SECOND EDITION

MEDICINE

John Axford
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Blackwell Publishing

MEDICINE

MEDICINE has evolved into a revolutionary core text through close collaboration with students, junior doctors, and teachers. This new edition contains all of the medicine you will need to know in order to qualify as a doctor and shows you how to develop the skills and attitudes needed for success and competence in clinical practice.

MEDICINE triumphs where other contemporary texts falter by being refreshingly different:

- **Clinically-orientated throughout**
- **Focussed on the core curriculum**
- **Unencumbered by unnecessary detail**
- **Highly-structured for easy learning and revision**
- **Carefully regulated content – exactly the right level of detail for every topic**
- **Comprehensively visual to simplify the learning process**
- **Affordable**

Using MEDICINE for Maximum Benefit

The first two chapters are essential reading regardless of your stage of learning: they provide an overview of the human dimension in clinical medicine and a solid review of the basic science which underpins modern medicine. Subsequent chapters give a systematic account of modern clinical practice. Each chapter stands alone as an authority on the system or topic concerned, but all have been carefully integrated and cross-referenced to furnish the reader with a comprehensive learning package. Features common to all chapters make learning easy and logical (*see the following sample pages*).

Chapter Layout

Main subject chapters follow a common plan preceded by an introduction which places the chapter in context. There are three main sections:

- Structure and Function
- Approach to the Patient
- Diseases and their Management

You will develop a clear understanding of the disease processes responsible for the presenting clinical problems and learn the attitudes and skills needed to make a diagnosis and develop a management plan.

Aids to Learning

A standard system of 'boxes' is used throughout to highlight key material:

- **History and Examination boxes**: summarise the relevant history to be taken and examination to be made for the system or topic considered.
- **At a Glance boxes**: summarise all key information on a core topic and are designed for rapid revision. System-based chapters include an initial Clinical Presentations at a Glance which summarise the different problems caused by diseases of the system under review
- **Emergency boxes**: a brief summary of essential information relating to emergency situations
- **Key Points boxes**: a crisp reminder of the key aspects of important topics
- **Further Reading boxes**: Concise advice on useful resources for additional information
- **Must Know Checklist boxes**: a brief reminder of the key elements in the chapter you **must** know

The following sample pages give a visual representation of the unique layout of MEDICINE and illustrate how, by applying new concepts to learning and design, this new text reaches beyond the scope of the contemporary text to meet the developing needs of today's medical students.

MEDICINE

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Infectious Disease

3

Mini-contents lists show clear chapter structure used throughout the book – great for ease of use and reference

03

Three hundred years ago most people in Britain died from infection and the average life expectancy is estimated to have been 30–40 years. In the middle of the last century, when comprehensive mortality figures were first compiled, the main causes of death included tuberculosis, smallpox, typhoid, cholera, dysentery, rheumatic heart disease, diphtheria and lobar pneumonia.

Clearly, a profound revolution has since occurred in the pattern of disease in developed countries. The traditional infective scourges are all but eradicated in the developed world and degenerative and neoplastic diseases now dominate the mortality statistics.

This dramatic reduction in the burden of infectious diseases in developed countries has occurred through a combination of factors:

- An enormous improvement in the nutrition and living conditions of most of the population has been at the root of the decline of most infectious diseases (Fig. 3.1).
- Public health measures, such as the provision of safe water and drainage, have limited epidemics of the faecooral infections.
- Specific measures, such as immunization (which has been most important for certain diseases) and effective chemotherapy, have become available for most of these conditions.

Meanwhile, developing countries continue to experience much the same pattern of infection-dominated pathology as developed countries in the last century, with the addition of some purely tropical parasitic infections. In some countries, many children die before their fifth birthday; acute respiratory infection, gastroenteritis, measles and malaria are among the biggest killers.

Infectious diseases remain important because:

- There are newly recognized diseases, such as acquired immune deficiency syndrome (AIDS), Lyme disease and Legionnaires' disease.

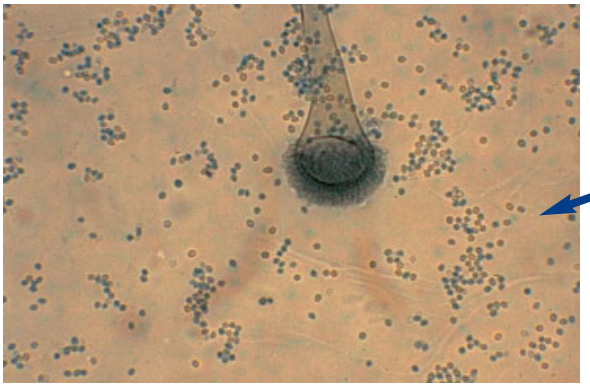


Figure 3.10 *Candida*.

