Subject: HLS- Microbiology

Topic: 1&2 viral diseases in hematolymphatics

Done by: Batool Bdour

	features	Tropism (target)	Diseases	Nucleic acid
Parvoviruses (parvoviridae)	-very small -icosahedral -non-enveloped -<u>some are dependent on co-infection</u> - replication happens in the nucleus and it depends on the dividing cell functions	Cells with BG-pAg Erythrocytes and erythrocyte progenitor cells	B19 (the only human pathogen of this group) causes: -Erythema Infectiosum -Aplastic Crisis -Transient aplastic anemia -hydrops fetalis -pure red cell aplasia	ss-DNA
Herpes viruses (herpes viridae)	-can establish life-long infections with periodic reactivation - replicate in the nucleus - Their envelope (derived from the nuclear membrane) has **receptors for Fc portions of ABs** giving them life-long persistence.	B-lymphocytes	EBV → infectious mononucleosis HHV8/ KSHV→ Kaposi sarcoma → AIDS associated lymphoma	ds-DNA
Human T-lymphotropic viruses	-Retro viruses -Present worldwide -have a very long latency period [20-30 years]	Mature T-lymphocytes	HTLV-1 → adult T-cell leukemia lymphoma →tropical spastic paraparesis →HTLV1-associated myelopathy	RNA

Parvovirus B19:

Features:

-ssDNA
-Icosahedral
-nonenveloped
-INdependent on Co-infection
- 3 genotypes – 1 phenotype

Tropism:

Erythrocyte precursor cells (it's the most common erythrogenous virus)

Parvovirus B19

Epidemiology:

-spread worldwide
-Infects all ages, any time of the year

Transmission:

Respiratory droplets (MOST common)
Fecal-oral
Blood transfusions/Injections

Pathogenesis:

Invasion of erythroid progenitor cells → destruction of these cells (cytotoxic effect)

Outcome depends on the patients and their immune status:

Background of anemia (sickle cell/ chronic hemolytic anemia) → aplastic crisis (severe anamia)

Healthy → viremia and erythropoietic arrest are transient & usually resolve with IgG production

→ causes a harmless infection in children called erythema infectiosum

TABLE 31-2 Human Diseases Associated with B19 Parvovirus

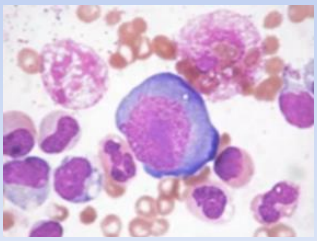
Syndrome	Host or Condition	Clinical Features
Erythema infectiosum	Children (fifth disease)	Cutaneous rash
	Adults	Arthralgia-arthritis
Transient aplastic crisis	Underlying hemolysis	Severe acute anemia
Pure red cell aplasia	Immunodeficiencies	Chronic anemia
Hydrops fetalis	Fetus	Fatal anemia

Clinical features of:

The main presentation **erythema infectiosum** → mostly asymptomatic, In children it shows '**slapped cheek disease**' (macular rash on face, trunk and extremities)
In adults→ **poly arthropathy** (pain and swelling in the joints that resolves in <3 weeks,)
The arthropathy is symmetrical (hands/ankles/ knees)
It doesn't persist but it may trigger rheumatoid arthritis.
-most **have asymptomatic transient reticulocytopenia** due to a temporary stop in RBC production

Clinical features of:

Transient aplastic anemia→
In patients who depend on continual rapid production of RBCs (they have hemolytic disorders, hemoglobinopathies, RBC enzymopathies, AI hemolytic anemias)
A characteristic is the presence of giant cells called 'pronormoblasts' in BM



Clinical features of:

→**Pure red cell aplasia:** chronic infection with B19 **with chronic suppression of BM** due to **Immunodeficiency (of any cause)**
- pronormoblasts appear, low IgGs with high B19 DNA in serum
→ **hydrops fetalis:**
-B19 isn't teratogenic , yet the mother's infection causes **fetal anemia** which leads to increased cardiac output → edema in the fetus and heart failure

Diagnosis:

Enzyme immunassays of IgG and IgM Abs [main method in immunocompetent patients]

-PCR and electron microscopy
-culturing in vitro isn't standard

Treatment:

-no antivirals, no vaccine
- symptomatic treatment
-TAC is treated by **Blood transfusions**
-Immunoglobulin (IVIg) from healthy donors can be given to the immunocompromised and anemic patients

