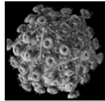


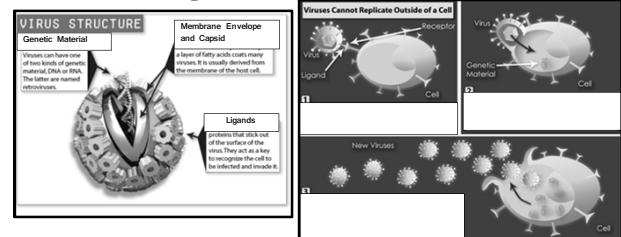
## Patients with Human Immunodeficiency Virus Disease (HIV/AIDS)



### Dental Management Considerations

Harold V. Cohen, DDS  
Professor  
Rutgers School of Dental Medicine  
Department of Diagnostic Sciences  
Division of Oral Medicine

## Life Cycle of *ALL* Viruses



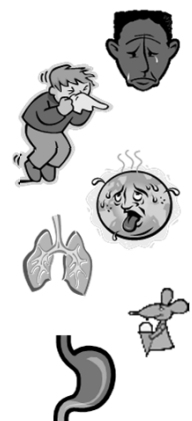
- A single virus particle (virion) is in and of itself essentially inert
- Viruses cannot reproduce or express their genes without the help of a living cell
- Once a virus has "infected" a cell, it will use the cell's ribosomes, enzymes and much of the cellular machinery to reproduce
- Viral reproduction produces many, many new viral "children" that will eventually leave the host cell to infect other cells in the organism

## The Immune System

- ❖ **Complex system of cells and fluids (cytokines, complement, antibodies)**
- ❖ **Can remember previous encounters with foreign substances and develop responses to new challenges**
- ❖ **Differentiates between "self" and "foreign"**
- ❖ **In many cancers, may not recognize the cancer as "foreign" and/or the immune system does not act against it**

## Innate Immunity Barriers

- Physical Barriers**  
Skin, mucous, tears, saliva, sneeze urine, cilia
- Chemical Barriers**  
pH (stomach / genital tract)
- Lysozymes**  
tears, saliva, sweat
- Biological Barriers**  
Non-pathogenic bacteria in gut compete with pathogenic bacteria

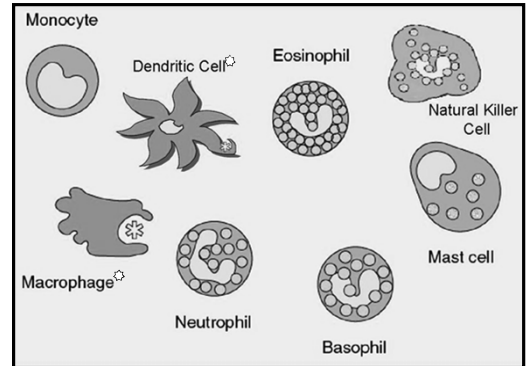


## Innate Immunity Cells & Fluids

The defense system we are born with

- Rapid, 4-10 days,
- These immune defenses that lack memory, remain unchanged no matter how often the antigen is encountered
- Cells (macrophages, neutrophils, dendritic cells, eosinophils, basophils, natural killer cells)
- Fluids (complement, cytokines)

## Innate Immune Neutrophils, Macrophages etc.



## Innate Immunity Cells & Fluids

The defense system we are born with

- Rapid, 4-10 days
- Can secrete its own cytokines (chemicals) - *does not need CD4 cells*
- Wipes out dental infections - we are not dependent upon the adaptive system T-cells (CD4) to prevent or control a dental bacterial infection
- Antibiotics usually not needed unless already has dental infection as with any other patient (even if CD4 count is low)

## Adaptive Immunity

*Along came viruses, fungi and cancer*

- We needed a system to fight these attackers
- We needed a system **with memory and a rapid response** to fight these invaders
- The body developed **B-lymphocytes** which make antibodies and...
- The body developed **T-lymphocytes** to **coordinate the attack** and kill the invaders

## What are the types of T-lymphocyte cells and what do they do?

### CD-4

The "coach" that helps the system function but does not kill - the cell that the HIV virus attacks.



### CD-8

The killers that directly attack invaders



## Theories on CD4 Cell Death

Suicide (apoptosis)?- Holes in membrane from release of new virions? -  
A newer theory - it is a victim of the chronic inflammatory process

In an area of inflammation (like HIV infection) pro-inflammatory signals released by death of cells attract more cells (CD4) into the infected tissue to die and, in turn, produce more inflammation.

