



## Virology for 2<sup>nd</sup> Year MD Students

### (09) Retroviruses 1

٣٠.  $\xrightarrow{\text{RNA}} \text{DNA} \rightarrow \text{RNA} \rightarrow \text{Protein}$

على عكس الميكروبات على

$\text{DNA} \rightarrow \text{RNA} \rightarrow \text{Protein}$

لماذا هنا السبي و خطير؟

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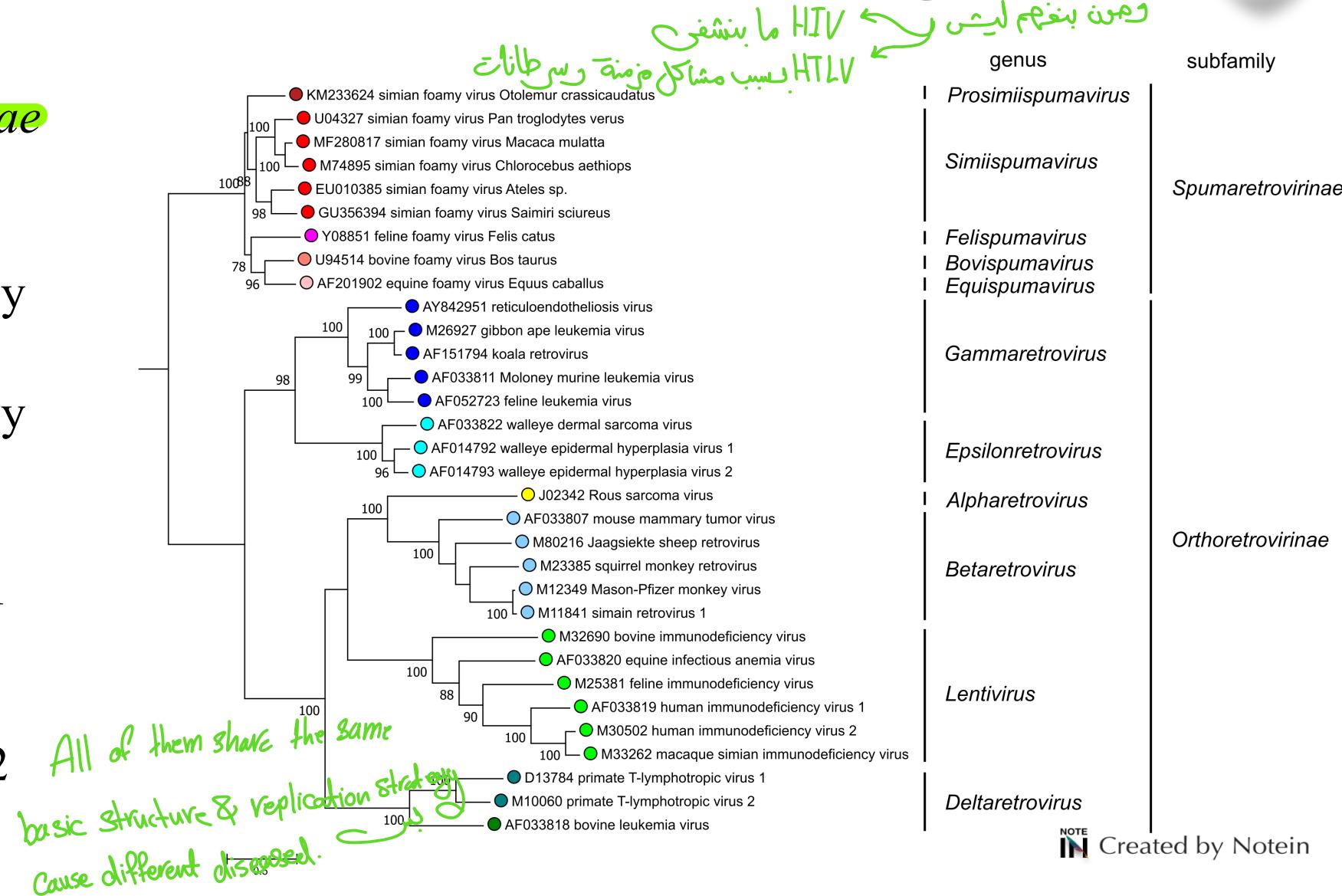
ويدخل داخل Chromosome الخلية  
بعض جزيئاته منها



