 445 000, a similar number to the previous year.

Species of malaria

- 5 species infect humans:
  - *P. falciparum*
  - *P. vivax*
  - *P. ovale*
  - *P. malariae*
  - *(P. knowlesi)*

Life-cycle of malaria



Clinical presentation

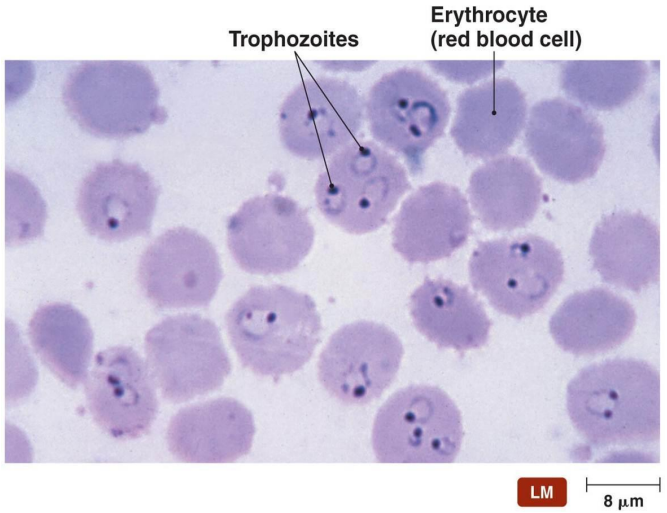
- Incubation period 7-30 days
  - Travel prophylaxis can delay the appearance of malaria symptoms by weeks/months, esp. with *P. vivax* and *P. ovale*
  - Consider travel in malarial areas during the past 12 months.
- **Fever and rigors**
- (may be afebrile when seen but typically give a history of fever or chills).
- Fevers begin abruptly, are chaotic
- Rarely periodic until 7-14 days later when synchronous release of parasites established
  - Every 3rd day (tertian fever) – vivax and ovale
  - Every 4th day (quartan fever) - malariae

Clinical presentation

- Non-specific symptoms:
  - Abdo pain
  - Headache
  - Dysuria/frequency
  - Sore throat/cough
- Splenomegaly may be present
- Hepatomegaly and mild jaundice in relapsing malaria

Falciparum malaria

- Falciparum or ‘malignant’ malaria may be **life-threatening**
- Medical emergency
- Can have high parasitaemia
- Sludging of parasitized red cells in small vessels
- Blackwater fever
  - High parasitaemias causing intravascular haemolysis, lead to jaundice, profound anaemia, haemoglobinuria & ARF if untreated
- Cerebral malaria
  - Encephalopathy
  - Children <4y (ΔΔx bacterial meningitis)
  - Hypoglycaemia, seizures, hypoxia
- Pulmonary oedema



Vivax malaria

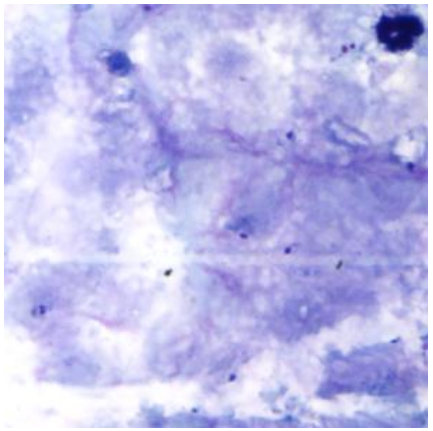
- wider range then falciparum because can survive in mosquito at lower temperatures
- eradication of hypnozoites needed after treatment of vivax and ovale, otherwise relapse can occur after months
- Vivax more prevalent in Asia, as African populations have high rate of Duffy gene, which prevents *P. vivax* invading RBC
- Lower parasitaemias as prefer younger RBC, cf falciparum which infects all

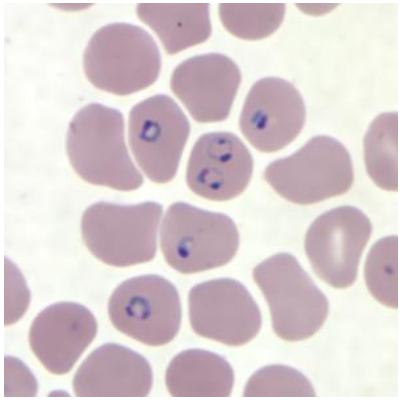
Diagnostic testing

- WHO recommends diagnostic testing for all people with suspected malaria before treatment is administered.
- Rapid diagnostic testing (RDTs), introduced widely over the past decade, has made it easier to swiftly distinguish between malarial and non-malarial fevers, enabling timely and appropriate treatment.
- In 2015, approximately half (51%) of children with a fever who sought care at a public health facility in 22 African countries received a malaria diagnostic test compared to 29% in 2010.

Malaria - diagnosis

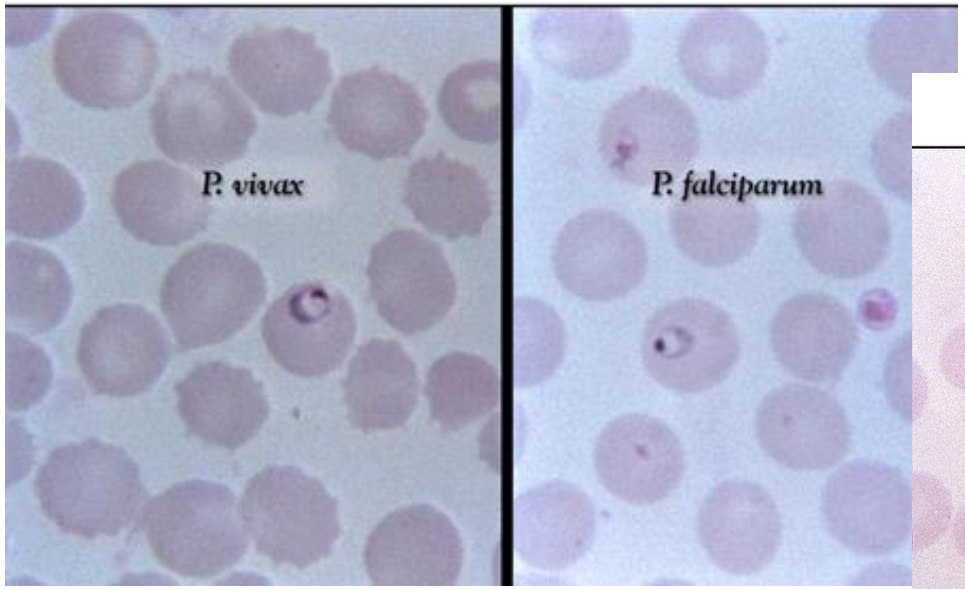
- Gold standard – **microscopy of blood film**
  - Thick film for screening
  - Thin film for speciation & estimate of parasitaemia