"The cavalry comes riding in and falls victim to this same form of fiery cell death, turning their rifles on themselves"

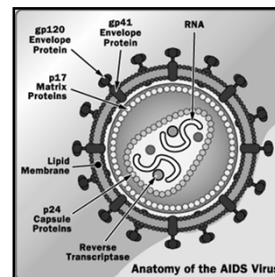
The Scientist Magazine-Dec. 2013

## HIV

- HIV is a RETROVIRUS. A retrovirus is a ribonucleic acid (RNA) virus that must reverse to the deoxyribonucleic acid (DNA) before reproducing/replicating.
- It is the DNA gene that enables the HIV virus to replicate. HIV invades mainly the helper T-cells (CD4) to replicate itself.
- No cure or vaccine as of today, June 3, 2015

## CHARACTERISTICS OF THE VIRUS "THE VIRAL GENOME"

- Icosahedral (20 sided), enveloped virus of the lentivirus subfamily of **retroviruses**.
- Retroviruses transcribe RNA to DNA.

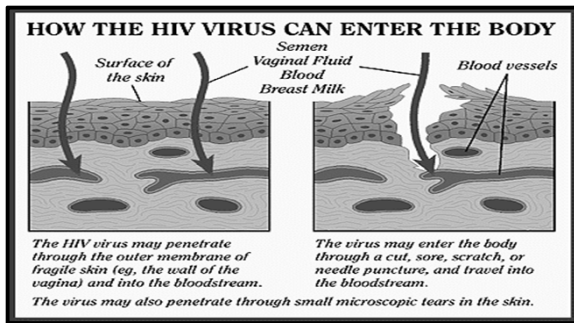


Two viral strands of RNA found in core surrounded by protein outer coat.

Outer envelope contains a lipid matrix within which specific viral glycoproteins are imbedded.

These knob-like structures responsible for binding to target cell.

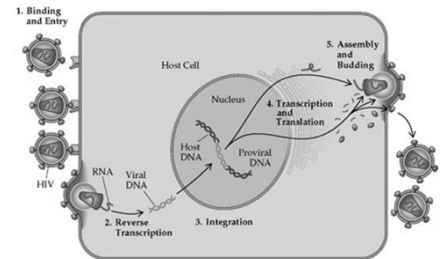
## Transmission to individual



## HIV – Life Cycle and Medications (“HAART”)

There are 7 steps in the life cycle of HIV, they are

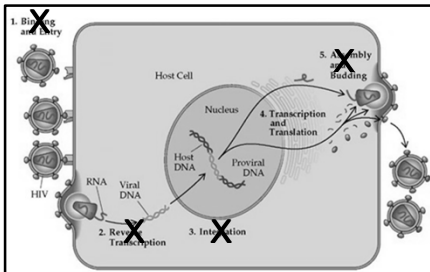
- **Binding**
  - **Reverse transcription**
  - **Integration**
  - **Transcription**
  - **Translation**
  - **Assembly**
  - **Budding**
- Medications focus on these processes



## HIV – Why drug resistance – no vaccination - no cure yet – Multiple mutations in its life-cycle!

There are 7 steps in the life cycle of HIV, they are

- **Binding**
  - **Reverse transcription**
  - **Integration**
  - **Transcription**
  - **Translation**
  - **Assembly**
  - **Budding**
- Medications focus on these processes



## HIV ⇔ AIDS (CD4 < 200) – if rises > 200, still considered that patient has AIDS

- The immune system weakens
- The illnesses become more severe leading to an AIDS diagnosis

### What is an opportunistic infection?

-An infection caused by a pathogen (bacteria, virus, fungus or protozoan) that usually does not cause disease in a healthy host, i.e. one with a healthy immune system

- A compromised immune system, however, presents an "opportunity" for a resident pathogen to cause an infection and/or a cancer to develop. Commonly occurring **opportunistic infections** in the oral cavity of HIV infected patients are:



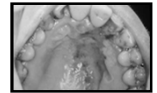
### Examples of oral opportunistic infections

**Soft tissue screening is essential an part of a dental examination for your HIV patient (as with any patient!)**

- Candidiasis (fungus)



- Herpes (virus) – the “cold sore” (HSV-1)