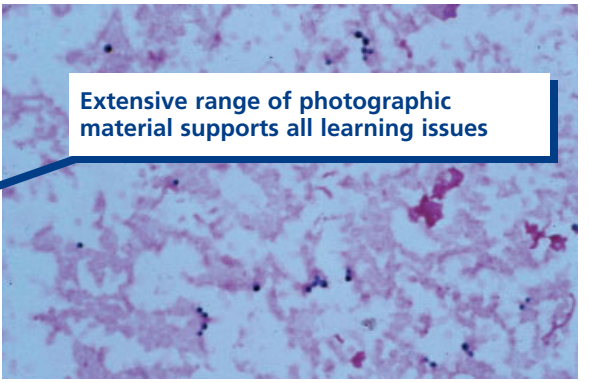


Figure 3.11 *Aspergillus*.

Extensive range of photographic material supports all learning issues

Table 3.13 Fungi and associated diseases

Organism	Associated disease	Principal target organs	Geographical distribution	Page
Microsporum sp.	Ringworm	Skin	Worldwide	000
Trichophyton sp.	Ringworm, athlete's foot	Skin, nails	Worldwide	000
Malassezia furfur	Tinea versicolor	Skin	More common in hot climates	
Sporothrix shenkii	Sporotrichosis	Subcutaneous	Tropics/subtropics	
Madurella sp. and others	Madura foot, mycetoma	Subcutaneous, bone	Tropics	000
Cryptococcus neoformans	Cryptococcosis	Lung, meninges (often opportunistic)	Worldwide	000
Histoplasma capsulatum	Histoplasmosis	Lung/disseminated (opportunistic)	North America and many tropical areas	000
Histoplasma duboisii	African histoplasmosis	Skin, bones, disseminated	Africa	
Blastomyces dermatitidis	Blastomycosis	Skin, lung, bone	North America and Africa	
Coccidiodes immitis	Coccidiodomycosis	Lung, bone, skin, disseminated	South-western USA, Mexico, Argentina, Paraguay	
Paracoccidiodes braziliensis	Paracoccidiodomycosis	Lung, lymph nodes, disseminated	South America	000
Candida albicans	Candidiasis	Mucous membranes, commonly	Worldwide opportunistic, rarely disseminated	000
Pneumocystis carinii	Opportunistic infection	Lungs	Worldwide	000
Aspergillus fumigatus	Aspergillosis	Opportunistic (especially lungs)	Worldwide	000
A. flavus, A. niger		Also allergic bronchopu aspergillosis		

All chapters include clinically-orientated sections to emphasize and highlight: History and Examination; Clinical Presentations; Investigations, Treatment and Management

Approach to the patient

History and examination

History

About the patient

Infection results from a complex interaction between an individual a EXAMINATION Boxes 3.1 and 3.2). Any feature of the individual, innate or acquired, may be relevant.

- Age, sex and race alter susceptibility.
- Occupation, lifestyle and level of education influence the range of organisms to which an individual is exposed.
- Intestinal conditions may increase the risk of infection because of immunodeficiency or organ damage.
- Skin conditions with a break in the protective surface surrounding the organism predispose to infection.
- Sickle cell anaemia results in a functional splenectomy.

Highlights the key questions for the history and examination of each body system

History & Examination

Questions to be addressed by the history and examination of a patient with an infectious disease

What is the site of the infection?
What is the probable infecting organism?
Is there any associated tissue damage and/or organ failure?
Is there an underlying disease predisposing the patient to infection?
Are there other predisposing factors (e.g. lifestyle, travel)?

History & Examination

Important questions to ask a patient with an infection

About the patient
Where have you been recently?
Have you been abroad? If so, where and for how long?
What is your occupation?
Have you been exposed to animals or insect bites?

Symptoms
When were you last well?
Do you have any localized features?
Does the fever have a pattern?
Do you have any symptoms other than fever (e.g. headache, joint aches, rash, diarrhoea, stomach upset, nausea)?
Have you lost any weight?
Do you have sweats during the night?

Drug history
Have you taken any antibiotics?
Have you taken any medicines to bring down your fever?
Are you taking any other medicines or tonics, either prescribed or obtained from other sources including health food shops?

Past medical history
What infections have you had in the past?
What immunizations have you had?
Have you had any transfusions?

Family history
Is anyone in your family immunosuppressed?
Has anyone in your family had an unusual infection?
Does anyone in your family have a skin condition?

Sexual history
(see History & Examination Box 3.3)

Table 3.14 Screening investigations performed on all patients presenting with pyrexia of unknown origin (PUO)

Full blood count
Neutrophils
Eosinophils
Anaemia of chronic disease
Low platelets
Blood culture (×3)
Sputum culture
Urine culture
Faeces
Bacterial pathogens
Ova, cysts and parasites
Chest X-ray
Pneumoniae
Tuberculosis or other chronic lung infection
Serum
Save for investigation when a second sample collected after 10 days
C-reactive protein and erythrocyte sedimentation rate

History of exposure to infection

Obtain a detailed history of factors that increase the risk of exposure to infectious agents including travel, occupational history and a history of exposure to animals or of insect bites. Any medical procedures, especially injections and transfusions, which may transmit a variety of agents (Table 3.14), should be noted. Contact with family members or others who have been unwell may be relevant. Always ask about sexual contacts.