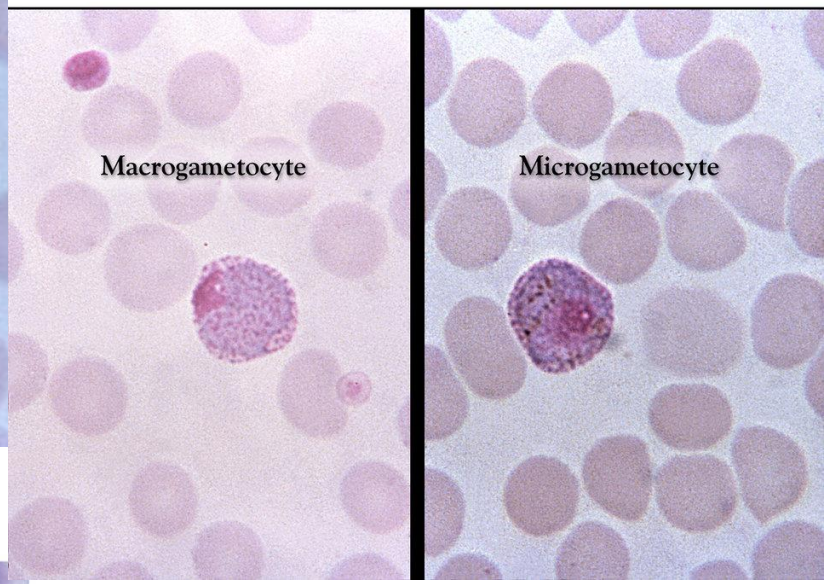


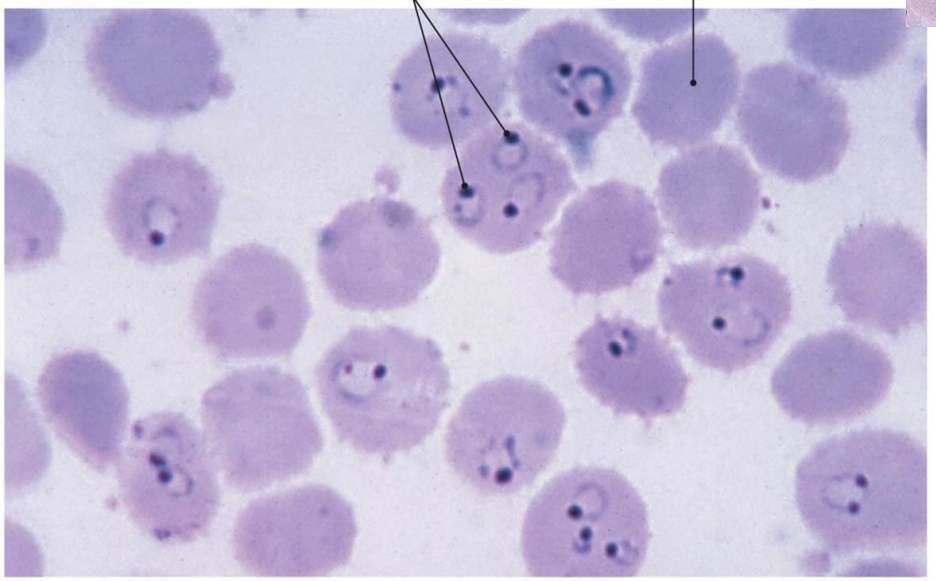
- **If negative, repeat after 12-24 hours and after another 24 hours**

Ring-form Trophozoites



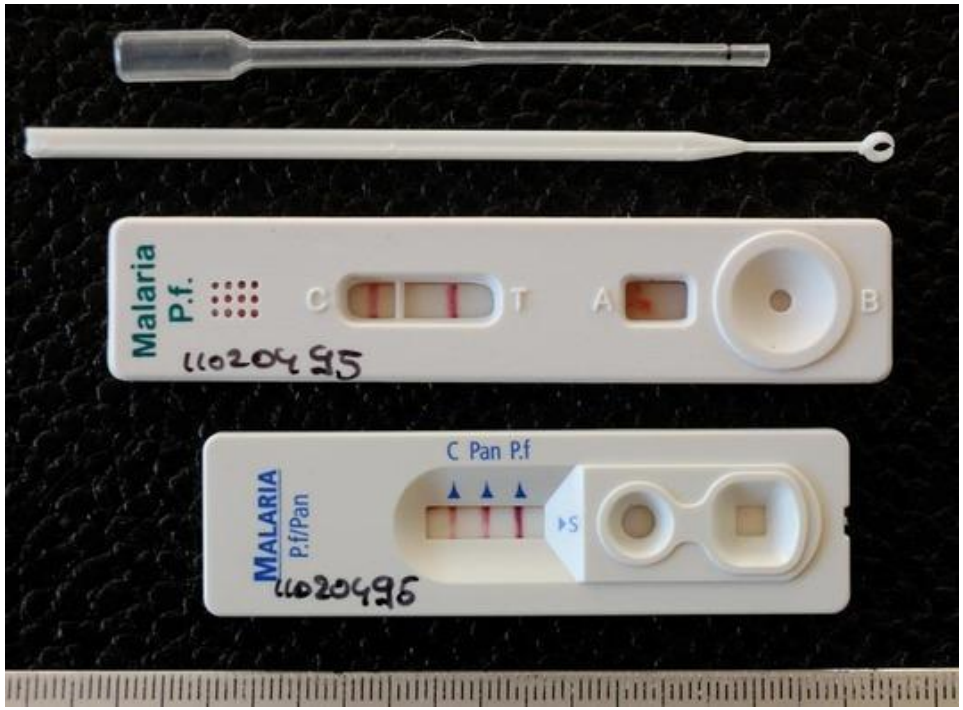
Plasmodium vivax





Malaria RDTs (rapid diagnostic tests)

- Dipstik format immunochromatography
- Detects malaria antigens by using dye-labelled antibodies to bind them



Issues with RDTs

Advantages

Can be used by staff with limited training

Can be rapidly available e.g. on call/village setting

Modern RDTs are high-quality

Potentially allows 'universal testing' to prevent overtreatment (WHO 2010)

Problems

Cannot speciate (except falciparum)

Re-supply issues – need long shelf life

Limited temperature control - prolonged exposure tropical temp

Life-threatening situation – need high sensitivity and no over-reliance on negative result

Malaria – management of infection

- **ALWAYS** seek specialist advice
- WHO recommends treating uncomplicated falciparum malaria with ACT
- ACT – artemisinin combination therapy
- UK guidance from British Infection Association

Journal of Infection (2016) 72, 635–649

ELSEVIER

BIAMM British Infection Association

www.elsevierhealth.com/journals/jinf

UK malaria treatment guidelines 2016

David G. Lalloo [a,*], Delane Shingadia [b], David J. Bell [c], Nicholas J. Beeching [a], Christopher J.M. Whitty [d], Peter L. Chiodini [e], for the PHE Advisory Committee on Malaria Prevention in UK Travellers

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Accepted 6 February 2016
Available online 12 February 2016