- Kaposi's Sarcoma (cancer) from the HHV-8 (herpes virus)



### Tuberculosis

(A co-infection [opportunistic] risk factor in the HIV+ patient)



### Developing Issues in Dental Care for the HIV Patient

Prolonged life-span with use of HAART has increased:

- the numbers of HIV patients that present for dental treatment
- the challenges related to restorative considerations that *may* increase with time
- medical complexity considerations due to prolonged lifespan and co-morbid conditions
- potential development of early onset cognitive difficulties as per recent research



### Dental Care for Patients with HIV Overall Considerations

- Dental care is no more complex than for any other patient *with a significant medical history*
- Risk of transmission to the dental team is negligible
- TB – no risk unless patient presents with **productive** cough
- Standard medical assessment with additional considerations specific for HIV
  - Hemostasis, infection risk, drug actions/interactions, ability to tolerate treatment, co-morbidities
- Signed consent for medical info. sharing (?)
- HIPAA considerations as for any other patient

### Patients with HIV The Health History – Specific Issues

- *The privacy setting*
- **Confidentiality with pediatric patients**
- Risk factors – mode of transmission, if disclosed, *may* have implications for dental treatment
- Co-morbidities
- Patient is following up with MD?
- Last CD4 count, viral load

### HIV – Medications and Drug Interactions

- Current medications – HAART or for other comorbidity
- Not taking HAART – why? - Physician care? Non-compliance?
- GI upset may be from the use of multiple Rx, not GI disease – avoid NSAIDs (?)
- Drug-drug interactions with HAART medications from usual dentist-prescribed medications are usually not a significant issue
- HAART medications may affect blood cell counts



- For the PHIV with no active oral infection, there is no data to support the need for antibiotic coverage based on a patient's CD4 count
- Antibiotics should be used if the absolute neutrophil is low ( $<500 \text{ mm}^3$ ) or segmented neutrophil count is low as with any other patient
- Other medical issues may require antibiotic use
- Patients may be on other antibiotics for prevention of opportunistic infections. However, standard dental management protocols are still used (infection, cardiac)

### HIV Patient –Labs. for Dental Care

- Lab. values needed for dental/surgical/periodontal management are *medical* in nature, not specifically focused on HIV (CBC/D, complete metabolic panel, coagulation studies)
- *Altered blood cell counts – reduced red cells, white cells, platelets*
- CD4 count / viral load should be known so as to create an awareness of the potential for oral lesions or other systemic problems

### Reduce or Eliminate Risks for Acquiring HIV Infection in the Dental Office

- Infection control practices
- Blood and body fluid precautions



### HIV – Clinician Guidelines for General Dental Care

#### Treatment Planning

- Patient assessment and management for general dental procedures are based upon patient's medical status, not the HIV status
- Thorough oral soft tissue examination – screening for opportunistic disease and/or cancer (Kaposi's Sarcoma)
- Other patient medical issues, whether or not HIV related, can influence planning and management
- Life-style factors *may be* issues of concern in dental treatment planning

### HIV – Clinician Guidelines for General Dental Care

- HIV patients do not exhibit dental disease characteristics different from the non-afflicted population
- Xerostomia from medications can be a common complicating factor
- As with any medical illness, degree of impairment, care setting and personal hygiene characteristics will strongly influence planning, treatment, follow-up maintenance and prognosis



### **HIV – Clinician Guidelines for General Dental Care**

- Restorative, surgical, preventive, endodontic, periodontic, orthodontic procedures are the same as for the non-HIV patient with modifications as may be dictated by medical status issues



### **Oral Surgery: Clinician Guidelines**

- **Update the medical history on a regular basis**
- Follow same principles as with other medically complex patients
- Communicate – pre- and post-op instructions
- *Incidence of post-procedural complications is no greater than in other populations*

### **HIV – Clinician Guidelines for Periodontal Disease**

- Overall, HIV patients do not exhibit periodontal disease characteristics different from the non-afflicted population
- Standard periodontal therapies may be used with no modification except as dictated by medical status
- Noted periodontal manifestations:
  - Linear Gingival Erythema
  - Necrotizing Ulcerative Gingivitis (NUG)
  - Necrotizing Ulcerative Periodontitis (NUP)