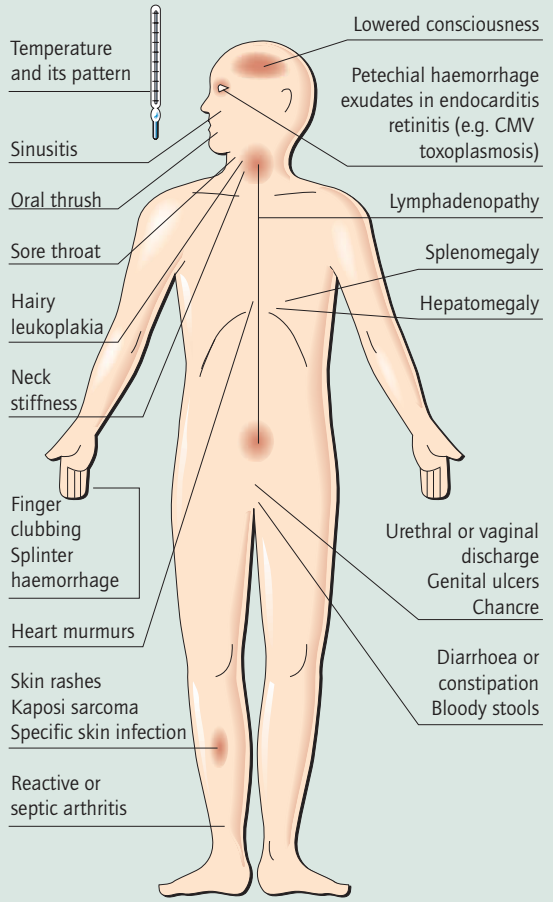
Travel history

Some infections occur within limited geographical areas to which they are restricted either by climate or by the range of a vector or an animal reservoir (e.g. malaria or leishmaniasis). Many others are associated with poor sanitation or poverty (e.g. amoebic dysentery). A detailed history of travel to the tropics is essential as many infections are found in this zone (Fig. 3.12), but there are some diseases limited by geography in developed countries (e.g. visceral leishmaniasis in the Mediterranean area and Rocky Mountain spotted fever in North America).

As with most aspects of clinical diagnosis, geographical ranges of disease are matters of probability rather than absolutes. Agents of disease and their vectors are capable of travelling as well as people. The apparent lack of an appropriate travel history has not prevented people living near airports from acquiring malaria from mosquitoes transported in aircraft. Some parasitic infections may be very persistent too (e.g. amoebiasis, strongyloidiasis,

Summary Diagrams focus on how patients actually present with their illness

Infectious diseases: Clinical presentations at a glance



colonize the pharynx, the lower small intestine and colon, the female genital tract and the skin (Fig. 3.2). The normal flora has a beneficial effect by competing with pathogens for colonization sites. Some bacteria produce antibiotic substances (bactericines) that suppress competing organisms. Resident anaerobes produce toxic metabolic products and free fatty acids that inhibit the growth of other organisms. In the female genital tract, lactobacilli produce lactic acid in quantities that lower the pH, making colonization by pathogens more difficult.

Bacteria from the normal flora can get beyond their proper place in the intestinal tract or the skin, with severe consequences. During aspiration of stomach contents, bacteria from the oral cavity are transported to the lung, where a rapidly progressive lung infection may develop. When there is perforation of the stomach or large bowel, intestinal contents can escape into the peritoneum, resulting in peritonitis. Poor dental hygiene can result in oral bacteria such as *Streptococcus sanguis* being deposited on heart valves, leading to endocarditis.

Other humans

The most common source of pathogenic organisms is from other humans and infections can spread by a number of routes described below (see p. 000). Interrupting routes of transmission is important for everyone involved in the practice of medicine.

Animals

Infections derived from animals are known as zoonoses. This may be as a result of direct contact with animals either as pets or in the course of farming or other occupational exposure. Almost all of the human population is exposed to animals through the consumption of meat or other animal products such as milk. Even strict vegetarians can be at risk if meat products contaminate their food.

Environment

Most environmental organisms have little capacity to invade humans and cause disease. There are some notable exceptions that, in the right circumstances, can cause infection. *Legionella* is an environmental organism that lives in an aquatic environment, often invading amoebae. It is able to colonize air-conditioning systems and showers.

Routes of transmission

Micro-organisms have devised many different ways of spreading from one host to another, which is broadly related to their ability to survive outside a host. Organisms that are very hardy, like *Clostridium tetani*, which has a spore, survives in the environment and patients can become infected from the inoculation of infected soil or other material. In contrast, organisms like *Neisseria gonorrhoeae* are very delicate and highly susceptible to drying and are not able to survive outside the body so are transmitted by the sexual route.