# Retroviridae (retroviruses)

يعنى اجهاز اكعاني ما ينفعها  
بسهولة و ما عني  
كامل elimination  
ومن بقى لهم ليس

- The virus family **Retroviridae** has four members that can cause human disease:
  - Human immunodeficiency virus type 1 (HIV-1)
  - Human immunodeficiency virus type 2 (HIV-2)
  - Human T cell lymphotropic virus type 1 (HTLV-1)
  - Human T cell lymphotropic virus type 2 (HTLV-2)

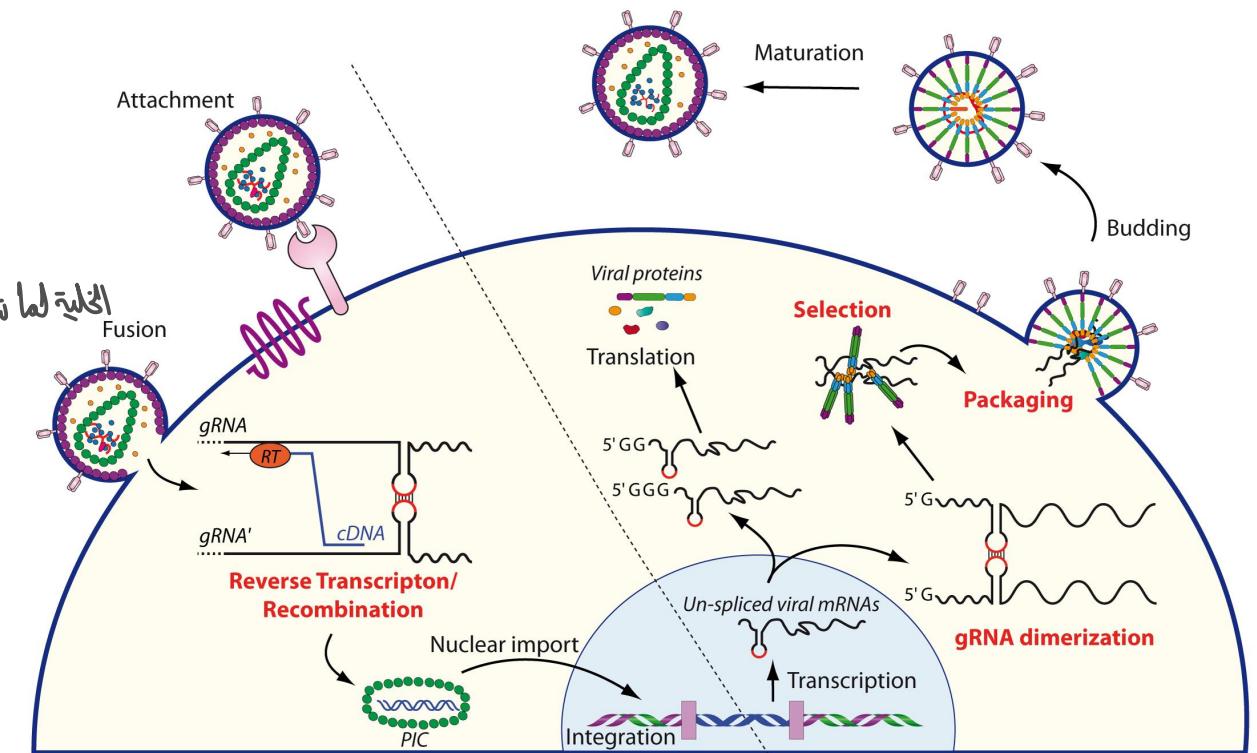




# General features of retroviruses

- Reverse transcriptase converts viral RNA into DNA which will be integrated in the host cell chromosomes by the viral enzyme called integrase. The integrated viral DNA is called “**provirus**”
- An **envelope** is present
- They infect cells of the **immune system** (mainly CD4+ T helper cells, monocytes)
- They remain in the body forever in the form of **provirus**

الآن نقسمها بحسب فحص  
ما يجري سبب Latent .





