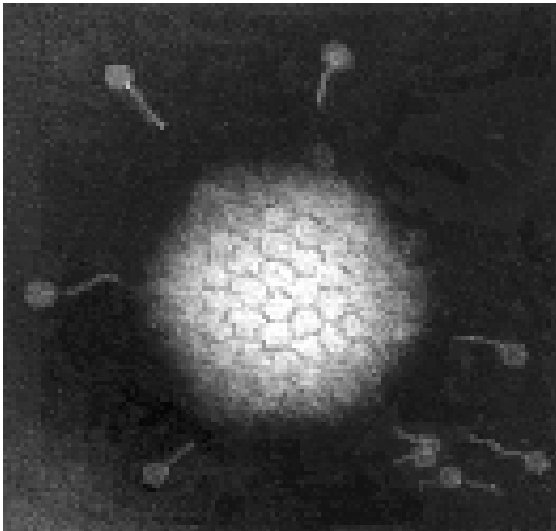


# DNA Viruses

# Adenovirus



(Linda Stannard, University of Cape Town, S.A.)

- Virion:
  - Icosahedral, non-enveloped
  - Genome: Double-stranded DNA
  - Proteins: Important antigens (hexon, penton base, fiber) are associated with the major outer capsid proteins
  - Replication: Nucleus
  - Virus classification: Family: Adenoviridae; Genus: Mastadenovirus; Species: Human adenovirus (H Ad)
- At least 54 serotypes are known
- classified into 7 subgenera: A to G

# Adenovirus

- Outstanding characteristics
  - virion has unique "spike" or fiber associated with each penton base of the capsid that aids in attachment to the host cell via the coxsackie-adenovirus receptor on the surface of the host cell; toxic to cells
  - Adenovirus has tropism for **cells of epithelial origin**
  - Replicative cycle is sharply divided into EARLY & LATE events
  - Infect by oral route, droplet and fomites
  - Epithelial cell replication, viremia, (kidney, bladder, liver, lymph nodes)
  - May remain in lymphoid structures (tonsils and adenoids), reactivation and shedding asymptotically for 6-18 months
  - Integration of adenoviral DNA into host cell genome may occur and is associated with latency
  - Produce smudgy intranuclear inclusion bodies

# Clinical Syndromes

1. Pharyngitis 1, 2, 3, 5, 7
2. Pharyngoconjunctival fever 3, 7
3. Acute respiratory disease of recruits 4, 7, 14, 21
4. Pneumonia 1, 2, 3, 7
5. Follicular conjunctivitis 3, 4, 11
6. Epidemic keratoconjunctivitis 8, 19, 37
7. Pertussis-like syndrome 5
8. Acute haemorrhagic cystitis 11, 21
9. Acute infantile gastroenteritis 40, 41
10. Intussusception 1, 2, 5
11. Severe disease in AIDS and other immunocompromized patients 5, 34, 35
12. Meningitis 3, 7

# Laboratory Diagnosis

- In addition to a complete medical history and physical examination, diagnostic tests for adenoviruses may include:
  - blood work
  - culture of respiratory secretions by nasal swab
  - stool culture
  - chest x-ray
- Antigen detection, PCR, virus isolation, and serology can be used to identify adenovirus infections.
- Adenovirus typing is usually accomplished by hemagglutination-inhibition and/or neutralization with type-specific antisera. Since adenovirus can be excreted for prolonged periods, the presence of virus does not necessarily mean it is associated with disease.

# Prevention & Management

- There is no specific antiviral therapy.
- There are currently **no vaccines** available to protect against the adenovirus.
- A vaccine is available against Adult Respiratory Distress Syndrome. It consists of live adenovirus 4, 7, and 21 in enterically coated capsules. It is given to new recruits into various arm forces around the world.
- **Good hygiene**
  - Handwashing: still the best way to avoid picking up the adenovirus from an infected person.
  - wear **special isolation apparel**, such as gowns and gloves
  - **Heat and bleach** will kill adenoviruses on objects.
    - Adenoviruses are unusually stable to chemical or physical agents and adverse pH conditions, allowing for prolonged survival outside of the body.

# Erythema infectiosum

- Parvovirus B19.
- Naked, icosahedral, SSDNA
- Three capsid proteins VP1-3
- cultured in BM cells, fetal liver cells.
- P antigen on erythrocytes as a receptor.
- Primary site of replication is the nucleus of immature cell in the erythrocyte lineage.
- Fever only. Anemia, and aplastic crises.
- Sickle cell and thalassemia

# Manifestations and diagnosis

- Fever, malaise, headache and myalgia
- Indurated rash on the face (slapped-cheek) which spreads in 1-2 days to arms and legs
- LNs, enlarged spleen and liver.
- Thrombocytopenia, nephritis, encephalitis.
  