Respiratory route (air-borne)

When an individual coughs or sneezes, a large number of particles are projected into the atmosphere. Some of these particles are of optimal size (5–7 μm) to be carried into the respiratory tract, some as far as the alveoli. These are known as droplet nuclei and may contain micro-organisms. Organisms that spread by the respiratory

Non-replicating vaccines contain either inactivated whole organisms (e.g. pertussis) or antigenic components (e.g. capsular polysaccharide of *S. pneumoniae*). The toxins of tetanus and diphtheria are inactivated to produce toxoids that do not cause symptoms but are fully immunogenic. The immunogenicity of acellular vaccines can be increased by conjugation with proteins (e.g. *H. influenzae*). Genetic engineering is being harnessed for acellular vaccine production (e.g. hepatitis B). These vaccines are safe in immunocompromised patients because they are unable to replicate. Multiple doses may be required for optimum immunogenicity.

The aim of an immunization programme may be eradication, elimination or containment. **Eradication** is total absence of the organism in humans, animals and the environment. This can be attempted if the disease is easily recognizable, there is no long-term carriage or subclinical infection and no non-human hosts. **Elimination** is where the disease has disappeared but the organism remains in animal hosts, the environment, or is causing subclinical infection in humans.

Universal immunization is adopted for most childhood infections and selective programmes for those at risk from disease (e.g. hepatitis B in health care workers). Immunization schedules vary between countries and the UK uses the schedule in Table 3.17.

Chemoprophylaxis

This is used for control of more serious infections such as diphtheria and meningococcal disease. The aim of chemoprophylaxis may be to eliminate carriage of pathogenic organisms, thereby reducing the risk of infection in those not yet exposed. Single-dose regimens are the most effective.

Outbreak investigation

Outbreaks can be recognized if there is adequate surveillance. A case is defined and basic epidemiological information is collected, including date of onset of symptoms, age/sex and place of residence. Additional information will be required (e.g. a food poisoning outbreak requires detailed food history).

A hypothesis of causation is tested by a case–control or cohort study. In a case–control study, exposure histories are sought from cases and healthy controls. The relative risk of exposure to the postulated source is calculated for cases and controls. The controls are drawn from the same population as the cases. Case–control studies are suited to investigation of uncommon infections such as botulism. In a cohort study, the disease outcome is compared between those exposed and not exposed to the source and are often used to investigate outbreaks with a high attack rate such as food poisoning incidents. In both cases, a structured questionnaire should be used.

The role of national agencies

Most countries have a national system to control communicable diseases and they have four main functions:

1 Surveillance of communicable diseases
2 Investigation of outbreaks
3 Surveillance of immunization programmes
4 Epidemiology research and training

Close collaboration between food and agriculture control agencies and the human infection control agency is required for zoonotic infections.

Infectious disease morbidity and mortality data is collected to identify trends or clusters of disease requiring preventive action, and to evaluate control measures. Data on common or less severe diseases, such as food poisoning, are collected by passive surveillance systems, and active surveillance is used for rare or serious conditions. Data can be obtained from statutory notification, microbiology laboratory reports, death certificates, GP surveillance schemes and infection reports from hospitals. Some conditions (e.g. sexually transmitted diseases) are reported by clinics to the Department of Health directly. Active reporting schemes include those for AIDS and HIV-related diseases, and some rare childhood infections are surveyed through a network of paediatric consultants.

The collected data must be interpreted and disseminated so that clinicians can use it in diagnosing infections and ensuring that vaccination levels are maintained (e.g. influenza epidemics). In the UK, infectious disease data is published by the Registrar General in the weekly *Communicable Disease Report* and other countries have similar systems (e.g. [illegible] lished by the C

Disease mechanisms and the principles of management are explained in the context of clinical practice

Infections and their management

Infections of the nervous system

(Table 3.18)

Aseptic meningitis

This is inflammation of the meninges associated with

Popular 'At A Glance' boxes provide a visual snapshot of core conditions

Malaria at a glance

Epidemiology
More than 2 million deaths per year, 2 billion at risk
Transmitted by the bite of the female mosquito
Four species infect humans: *P. falciparum, P. vivax, P. ovale* and *P. malariae*
P. falciparum is the species that may cause rapidly progressive and fatal infection

Clinical features
Fever and muscle aches
Can resemble influenza
Temperature clinical signs are often absent but the spleen and liver may be enlarged in children

History
It is essential to take a history of travel to an endemic area

Diagnosis
Urgent blood smear (×3)
Dipstick antigen detection test

Treatment
P. falciparum infection must be treated with quinine infection with other species usually respond to chloroquine

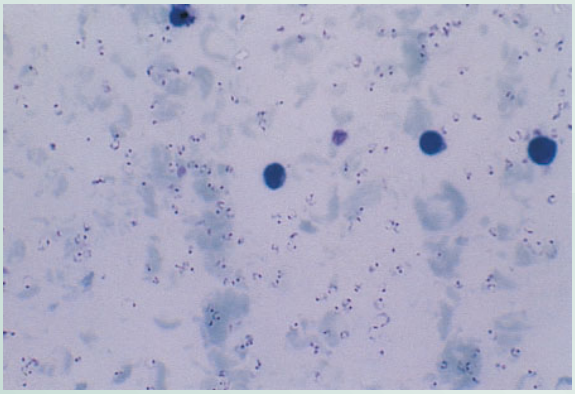


Fig. A Thick blood film showing *P. falciparum* trophozoites.