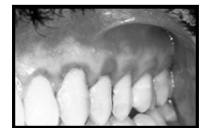
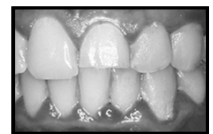
These periodontal manifestations may occur in non-HIV individuals such as immunocompromised patients

NUP may be a marker of immune decline from HIV to AIDS

These entities may be superimposed on conventional periodontitis

### **Linear Gingival Erythema (LGE)**

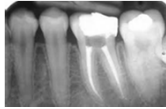
- Erythematous band along the gingival margin, not always associated with bleeding or discomfort
- Can present on non-attached gingival tissues as petechiae
- Not necessarily related to plaque accumulation; may be due to subgingival candida colonization
- Debridement, chlorhexidine gluconate





### Endodontic (Root Canal) Considerations

- Endodontic treatment appears to offer many benefits and few drawbacks for HIV patients
  - Reduced infection risk
  - Reduced need for extraction
  - Improved ability to chew
  - Improved self-esteem
  - *Restorative and maintenance prognosis as with any patient*

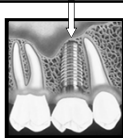


### Prosthodontic Considerations

- Most principles are similar to the general population
- Special concern should be given:
  - overall medical status
  - candidiasis
  - xerostomia
  - wasting syndrome
  - *maintenance potential*

### HIV and Dental Implants

- Not a contraindication
- Medical considerations as with non-HIV patients for surgery can influence the placement and survival
- If medical aspects of patients health are acceptable, patient is a good candidate
- Surgical risks should be part of assessment (bleeding, infection)
- Other life-style factors relating to the illness may be a consideration (illicit drugs, hygiene)



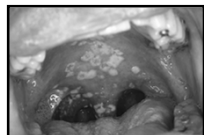
### Xerostomia

- Impacts on hard and soft tissue
- Impacts on quality of life
- Treatments are available
  - (prescription and local OTC)

### Do not forget to perform the intraoral soft tissue examination



Kaposi's Sarcoma



Candidiasis  
(Thrush)



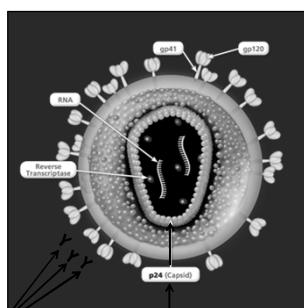
Oral Warts  
Condyloma-  
acuminata (HPV)

### To summarize:

- The principles of good oral health care are the same for people with HIV as they are for all dental patients
- There is no evidence to support alterations in oral health care solely based on HIV status.
- By focusing on routine and preventive care, dentists can maintain and improve the quality of life for patients with HIV
- With the now prolonged lifespan of the PHIV, maintaining oral health becomes a more critical and challenging focus for the dental clinician as is with all other patients

### HIV – Combo. Rapid Test – 2013

Tests for p24 antigen / HIV antibodies  
One small drop of blood  
Results in 20 minutes



HIV Antibodies

p24 Antigen

### References

1. American Academy of Periodontal Therapy, Periodontal Manifestations in the HIV-Positive Patient 1994
2. Glick, M., Know thy Hepatitis, A through TT, Journal of the California Dental Association, Volume 27, #5, 1999
3. Glick, M., Molinari, J., Infectious Diseases, Chapter in Burket's Oral Medicine, 10<sup>th</sup> Edition, B.C.Decker, Hamilton, Ontario, Volume 194, no. 10, 2002
4. Glick, M., Muzyka, B, Salkin L., Lurie, D., Necrotizing Ulcerative PEriodontitis: A Marker for Immune Deterioration and a Predictor for the Diagnosis of AIDS, Journal of Periodontics, Vol. 65, #5 1994
5. Levitsky, J., Cohen, S., The liver transplant recipient: what you need to know for long term care, Applied Evidence, Vol 54, #2, February 2005
6. Novak, J., Necrotizing Ulcerative Periodontitis, Ann Periodontol. 1999 Dec;4(1):74-8
7. Perspective: Oral Manifestations of HIV Disease, Vol. 13, #5, 12/05-1/06
8. Wasmuth, JI, Rckstroh J., HIV and HCV Coinfections, [www.hivmedicine.com](http://www.hivmedicine.com)
9. Graphics – Dovemed.com, [www.niaid.nih.gov](http://www.niaid.nih.gov)
10. [www.niaid.nih.gov](http://www.niaid.nih.gov)