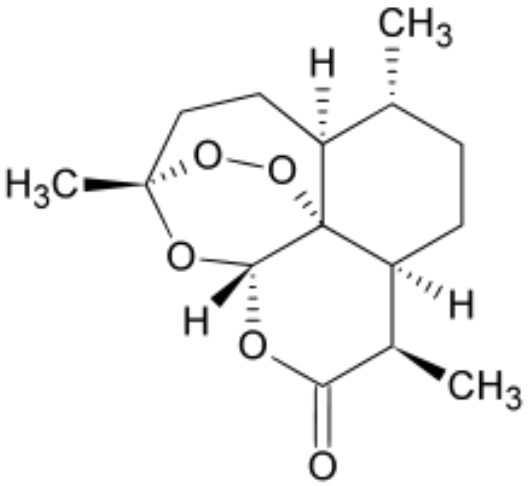
Tu Youyou

‘Project 523’ 1967

‘Prescriptions for 52 diseases’ c.200 BC

Artemisinin

- *Artemisia annua* – sweet wormwood
- Quinghaosu



Artemisinin Combination Therapy - ACT

- **Always** use artimisinin in combination, e.g. with:
  - lumefantrine, mefloquine, amodiaquine, sulfadoxine/pyrimethamine, piperaquine and chlorproguanil/dapsone
- Chloroquine still effective in some areas for *P. vivax*
- Must also kill liver stages *P. vivax & P. ovale*
  - *Primaquine*
  - *Tafenoquine* recently FDA licensed

New drug for recurring malaria

By Smitha Mundasad
Global Health Correspondent, BBC News

23 July 2018 Share

A new drug to treat malaria has been given the green light by authorities in the United States.

The medicine is specifically for the recurring form of malaria - caused by the parasite plasmodium vivax - which makes 8.5 million people ill each year.

Prof Ric Price, of Oxford University, told the BBC: "The ability to get rid of the parasite in the liver with a single dose of tafenoquine is a phenomenal achievement and in my mind it represents one of the most significant advances in malaria treatment in the last 60 years."

Malaria interventions

Highly effective and affordable

- Vector control
- Chemoprophylaxis
- Case management

Anophelene characteristics

- Anthropophilic vs zoophilic
- Endophagic vs exophagic
- Exophilic vs endophilic
- Crepuscular/nocturnal feeders
- Successful development of parasite depends on:
  - ambient temperature and humidity
  - Survival of mosquito for long enough (10-18 days)
  - Most only live 1-2 weeks

Vector control

- Core – LLIN and IRS: reduce incidence of malaria by c. 50%
- LLIN – long-lasting insecticidal nets
  - ITN – insecticide-treated net (bednet): 49% people now have access cf 3% in 2004

- IRS -Indoor residual spraying
  - Most commonly pyrethroids
  - Problem of resistance
- Supplementary –larval source management

Preventive therapies

- IPTp - intermittent preventive treatment in pregnancy - 2nd and 3rd trimester
  - Reduces severe maternal anaemia, low birth weight and perinatal mortality
- SMC – seasonal malaria chemoprevention
  - children age 3-59 months in Sahel subregion of Africa
- IPTi - intermittent preventive treatment in infants
  - At routine immunisation clinics

Malaria vaccine?

- RTS,S/AS01 (‘Mosquirix’)
  - GSK - with support from Bill and Melinda Gates Foundation
- Phase three trials in Africa, reported April 2015
- severe malaria in 5-17 month old children receiving four doses at 0, 1, 2, and 20 months was cut by a third
  - reductions in severe anaemia, malaria hospitalizations and all-cause hospitalizations also seen.
- Without the 20 month booster no protection was seen against severe malaria - efficacy is short-lived.
- Did not protect young babies

WHO meeting report October 2015

‘One primary outstanding question … is the extent to which the protection demonstrated in the Phase 3 trial can be replicated in the context of the routine health system because of the challenge of implementing a four-dose schedule.’

‘To address this question... recommend to evaluate RTS,S in pilot implementations before wider country level introduction is considered.’

‘These pilot implementations should be done in the context of ongoing coverage of other proven malaria control measures, particularly long lasting insecticidal treated nets, access to rapid diagnostic tests, artemisinin-b based combination therapy, and seasonal malaria chemoprevention where appropriate.’

Malaria: Kenya, Ghana and Malawi get first vaccine

By James Gallagher
Health and science reporter, BBC News website

24 April 2017 | Health

Share

The vaccine has been tested extensively in more than 15,000 children

The world's first vaccine against malaria will be introduced in three countries - Ghana, Kenya and Malawi - starting in 2018.

WHO Global Technical Strategy for Malaria 2016–2030

- ‘This Strategy sets ambitious but attainable goals for 2030, with milestones along the way to track progress. The milestones for 2020 include:
- Reducing malaria case incidence by at least 40%;
- Reducing malaria mortality rates by at least 40%;
- Eliminating malaria in at least 10 countries;
- Preventing a resurgence of malaria in all countries that are malaria-free.’

Malaria – travel prophylaxis

- https://www.gov.uk/government/publications/malaria-prevention-guidelines-for-travellers-from-the-uk

- Seek **specialist advice** from a travel clinic at several weeks before travel
- Options include doxycycline, malarone and mefloquine dependent on destination
- **Not 100% effective – combine with personal protection**
  - insect repellent, long sleeves, long pants, sleeping in a mosquito-free setting or using an insecticide-treated bednet, avoid being out at dusk/dawn

Imported malaria cases by species and region of travel, United Kingdom: 2017

Region of acquisition [1]	*P.falciparum	P.vivax	P.ovale	P.malariae	Mixed	P.knowlesi	2017 total	2016 total
Western Africa	1013	-	66	29	9	-	**1117**	**932**
Middle Africa	104	1	7	8	-	-	**120**	**160**
Eastern Africa	182	14	22	11	-	-	**229**	**218**
Northern Africa	16	-	1	2	-	-	**19**	**25**
Southern Africa	11	-	1	-	-	-	**12**	**4**
Africa - unspecified	18	1	2	-	1	-	**22**	**15**
Southern Asia	4	116	-	1	-	-	**121**	**123**
South-Eastern Asia	2	2	-	-	-	2	**6**	**3**
Western Asia	-	3	-	-	-	-	**3**	**-**
South America	2	4	-	-	-	-	**6**	**4**
Caribbean	-	-	-	-	-	-	**-**	**2**
Oceania	-	3	-	-	-	-	**3**	**3**
Not stated	100	20	9	4	1	-	**134**	**129**
Total	**1452**	**164**	**108**	**55**	**11**	**2**	**1792**	**1618**

https://www.gov.uk/government/publications/imported-malaria-in-the-uk-statistics

Imported malaria cases by species and reason for travel, United Kingdom: 2017 (PHE)

Imported malaria cases by species and reason for travel, United Kingdom: 2017

Data from the PHE Malaria Reference Laboratory

Reason for travel	*P.falciparum	P.vivax	P.ovale	P.malariae	Mixed	P.knowlesi	2017 Total	2016 Total
Visiting family in country of origin	673	77	41	18	5	-	814	711
Holiday travel	81	12	8	5	-	2	108	96
Foreign visitor ill while in UK	69	6	4	-	-	-	79	73
New entrant	24	17	3	2	-	-	46	55
Business/professional travel	69	4	6	8	-	-	87	79
UK citizen living abroad	12	1	2	-	-	-	15	17
Foreign student studying in the UK	12	3	4	-	-	-	19	39
Civilian sea/air crew	1	-	-	-	-	-	1	2
British armed services	5	-	4	1	-	-	10	4
Children visiting parents abroad	-	-	-	-	-	-	-	1
Not stated	506	44	36	21	6	-	613	541
Total	**1452**	**164**	**108**	**55**	**11**	**2**	**1792**	**1618**

https://www.gov.uk/government/publications/imported-malaria-in-the-uk-statistics

Fever in the returning traveller

Fever in the returning traveller

- Cause of uncertainty and concern for medical staff who feel inexperienced in imported diseases
- Presentation of most imported diseases is very similar, and co-infections with more than one agent are also relatively common.
- By the end of this session you should know how to sensibly approach such cases and cover the basics before seeking specialist help