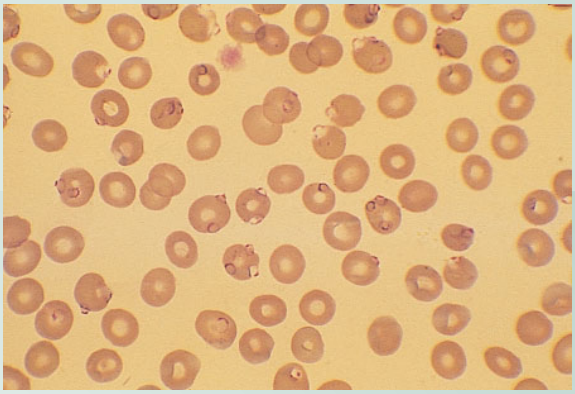


Fig. B Thin blood film showing *P. falciparum* trophozoites.

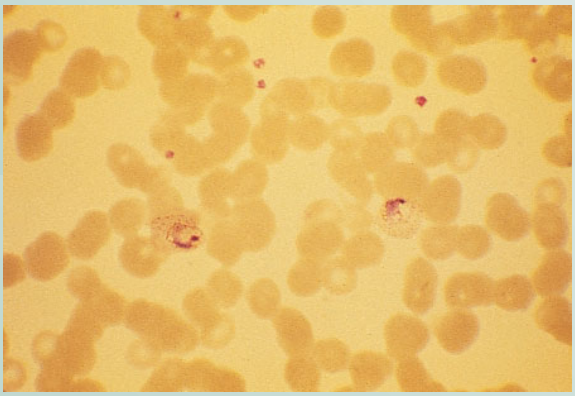


Fig. C Thin blood film showing *P. vivax* trophozoites

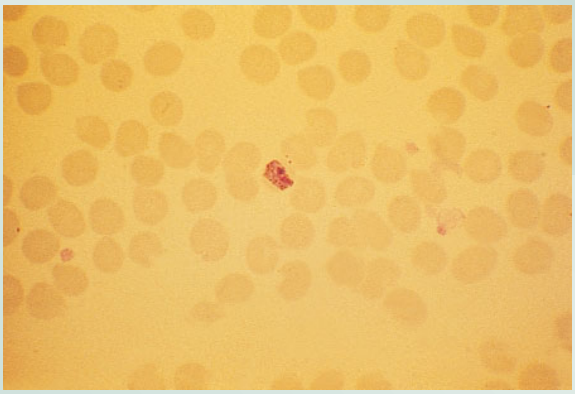


Fig. D Thin blood film showing *P. malariae trophozoites*. Both figures reproduced from Gillespie, Medical Microbiology Illustrated, 1994 (Butterworth Heinemann, Oxford) with the permission of the author and the publisher.

makes the diagnosis clear in many cases, but is absent in a substantial minority as mumps meningitis can precede parotid swelling or occur in its absence.

Rarely, deafness, labyrinthitis, facial neuritis and encephalitis have been reported. The condition is benign and self-limiting, unless there is a predominant encephalitis, which is fortunately rare. Orchitis occurs in adults and may present as gross painful swelling of the testis. It is usually unilateral, and resultant sterility is extremely rare. Oophoritis can present in women as high fever and back pain. Pancreatitis is indicated by fever, abdominal pain and vomiting.

Investigation

The diagnosis is usually made clinically and can be

'At A Glance' boxes – fantastic for revision!

Rubella and mumps at a glance

RUBELLA
Epidemiology
Prevalence
80% of adults have antibodies

Age
5–9-year-olds

Sex
Disease in pregnancy can lead to congenital infection

Findings on investigation
Haematology
Lymphocytosis

Immunology
Rubella antibody detection by various techniques

Microbiology
Culture rarely required

Diagnostic imaging
Rarely required

Clinical features
Usually mild fever with erythematous rash
Infection in pregnancy can result in congenital infection resulting in deafness and mental retardation

MUMPS
Epidemiology
Prevalence
Rare in countries with a vaccination programme

Age
Under-15-year-olds

Findings on investigation
Haematology
Lymphocytosis

Biochemistry
Not usually helpful

Immunology
Specific antibody demonstrated by various techniques

Microbiology
Viral culture from CSF in cases of meningoencephalitis

Diagnostic imaging
Rarely required

Clinical features
Fever and painful swelling of parotid glands
May be complicated by orchitis and pancreatitis