- Transmitted through respiratory route
- Spring months
- Viremia last 7-12 days
  
- Diagnosis: PCR, and serology: IgM-specific Ab
  
- Treatment: no definitive treatment, immunoglobulin

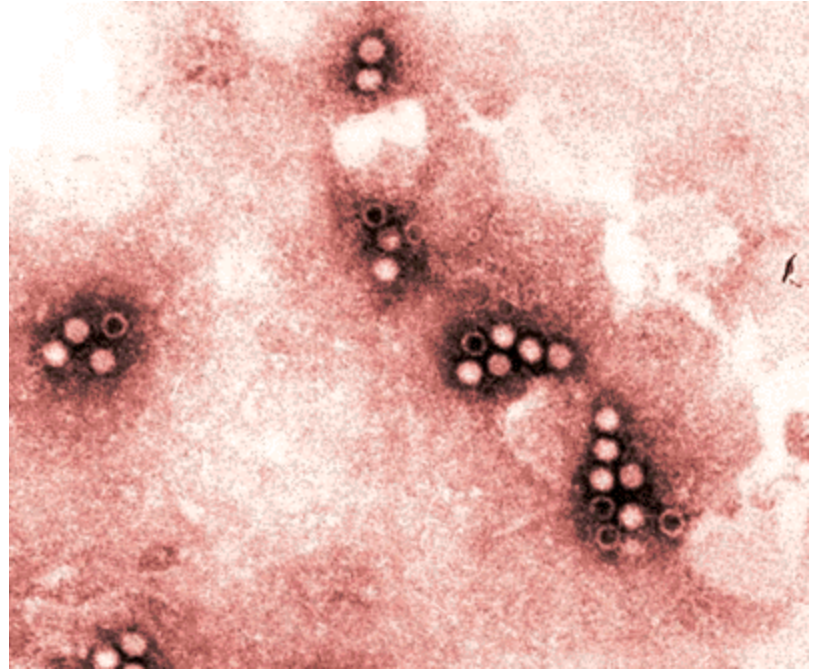


# Parvovirus B19



"Slapped cheek" rash

ADAM.

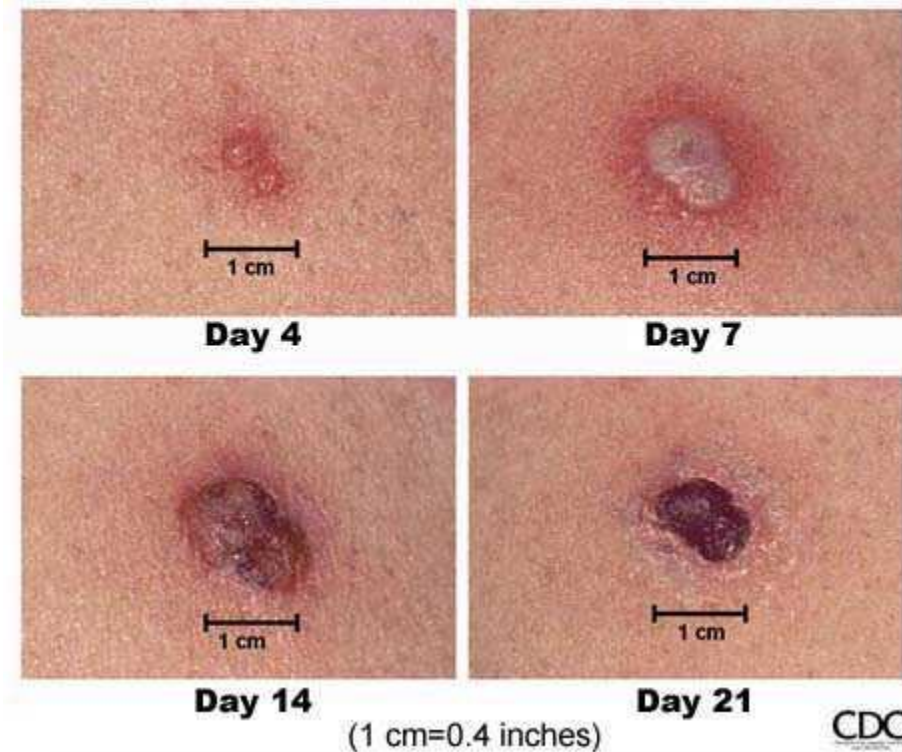


# Poxviruses

- Infect humans, birds, mammals, and insects.
- DsDNA brick shaped, enveloped multiply in the cytoplasm, 100x200x300 nm.
- lack normal capsid – instead, layers of lipoproteins and fibrils on surface
- Variola (small pox), Vaccinia, Moluscum contagiosum, orf, cowpox, and pseudocowpox.

# Manifestations

- IP=12-14 days, can be short to 4-5 days.
- Abrupt onset, fever, chills, myalgia, rash 3-4 days later.
- Firm papulovesicles, pustular in 10-12 day, crust and slowly heal
- All in the same stage of evolution
- Hemorrhagic rash (sledge hammer).
- Bacterial superinfection leads to death.



# Diagnosis and prevention

- Diagnosis: take vesicular scraping, culture, electron microscopy, PCR.
- Edward Jenner, milkmaids, cowpox, immune to smallpox
- Vaccinia virus, recombination cowpox and smallpox, used as a vector for vaccine
- Vaccination resembles real infection, localised.
- Immunity wane after 3 yrs

# Molluscum contagiosum

- Spread by direct contact, towels, sex
- IP=2-8 weeks
- painless nodule, pearl-like lesion, cheesy material in the center
- No systemic symptoms
- Dx: eosinophilic inclusions in cytoplasm of epithelial cells (molluscum bodies).
- No specific treatment, disappear in 2-12 months, removed by curettage



orf: sheep and goat



milkers nodules and cowpox

# HPV

- HPV stands for the Human papillomavirus.
- HPV is the most common sexually transmitted infection.
- There are over 100 different types of the HPV virus - most types are totally harmless.
- Genital warts are unsightly cauliflower-like growths (6, 11)
- Some types are considered “high risk” and can cause pre-cancerous lesions and can lead to cancer of the cervix, anus and other genital areas.(16,18,31)
- Most common transmission is by skin-to-skin contact with the penis, scrotum, vagina, vulva, or anus of an infected person.
- No antiviral treatment
- Prophylaxis: pap smear, cervarix vaccine