Fever in the returning traveller – common causes in UK

- **Malaria** - commonest cause of acute fever after travel to sub-Saharan Africa
- **Dengue** (an arbovirus) – commonest cause of acute fever after travel to Latin America or Asia
- **Enteric fever (Typhoid)**
- **Non-travel associated (e.g. pyelonephritis, pneumonia, meningitis...)**
- **HIV seroconversion/**other STI

More causes by region of travel

- Africa: **malaria, rickettsia,** amoebic liver abscess, Katayama syndrome (schistosomiasis)
  - **West Africa: risk assess for Viral Haemorrhagic Fever (VHF)**
- South and South East Asia: **enteric fever** and **dengue**/arboviral infection
- Middle East: brucellosis
  - **Risk assess for Middle East Respiratory Syndrome (MERS)**
- Hajj: meningococcal meningitis/sepsis
- Horn of Africa: visceral leishmaniasis

- Always consider malaria and TB

The returning traveller - history

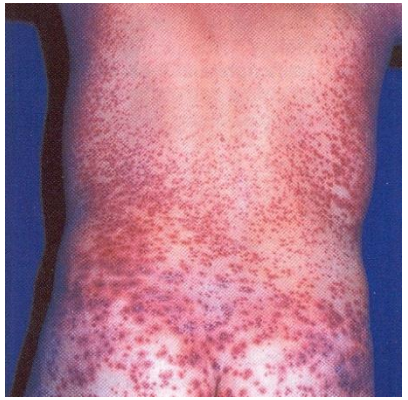
- Exact areas travelled to
- Dates of travel and illness onset
- Activities/accommodation – rural/camping/trekking?
- Pre-travel vaccinations and prophylaxis
- Precautions taken – bed net? Took prophylaxis properly? Bitten a lot?
- Drinking water
- Food
- Sexual activity

Dengue

- **An arbovirus - Ar**thropod-**bo**rne **viruses**
- Vectors eg mosquitoes, ticks, sandflies
- Examples:
  - Dengue
  - West Nile virus
  - Yellow fever
  - Chikungunya

Dengue

- aka **break-bone fever**
- **Virus**
- 4 serotypes, DEN-1-4
- 3-14 days after bite of *Aedes aegypti* mosquito
  - Fever up to 41°C
  - headache
  - pain behind the eyes
  - bone, muscle and joint pain



- NB *haemorrhagic dengue*: fever, abdominal pain, persistent vomiting, bleeding and breathing difficulty

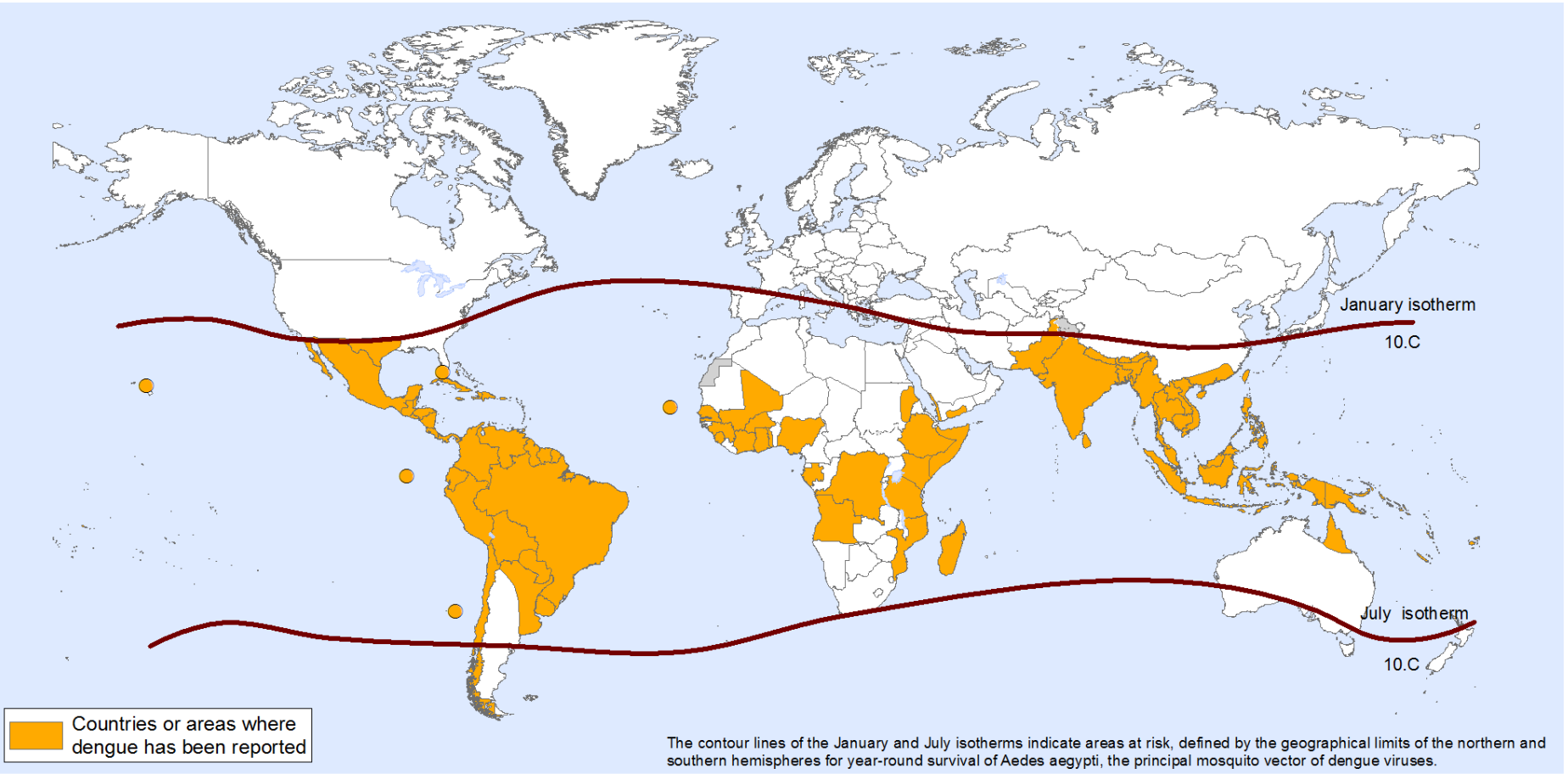
- Supportive therapy. Avoid bites. Fatality <1% with early diagnosis and proper medical care

Immunization

In late 2015 and early 2016, the first dengue vaccine, Dengvaxia (CYD-TDV) by Sanofi Pasteur, was registered in several countries for use in individuals 9-45 years of age living in endemic areas.