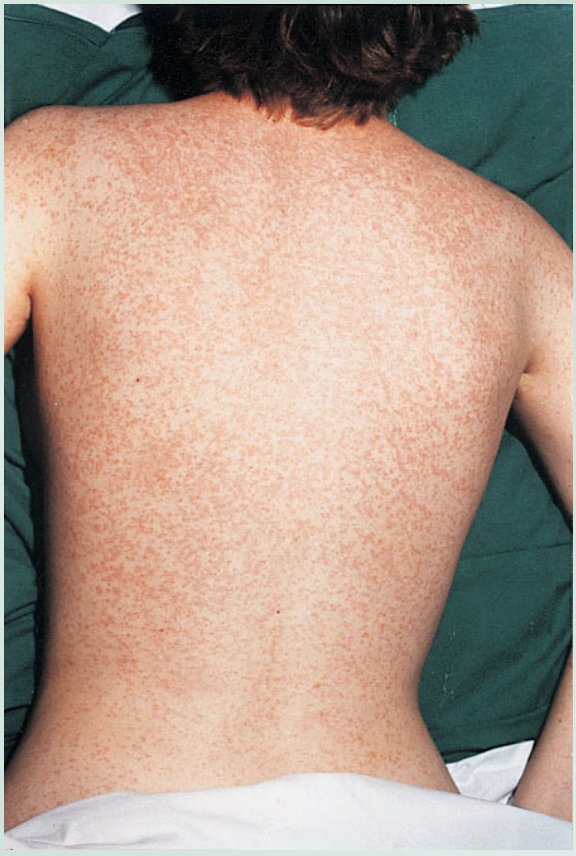


Fig. A The typical rash of rubella. Reproduced from Finch & Ball, Infection, 1991 (Blackwell Scientific Publications, Oxford) with the permission of the authors.

positive blood will acquire the virus. For this reason, in countries that can afford it, blood is screened for HIV antibodies. Nevertheless, there remai… mission if HIV-infected people donate… infection before HIV antibodies become detectable (usually at some time in the first 3 months following infection). For this reason, people who perceive themselves to have been at risk of HIV are asked to refrain to donating blood. In developed countries with an efficient system for screening blood, it has been estimated that the risk of acquiring HIV from a blood transfusion is less than 1 in 1 million.

Early in the epidemic many haemophiliacs were infected by transfusions of factor VIII. Now screening and heat treatment renders this and other blood products safe.

In much of the developing world it is not feasible to screen donated blood for HIV and the risk of transmission by this route remains.

Injecting drug use

Injecting drug users who share needles and/or syringes run the risk of acquiring HIV infection. According to a World Health Organization estimate, the risk of acquisition of HIV by this means is between 0.5 and 1% each time an HIV-positive drug user shares needles.

Vertical transmission

Transmission from mother to … the time of delivery, but can also take place earlier in pregnancy across the placenta or, in a smaller number of cases, through breastfeeding. Rates of transmission vary from country to country. At worst, some areas of the developing world have transmission rates of approximately 50%. In industrialized countries, transmission occurred in between 10 and 15% of pregnancies before modern interventions were introduced. Nowadays, antiretroviral drugs are given to the mother and infant where possible to cut down the risk of transmission. Another useful intervention can be the use of caesarean section. By the use of these means, the rate of transmission can be cut to less than 1%.

Health care workers

Carers, mainly health care workers, run the risk of acquiring HIV mainly as a result of needlestick injuries. Someone who acquires a needlestick injury with HIV-positive blood runs a 1 in 300 risk of acquiring HIV, unless antiretroviral drugs are started quickly. After encouraging the wound to bleed freely under flowing warm water, the carer should access one of the relevant hospital departments (occupational health, accident and emergency or infectious diseases). Ideally, triple antiretroviral therapy should be started within 1 h and continued for 1 month. This will greatly diminish the risk of the carer acquiring HIV infection. When a needlestick injury has occurred from a patient of unknown HIV status, any approach to … nt to perform an HIV test should … th care professional rather than the recipient of the needlestick injury.

Provides clear guidelines for the emergency situation

Emergency: HIV-positive needlestick injuries

- Encourage bleeding under warm running water
- Seek immediate advice (e.g. occupational health, accident and emergency, infectious diseases)
- 1 in 300 risk of acquiring HIV if no drugs given
- Postexposure prophylaxis (PEP) with AZT alone cuts risk fivefold
- PEP now recommended with three antiretrovirals for 1 month
- Start PEP as soon as possible (ideally within 1 h)

Keypoints flagged throughout all chapters!

Disease mechanisms

The HIV life cycle is shown in Fig. 3.49. The envelope of HIV attaches to the CD4 epitope on various cells. Langerhans cells are infected early on. Subsequently, cells in the monocyte–macrophage series are infected. Activated … ss the blood–brain barrier and set up … CNS, predominantly in microglial cells (KEYPOINTS BOX 3.4).

Cells infected by HIV

T-helper lymphocytes
Langerhans cells
Macrophages
Microglial cells

The presence of HIV in the CNS can uncommonly cause symptoms at the time of seroconversion (see p. 000). More commonly, HIV can have direct effects on the CNS late on in disease. HIV also infects the T-helper lymphocyte, which also bears the CD4 epitope. Ultimately, the consequence of this infection is depletion in the number of T-helper lymphocytes giving rise to severe immunosuppression and the manifestations of AIDS. Another feature of the immune perturbation is B-cell activation resulting in hypergammaglobulinaemia. A further consequence is immune thrombocytopenia. When the T-helper cell count (CD4 count) drops below approximately 200/μl, HIV-positive people become vulnerable to the various life-threatening conditions that characterize AIDS.