# Human T-cell lymphotropic virus types 1 & 2

target cells  
HTLV = Cancer + proliferation

Oncovirus      بكتيريا

- Human T-cell lymphotropic viruses types 1 & 2 (HTLV-1 & HTLV-2) are genetically and biologically similar. However, their worldwide distribution is different.
- HTLV-1 is present throughout the world, with clusters of high endemicity (Southwestern part of Japan, sub-Saharan Africa and South America).  
*الآن* ↗
- HTLV-2 has a more restricted distribution, more prevalent among some native Americans and some Central African tribes, but is relatively common among intravenous drug users and their sex partners in Europe, North America.



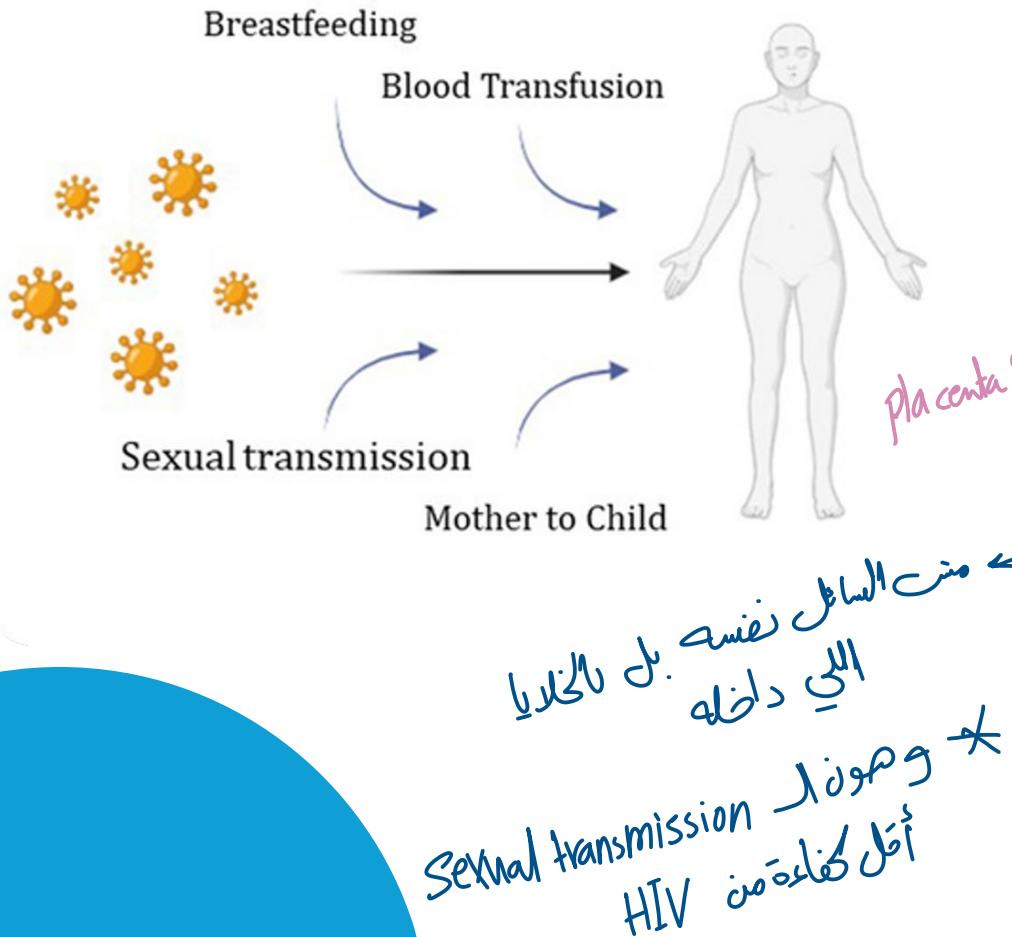
# Summary of HTLV-1/2 endemic regions, prevalence, and data collection periods