WHO recommends that countries should consider introduction of the dengue vaccine CYD-TDV only in geographic settings (national or subnational) where epidemiological data indicate a high burden of disease. Complete recommendations may be found in the WHO position paper on dengue:

Dengue, countries or areas at risk, 2013



The contour lines of the January and July isotherms indicate areas at risk, defined by the geographical limits of the northern and southern hemispheres for year-round survival of Aedes aegypti, the principal mosquito vector of dengue viruses.

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
Map Production: Health Statistics and Information Systems (HSI)
World Health Organization

World Health Organization

UK confirmed cases of dengue by region of travel 2009-2014 (Rare and Imported Pathogens Laboratory)

https://www.gov.uk/government/collections/dengue-fever-guidance-data-and-analysis

UN Regions*	2009	2010	2011	2012	2013	2014
South-Eastern Asia	66	133	52	109	199	186
Southern Asia	42	127	71	102	142	78
Eastern Africa	8	11	3	1	12	22
Caribbean	5	36	25	48	83	18
Southern and Central America	7	31	16	16	35	14
Other Africa	10	7	4	3	18	10
Other	4	4	2	7	13	17
Southern Europe**	-	-	-	20	-	-
Country not stated	34	99	60	67	85	58
No travel	-	-	-	-	-	1
Total	**176**	**448**	**233**	**373**	**587**	**404**

Chikungunya

- Kimakonde language “to become contorted”
- Mosquito-borne virus transmitted by female Aedes mosquito.
- Symptoms range from mild or non-existent to severe
- Sudden onset of fever usually accompanied by joint pain (arthralgia); also headache, fatigue, nausea, muscle pain, rash
- usually resolves within few days; serious complications uncommon though joint pain may persist for months/years.
- incubation period 3-7 days.
- no vaccine or specific anti-viral treatment

Chikungunya

- First discovered in Africa
- In 2005, the African strain of chikungunya virus mutated and spread across the islands of the Indian Ocean
- In 2006-7 the outbreak extended to India
- At the end of 2013, indigenously acquired chikungunya was first reported in St Martin in the Caribbean.
- By 13 March 2015, most countries and territories in the Caribbean and parts of South and Central America had reported cases of indigenous chikungunya.

Laboratory-confirmed cases of chikungunya by region of travel, England, Wales and Northern Ireland: 2009 - 2014

World region* of travel	2009	2010	2011	2012	2013	2014
Caribbean	-	-	-	-	-	227
Southern Asia	23	43	12	5	10	13
South America	-	-	-	-	-	12
South-Eastern Asia	21	10	1	8	13	10
Sub-Saharan and Southern Africa	7	9	2	2	2	6
Other	1	1	-	-	1	2
Country not stated	11	16	-	1	2	30
Total	**63**	**79**	**15**	**16**	**28**	**300**

Data provided by the Rare and Imported Pathogens Laboratory, PHE Centre for Emergency Preparedness and Reponse, Porton Down.

Enteric fevers - typhoid & paratyphoid

- *Salmonella enterica* serovars typhi or paratyphi (‘*S. typhi*’)
- Incubation 6/7 - 4/52, average 2/52
- First symptoms: fever, headache, myalgia, cough and constipation.
- Later, diarrhoea, nausea and abdominal pain; ‘rose spots’
- May last several weeks
- Paratyphi usually milder

Presumed to have infected 51 people, three of whom died, over the course of her career as a cook…

Trail of victims

Would not accept she was a carrier

Would not give up working as a cook (changed her name)

Exiled twice to North Brother Island, NY

Typhoid/paratyphoid epidemiology

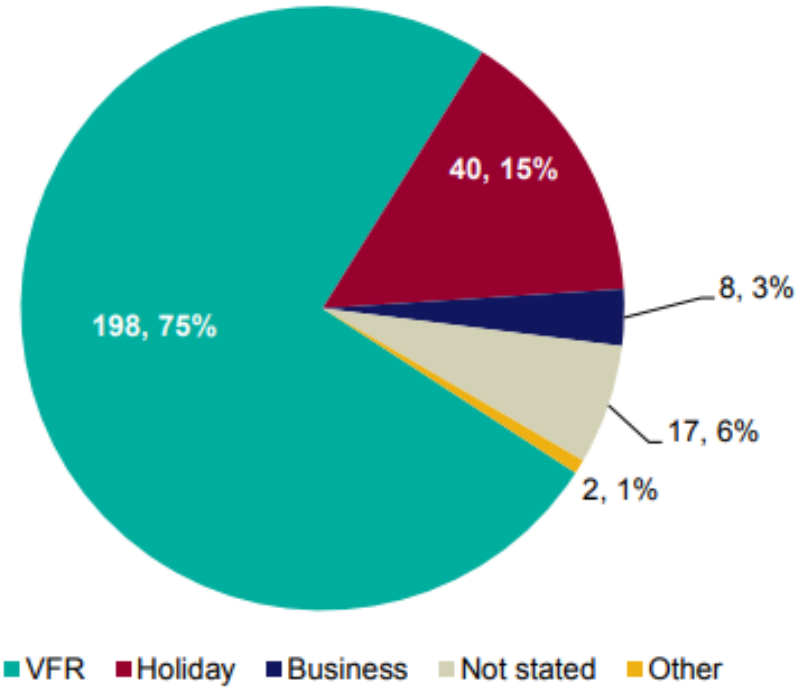
- c. 22m cases annually globally
- about 300 UK cases annually
- In 2014, there were 22 confirmed cases of symptomatic enteric fever in the UK where no travel abroad was reported, 14 were caused by *S. typhi*, seven by *S. paratyphi* A and one by *S. paratyphi* C.
- Contaminated water/faeco-oral spread
- **BOIL IT, COOK IT, PEEL IT OR FORGET IT!** (WHO)
- typhoid vaccine effective for 3 years

Table 1. Laboratory-confirmed symptomatic cases of enteric fever, England, Wales and Northern Ireland by organism: 2007 – 2016

Year	*S.*Typhi	*S.* Paratyphi A	*S.* Paratyphi B	*S.* Paratyphi C	Mixed infection	Total	% *S.* Typhi
2007	254	208	15	1	2	480	52.9%
2008	267	235	18	-	-	520	51.3%
2009	247	185	25	-	-	457	54.1%
2010	285	211	16	-	-	512	55.7%
2011	253	219	7	-	1	480	52.7%
2012	177	162	12	2	1	354	49.9%
2013	185	121	6	-	-	312	59.3%
2014	185	114	10	1	1	311	59.5%
2015	169	107	26	-	-	302	56.0%
2016	172	133	8	-	-	313	55.0%

PHE data

Figure 4. Reason for travel for laboratory-confirmed cases of enteric fever that travelled abroad from England, Wales and Northern Ireland: 2016 (N=265)



Where reason for travel was known (N=248), the most common reason for travel for cases that travelled abroad from EWNI was to visit friends and relatives (VFR)

PHE data

Table 3. Countries of travel and ethnicity for laboratory-confirmed cases of enteric fever that travelled abroad from England, Wales and Northern Ireland to visit friends and relatives: 2016 (N=198*)