Epstien- barr virus:

features:

It's a ubiquitous virus

It causes **heterophile positive infectious mononucleosis (IM)** and is associated with many tumors (nasopharyngeal and gastric carcinomas, Burkitt's lymphoma, HL, NHL, B cell lymphoma)

tropism:

B-cells

EBV

Epidemiology:

Common in all parts of the world,

Is a biphasic infection with one peak in childhood and the second in adolescence

>90% of people in adulthood are seropositive for EBV antibodies

Transmission:

Main route: oro-pharyngeal salivary secretions (remember kissing disease)

Can be transmitted through blood transfusions and BM transplantation

Pathogenesis:

The virus infects epithelium of the oropharynx and the salivary glands, and B-cells get infected by coming in contact with them.
-The proliferation of EBV infected B and reactive T cells → lymphoid enlargement
- It persists in latency in (immortalized) B cells → causes neoplastic transformation
-**If T-cell immunity is compromised, virus induced B-cell proliferation would be a precursor of neoplastic formation**
-In latent infection of B-cells, EBNAs, LMPs and EBV RNAs are expressed (used for diagnosis)
Most Infected B-cells release Igs not viruses

Clinical features of IM:

-Incubation 1-2 months

Children→ asymptomatic or mild pharyngitis +/- tonsillitis

Adults→ non-specific viral presentations + lymphadenopathy (enlargement)

-papular rash

-hepato and splenomegaly

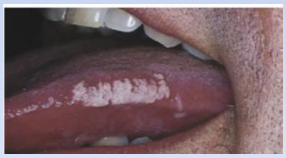
-Typically→ it's self limited

Some other EBV- associated diseases:

-Gastric carcinoma → the most common

-Congenital and acquired immunodeficiencies

-Oral hairy leukoplakia



Treatment:

-no vaccine

-acyclovir reduces shedding but doesn't reduce the number of EBV-immortalized B cells

-It has no effect on the symptoms of mononucleosis and no benefit in the treatment of associated lymphomas

Diagnosis:

They present with lymphocytosis where the cells are atypical (abundant cytoplasm, vacuoles, large)

-Molecular assays: e.g. nucleic hybridization which is very sensitive but **inconvenient**

-Isolation of virus from tropism tissues

-Serology: more convenient especially in immunocompetent.

ELISA, immunoblot, immunofluorescence, The heterophil agglutination test (monospot) which is rapid and confirmatory

Heterophilic antibodies are early and transient (early diagnosis)

>viral capsid IgM → recent infection

>VCA IgG → develop later and persist

>EBNA IgGs → develop later and persist for life

>early antigens → develop early persist for months

HHV 8 (Kapoosi-sarcoma):

Pathogenesis: it's genome contains related to cellular regulatory genes of proliferation, apoptosis and host responses
-it's the causative agent of Kaposi sarcomas and related to lymphomas occurring in AIDS patients

Transmission: **oral secretions [most common]** sexually, vertically, and in the blood

Diagnosis:

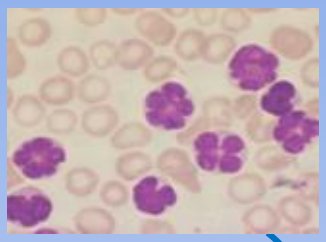
PCR assays

Serologic assays for Abs are available [ELISA, Western blot, indirect immunofluorescence]

Treatment:

Foscarnet and **famciclovir** among others have activity against KSHV

HTLV-1:



Diseases:
→adult T-cell leukemia lymphoma (ATLL)
→tropical spastic paraparesis
→HTLV1-associated myelopathy (HAM)

Transmission: [3 ways]

Breastfeeding, Sexual intercourse, blood transfusion and needles

Clinical syndromes:

-Infection is asymptomatic but can progress to ATLL which is **a CD4 helper T-cell neoplasia [usually fatal within a year of diagnosis]**
- malignant cells are termed flower cells because they're pleomorphic

Diagnosis:

ELISA for Ags or ABs/ viral PCR

Treatment:

No therapies are curative, no specific antiviral BUT the combination of interferon alpha with zidovudine may extend survival

Prevention:

Routine screening for it in blood of donors, prevention of breastfeeding in endemic areas, practice of safe sex and avoidance of needle sharing