| HTLV Type | Region                                 | Key Countries/Areas                       | Prevalence Range (General Population/Specific Groups)                                   | Data Collection Period |
|-----------|--|---|---|------------------------|
| HTLV-1    | Southwestern Japan                     | Kyushu, Okinawa                           | Blood donors: 1% (Hokkaido) to >6% (Kyushu, Okinawa)                                    | 2006-2016              |
|           | Sub-Saharan Africa                     | Gabon, DRC, Nigeria, Ghana, Guinea-Bissau | Adults: 0.3-3%; Older women (Gabon/DRC): 10-25%; Pregnant women (West Africa): 0.2-7.7% | early 2000s-2010s      |
|           | South America                          | Peru, Colombia, French Guiana, Brazil     | Blood donors (Brazil): 0.04-1%  | 2000s-2010s            |
|           | Caribbean Area                         | Jamaica, Haiti                            | Jamaica (mean): 6.1%; Pregnant women (Haiti): 2.2-4.2%                                  | 1990s-2000s            |
|           | Middle East                            | Iran (Mashad region)                      | Adults: 0.77-3%   | 2003-2011              |
|           | Australo-Melanesia                     | Central Australia, PNG, Solomon Islands   | Aboriginal Australians: up to 44%; Tribes: 1.2-3%                                       | 1990s-2000s            |
| HTLV-2    | Southeastern USA                       |   | Prevalence in blood donors, regional variations   | 2007-2015              |
|           | Indigenous populations of the Americas | Brazil (Amazon), Panama, USA              | Kayapó: up to 41.2%; Native American tribes: up to 13%; Mexico: 0.23%                   | 2000s-2010s            |
|           | People who inject drugs (PWID)         | North America, Europe                     | Estimated prevalence: 20% (USA)   | 1990s-2010s            |
|           | Some Indigenous people in Africa       | Cameroon, DRC (Pygmy populations)         | Detected in Pygmy populations   | 2000s                  |
| USA       |  |   | Blood donors: HTLV-2 more common than HTLV-1; overall prevalence: 0.016%                | 2007-2015              |

Source: Branda, F.; Romano, C.; Pavia, G.; Bilotta, V.; Locci, C.; Azzena, I.; Deplano, I.; Pascale, N.; Perra, M.; Giovanetti, M.; et al. Human T-Lymphotropic Virus (HTLV): Epidemiology, Genetic, Pathogenesis, and Future Challenges. *Viruses* 2025, 17, 664. <https://doi.org/10.3390/v17050664>



# Human T-cell lymphotropic viruses types 1 & 2





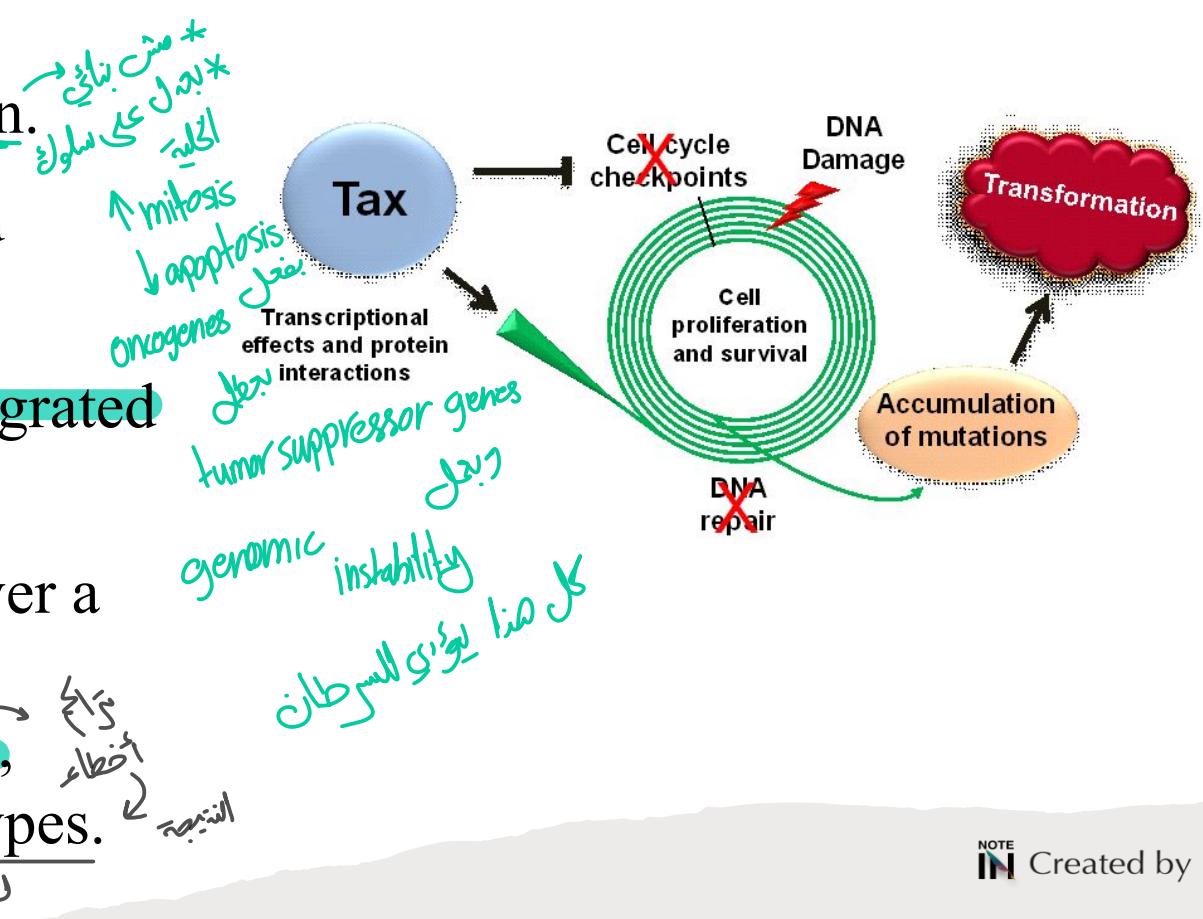
# Human T-cell lymphotropic viruses types 1 & 2