	Ethnicity							
Presumed country of infection	**Pakistani**	**Indian**	**Bangladeshi**	**Asian other**	**Black African**	**Other/mixed**	**Not stated**	**Total**
Pakistan	75	2	-	1	-	-	4	82
India	-	87	-	-	-	-	6	93
Bangladesh	-	-	12	-	-	-	-	12
Sub-Saharan Africa	-	-	-	-	2	1	1	4
South America	-	-	-	-	-	1	-	1
Europe	-	-	-	-	-	1	-	1
Other Asia	-	3	-	3	-	-	1	7
Total	**75**	**92**	**12**	**4**	**2**	**3**	**12**	**200***

PHE data

Complications of untreated typhoid

- Bowel haemorrhage
- Bowel perforation
- Acute cholecystitis
- Osteomyelitis (esp. Spinal)
- Relapse – 10-15%
- Prolonged excretion of organism

Typhoid – diagnosis

- Mainstay of diagnosis is **Blood cultures** – at least 10-15 ml – take several
- Bone marrow culture is gold standard
- Stool cultures may be positive after the early phase – useful for identifying carriers
- Historically ‘Widal test’ – unreliable...but cheap so still in use globally

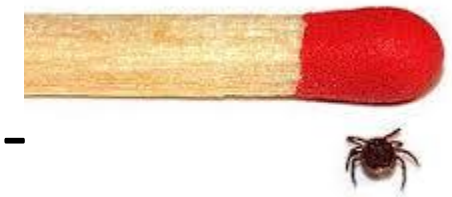
Typhoid - treatment

- Resistance is a problem...so use iv ceftriaxone
- Azithromycin can be used as po option
- (fluoroquinolones were first line but resistance is high in Indian sub-continent; still used widely, globally)

Rickettsial infections

- Rickettsia: obligate intracellular bacteria
- transmitted by ectoparasites such as fleas, lice, mites, and ticks.
- typhus group and spotted fever group
  - African tick-bite fever
  - Mediterranean spotted fever
  - Rocky Mountain spotted fever/ Brazilian spotted fever
  - Epidemic typhus
  - Murine typhus

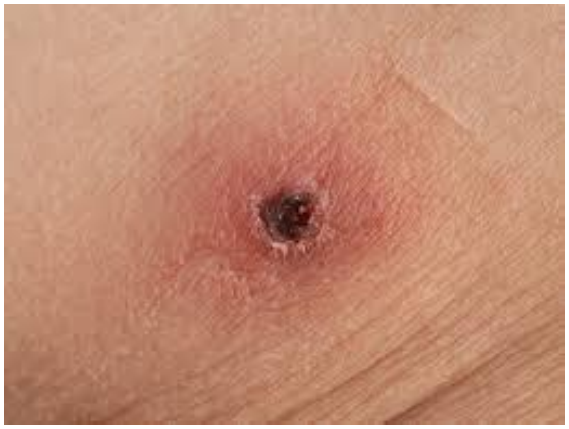
Tickborne rickettsioses



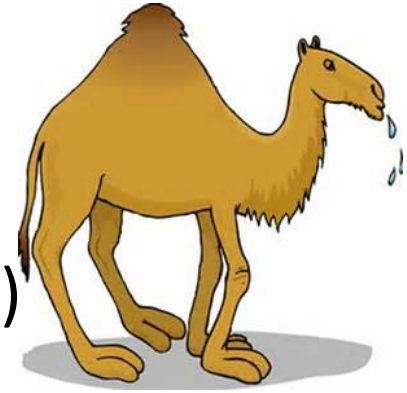
- the most frequently reported travel-associated rickettsial infections are tickborne
- African tick-bite fever: the most commonly reported rickettsial infection acquired during travel
  - Game hunting and travelling to southern Africa in November through April

African tick-bite fever

- milder than some other rickettsioses, but recovery improved with treatment.
- suspect in patient who presents with fever, headache, myalgia, and an eschar (tache noir) after recent travel to southern Africa.
- Diagnosis: clinical, serology, PCR
- Treatment: doxycycline



MERS



- Middle East Respiratory Syndrome (MERS)
- first reported Saudi Arabia in 2012
- Coronavirus causing severe acute respiratory illness, including fever, cough, and shortness of breath.
- 2229 cases of MERS-CoV reported to WHO since 2012 with 791 related deaths.
- Most from the Arabian Peninsula particularly Saudi Arabia
- Host - Dromedary camels
- epidemiological picture is of sporadic zoonotic infections amplified within healthcare premises.

UK guidance: Risk assess patients from all countries within the geographical Arabian Peninsula, plus (as of 24/12/2015): Bahrain, Jordan, Iraq, Iran, Kingdom of Saudi Arabia, Kuwait, Oman, Qatar, United Arab Emirates, and Yemen

Public Health England

Protecting and improving the nation's health

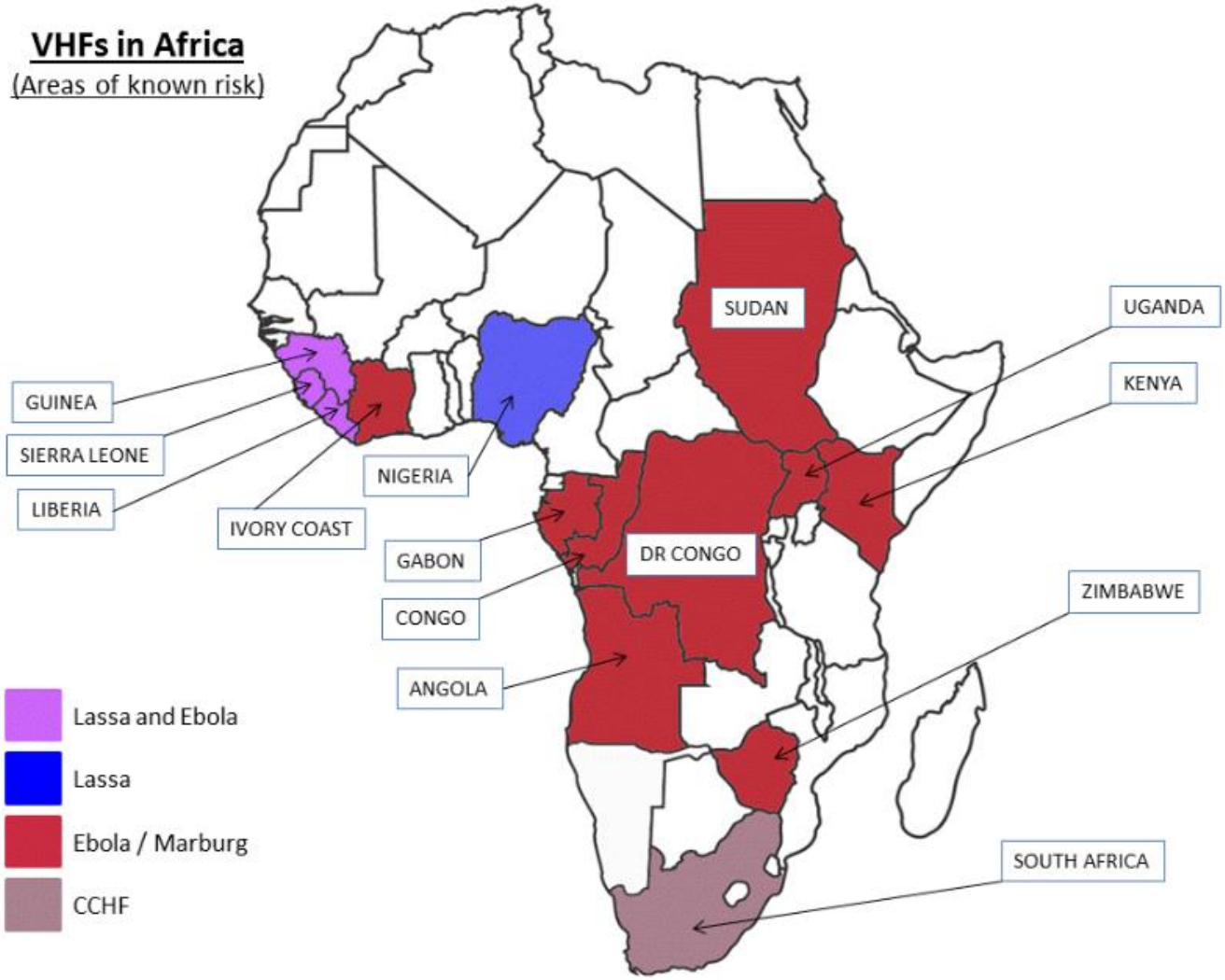
Risk assessment of Middle East Respiratory Syndrome Coronavirus (MERS-CoV)