Easy-to-follow tables outline commonly presenting diseases

Table 3.29 Common childhood exanthema

Measles	Chickenpox	Rubella (German measles)	Erythema infectiosum	Mumps
Causative virus Paramyxovirus (RNA)	Herpesvirus (DNA)	Togavirus (RNA)	Parvovirus (DNA)	Paramyxovirus (RNA)
Spread Droplet	Droplet, fomite	Droplet	Droplet	Droplet
Incubation period 8–14 days	14–21 days	14–21 days		4–18 days
Infectious period 2–3 days before rash	Until crusts dry			15 days before to 4 days after parotitis
Prodrome Conjunctival suffusion, cough, fever, Koplik's spots on the palate	Fever, malaise of a few hours or no prodrome	Malaise or no prodrome	Malaise, arthralgia	Sore throat, fever, pain at angle of jaw
Rash Blotchy macular rash becoming confluent appears about day 4, beginning on the forehead, spreading onto trunk and limbs over 3–4 days. Clears after 4–5 days, often with fine desquamation and brown discoloration	Pink macules, mainly central (trunk, face)—rapidly evolve into papules and vesiculate, dry and crust over. Different stages present at the same time	Fine macular rash develops over face and upper arms and spreads down. Fades after 3 days	'Slapped cheek' appearance, and a lacy rash on thighs	None
Other clinical features	Mild conjunctivitis, sore throat and cervical adenopathy, especially postcervical, occipital, and postauricular Forscheimer's spots may be seen	Fever and generalized arthralgia		Meningitis
Complications Mainly respiratory—secondary viral pneumonia and rarely giant cell pneumonia, bronchitis and otitis media. Myocarditis, encephalitis, hepatitis and subacute sclerosing panencephalitis (SSPE) are rare complications	Secondary bacterial pneumonia, chickenpox pneumonitis, bacterial infection of spots, disseminated chickenpox (especially in the immunosuppressed), cerebellar ataxia (may precede or follow the rash), haemorrhagic chickenpox	Asymmetrical large joint arthropathy, teratogenicity	Persisting arthralgia, aplastic crisis in those with haemolytic disease	Swollen parotid, submandibular gland, pancreatitis, orchitis, mastitis, sterility (controversial—it has proved difficult to show that sterility following orchitis is a consequence of the orchitis and sterility is not inevitable), meningitis

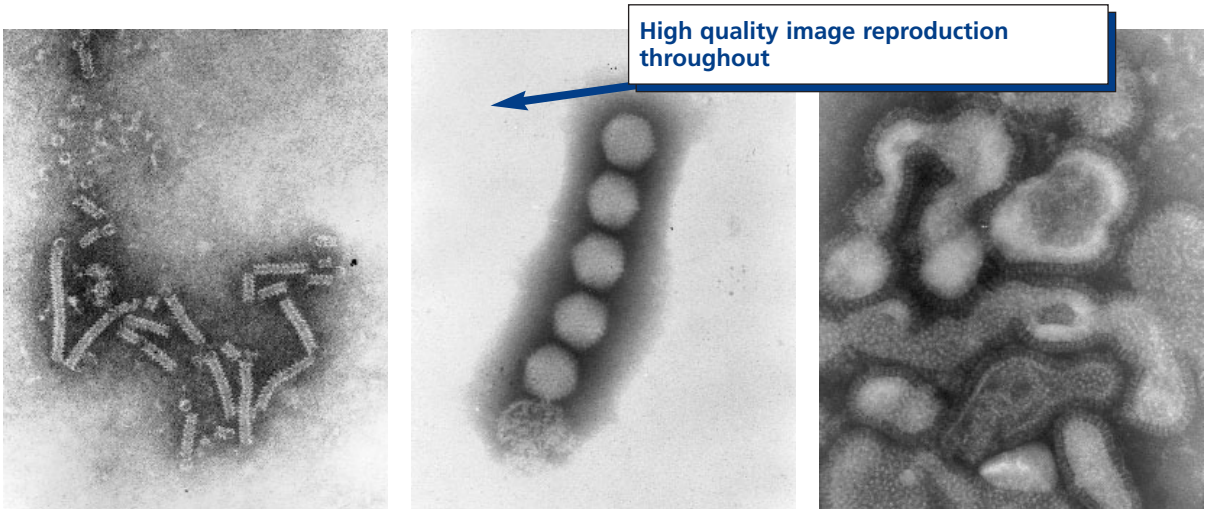


Figure 3.21 Viruses under electron microscopy. (a) A virus with helical symmetry, parainfluenza type 3 virus ×100 000. (b) A virus with icosahedral symmetry, adenovirus ×100 000. (c) An enveloped virus, influenza virus ×100000. All parts reproduced from Bannister *et al.*, *Infectious Disease*, 1996 (Blackwell Science, Oxford) with the permission of the authors.

phenol-auramine, which makes acid-fast organisms fluoresce bright yellow under ultraviolet light.