Update: November 2016

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/573145/MERS-COV_RA_29Nov2016_final.pdf

Viral haemorrhagic fevers

- Eg Ebola, Lassa, Marburg
- RNA viruses
- Humans are not the natural reservoir for any of these viruses.
  - Their survival is dependent on an animal or insect host, the natural reservoir.



https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/377142/Algorithm_v5.pdf

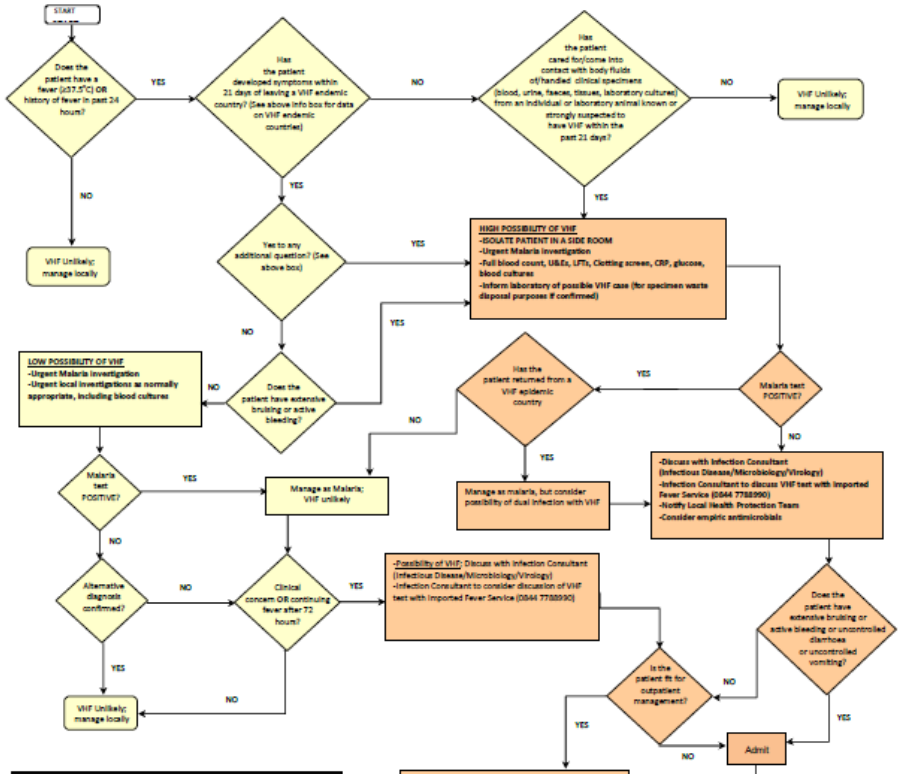
VIRAL HAEMORRHAGIC FEVERS RISK ASSESSMENT (Version 6: 15.11.2015)

VHF ENDEMIC COUNTRIES:

Information on VHF endemic countries can be found at https://www.gov.uk/viral-haemorrhagic-fevers-origins-reservoirs-transmission-and-guidelines
or see VHF in Africa map at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/365845/VHF_Africa_960_640.png

ADDITIONAL QUESTIONS:

-Has the patient travelled to any area where there is a current VHF outbreak? (http://www.promedmail.org/) OR
-Has the patient lived or worked in basic rural conditions in an area where Lassa Fever is endemic? (https://www.gov.uk/lassa-fever-origins-reservoirs-transmission-and-guidelines) OR
-Has the patient visited caves / mines, or had contact with or eaten primates, antelopes or bats in a Marburg / Ebola endemic area? (https://www.gov.uk/ebola-and-marburg-haemorrhagic-fevers-outbreaks-and-case-locations) OR
-Has the patient travelled in an area where Crimean-Congo Haemorrhagic Fever is endemic (http://www.who.int/csr/disease/crimean_congoHF/Global_CCHFRisk_20080918.png?ua=1) AND sustained a tick bite* or crushed a tick with their bare hands OR had close involvement with animal slaughter? (*If an obvious alternative diagnosis has been made e.g. tick typhus, then manage locally)



INFECTION CONTROL PERSONAL PROTECTION MEASURES:

MINIMAL RISK
Standard precautions apply:
Hand hygiene, gloves, plastic apron
(Eye protection and fluid repellent surgical facemask for splash inducing procedures)

STAFF AT RISK
Hand hygiene, double gloves, fluid repellent disposable coverall or gown, full length plastic apron over coverall/gown, head cover e.g. surgical cap, fluid repellent footwear e.g. surgical boots, full face shield or goggles, fluid repellent FFP3 respirator

VIRAL HAEMORRHAGIC FEVERS RISK ASSESSMENT (Version 6: 15.11.2015)

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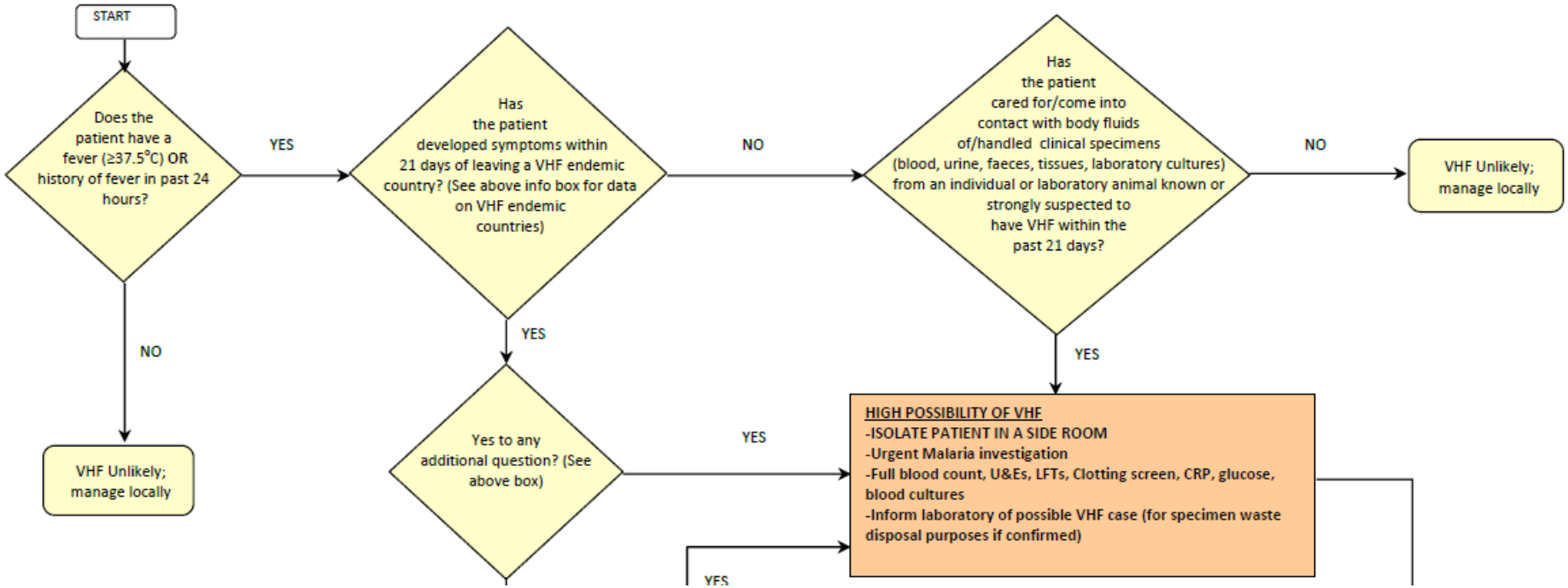

Public Health England

Imported Fever Service

- clinical and microbiological advice for acute imported infections
- 24-hour on-call diagnostic service for viral haemorrhagic fevers
- next working-day diagnostic service for a range of imported infections

For **fever/acute illness** combined with **recent history of foreign travel**

First discuss with local microbiology, virology or infectious diseases consultant

For further advice and testing call Imported Fever Service

0844 7788990

Available 24/7

Please ensure you have:

- patient identifiers
- full travel history including
  - dates and locations of travel
  - activities/exposures
  - vaccination/prophylaxis
- clinical details and past history

Further information and referral forms available from our website:
www.gov.uk/imported-fever-service-ifs

or put '**Imported Fever Service**' in your web browser

The Imported Fever Service is operated by PHE in partnership with:

The Royal Liverpool and Broadgreen University Hospitals NHS Trust

LSTM Liverpool School of Tropical Medicine

University College London Hospitals NHS Foundation Trust

PHE publications gateway number: 2014342

Approach to the febrile returning traveller

- Consider whether need to isolate – VHF/MERS risk assessment
- Send off malaria blood films, at least 3
- Take blood cultures (3 sets)
- General septic screen: urine (m, c &s), CXR
- Stool culture and microscopy for ova, cysts and parasites (OCP)
- HIV test
- Serology +/- polymerase chain reaction (PCR) for dengue, rickettsiae, brucella & others as indicated by travel history
- Chest X-ray and USS of liver and spleen
- ?GUM assessment if indicated

The returning traveller - management

- Specialist advice for treating malaria
- Admit if falciparum
- If strong suspicion enteric fever, treat with azithromycin (po) or ceftriaxone (iv)
- Dengue – supportive
- Rickettsia – doxycycline
- Travel-related infections must be notified to public health

Travel medicine

Seek specialist advice 6 weeks before travel
sensible precautions
chemoprophylaxis
vaccination

http://nathnac.net/

http://www.fitfortravel.nhs.uk/home.aspx

https://www.gov.uk/government/publications/malaria-prevention-guidelines-for-travellers-from-the-uk

ADVANCING YOUR CAREER IN TRAVEL MEDICINE

with the Royal College of Physicians and Surgeons of Glasgow

FACULTY OF TRAVEL MEDICINE

ROYAL COLLEGE OF PHYSICIANS AND SURGEONS OF GLASGOW

TRAVEL MEDICINE

Summary 1

- Malaria is commonest cause of acute fever after travel to sub-Saharan Africa
- Malaria, especially *P. falciparum*, can progress rapidly. Test promptly and treat immediately if diagnosed. Remember may be afebrile when seen.
- A history of taking malaria chemoprophylaxis doesn't exclude possibility of malaria.
- Hajj pilgrims – don't forget meningococcus and MERS
- Viral hemorrhagic fevers are important to identify but rare in travellers
  - bacterial infections, such as leptospirosis, meningococcemia, and rickettsial infections, can also cause fever and haemorrhage and should be always be considered because of the need for prompt, specific treatment.

Summary 2

- Dengue is commonest cause of febrile illness presenting after travel to Latin America or Asia.
- Don’t overlook common infections, such as pneumonia and pyelonephritis.
- Consider infection control, public health implications, and requirements for notification.

Useful websites

- http://www.who.int/topics/malaria/en/
- http://www.who.int/topics/typhoid_fever/en/
- https://www.gov.uk/guidance/imported-fever-service-ifs
- https://www.gov.uk/search?q=malaria
- https://www.gov.uk/government/organisations/public-health-england
- https://www.gov.uk/government/publications/malaria-prevention-guidelines-for-travellers-from-the-uk

Yellow fever

- parts of Central and South America and sub-Saharan Africa
- flavivirus spread by *Aedes aegypti* mosquito
- Three transmission cycles; Jungle, Urban and Intermediate.
  - **Jungle yellow fever** - transmitted among non-human hosts (mainly monkeys) by forest mosquitoes. Humans can become infected when they spend time in the forest and become the source of urban yellow fever outbreaks.
  - **Urban yellow fever** - is spread to urban areas by mosquitoes, mainly *Aedes aegypti*, that have bitten monkeys or humans infected with yellow fever. Urban yellow fever can occur in populated areas in close proximity to forests where infected monkeys and mosquitoes can be found. Urban cases rare in Americas.
  - Both jungle and urban cases occur in Africa (especially West Africa).
  - **Intermediate yellow fever** - occurs only in Africa in humid savannah regions where mosquitoes infected both monkeys and humans causing localised outbreaks.

Yellow fever 2

- incubation period: 3-6 days
- Sudden onset fever, backache, generalised muscle pain, nausea and vomiting.
- Jaundice can be seen early in the disease, intensifying as the disease progresses.
- Up to 60% mortality.
- no specific treatment
- Yellow fever vaccination is carried out for two different purposes:
  - To prevent the international spread of the disease by *protecting countries* from the risk of importing or spreading yellow fever virus. Countries that require proof of vaccination are those where the mosquito and potential non-human primate hosts of yellow fever are present. Proof of vaccination is often required for travellers coming from countries with risk of yellow fever transmission (including, sometimes, for travellers transiting through such countries).
  - To protect *individual travellers* who may be exposed to yellow fever infection.