Direct immunofluorescence

To examine a specimen using direct immunofluorescence it is first dried on a multiwell slide together with positive and negative controls. A specific antibody labelled with fluorescein is applied to the patient's specimen, which is then incubated at 37°C in a humidified chamber for approximately 1 h. The slides are then washed and examined under ultraviolet light.

Where a specific antigen–antibody interaction takes place, labelled antibody is bound to the pathogen and is evident as an apple-green fluorescence.

This technique is both sensitive and specific and provides a rapid presumptive diagnosis. Direct immunofluorescence is useful in the diagnosis of:

- *Chlamydia* urethritis
- influenza and parainfluenza virus infection
- respiratory syncytial virus (RSV) infection
- measles
- rhabdovirus infection

Electron microscopy

Electron microscopy is useful for the direct demonstration of (Fig. 3.21a–c):

- viruses
- pox virus in orf and molluscum contagiosum
- herpes virus
- herpes simplex or varicella zoster virus in vesicle fluid
- gastrointestinal viruses (e.g. rotavirus)

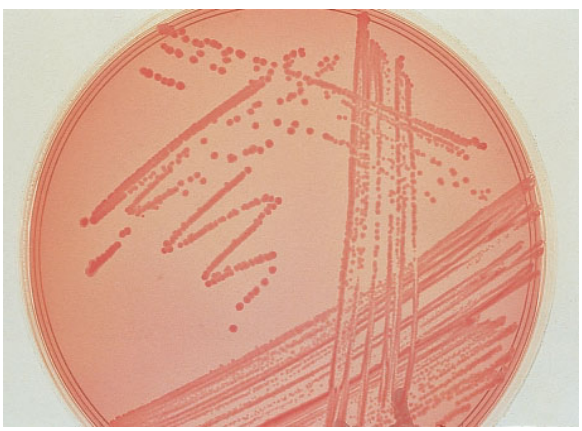


Figure 3.22 *E. coli* isolated on MacConkey's agar.

Bacterial culture

Microbiological culture can be attempted to provide a diagnosis in bacterial, parasitic and viral diseases. The main aim in bacteriological culture is to isolate bacteria on solid media so that they can be identified and appropriate sensitivity testing can be carried out. These methods are possible using agar, a gel-like substance derived from seaweed which melts at 90°C but solidifies at 50°C. It is a highly stable reagent to which nutrients such as blood, serum and protein digests can be added. Examples of bacteria growing on agar media are seen in Figs 3.22 and 3.23.

Viral culture

Viruses are obligatory intracellular pathogens. Viral

Prevention

Antiretroviral therapy that suppresses viral load effectively will prevent the development of HIV wasting syndrome.

Prognosis

Provided there is not widespread resistance to antiretrovirals, the prognosis is good.

Each chapter includes a simple summary of key, essential learning objectives

! What you must know

- Know how to take a history and examine patients with infections
- Understand the routes of transmission of infective agents and how to prevent their spread in the hospital and the community
- List the main organisms infecting humans
- Know the spectrum of the main anti-infective agents
- Understand the ways in which the laboratory can be used to make a diagnosis of infectious diseases
- Understand the process of immunization and outline the main components of an effective vaccination programme
- Acquired immune deficiency syndrome (AIDS) can be defined as the life-threatening diseases caused by human immunodeficiency virus (HIV)
- Common routes of transmission of HIV are sexual, via blood, via sharing of equipment by injecting drug users and by vertical transmission

Key references for special study modules and further research

Further reading

Books

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Gillespie S, Bamford K. *Medical Microbiology and Infection at a Glance*, 2nd edn, Oxford: Blackwell Publishing, 2000.

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Mims C. *The Pathogenesis of Infectious Diseases*. London: Academic Press, 2001.

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Journals

Reviews in Medical Microbiology http://www.revmedmicrobiol.com/ (Lippincott Williams and Wilkins)

Clinical Infectious Diseases (Infectious Disease Society of America) http://www.journals.uchicago.edu/CID/home.html Chicago University Press

Lancet Infectious Diseases http://www.sciencedirect.com/science/journal/14733099 Elsevier

AIDS http://www.aidsonline.com Lippincott Williams & Wilkins

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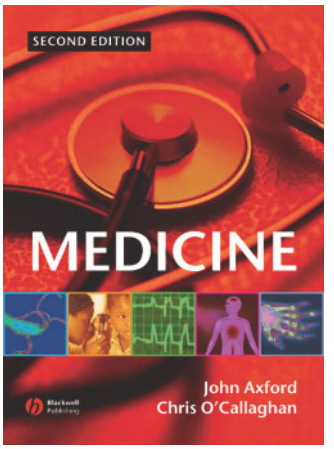

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