- It is estimated that 10 million to 20 million people live with HTLV-1 worldwide.



# *Retroviridae* (retroviruses)

- HTLV is considered an oncovirus.  
    ↳ viral protein
- The viral Tax is the critical viral oncoprotein.
- HTLV infection both stimulates mitosis and immortalizes T lymphocytes.  
    ↳ يُحفِّز細胞分裂 ويزيل عمرها  
    ↳ يُحيِّي خلاياymphocytes
- Following infection, the virus becomes integrated in the host cell as a provirus.
- In the course of continued multiplication over a period of many years, the infected T cells accumulate many chromosomal aberrations, leading to appearance of malignant phenotypes.  
    ↳ يُؤثِّر على الكروموسومات  
    ↳ يُؤثِّر على خلايا





# HTLVs disease



- Most individuals remain asymptomatic during their entire lives, whereas a small fraction of carriers develop HTLV-1-associated diseases:

- Adult T cell leukemia.
- Cutaneous T-cell lymphoma.
- HTLV-associated myelopathy/tropical spastic paraparesis (characterized by progressive spasticity and weakness of the extremities, urinary and fecal incontinence, hyperreflexia, and some peripheral sensory loss).

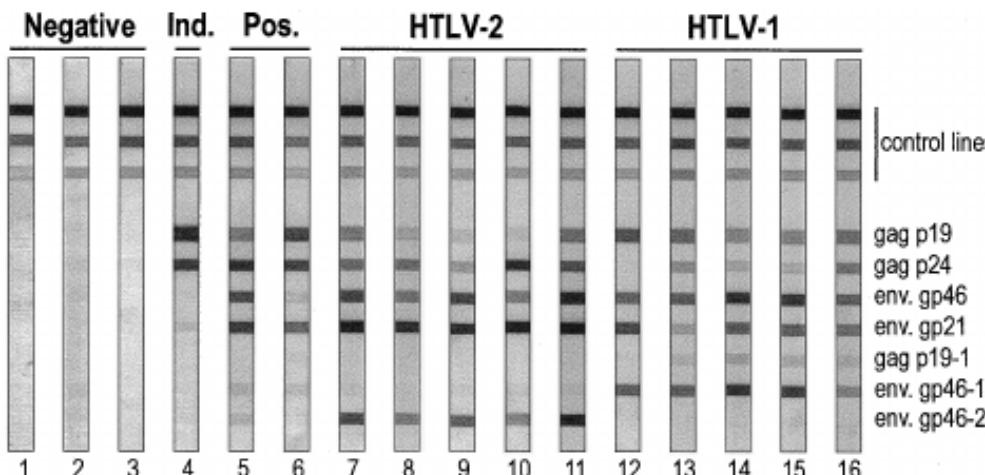
سرطان خلايا T  
عدواني جداً  
ال prognosis  
يتطور ببطء  $\rightarrow$  chronic + progressive  
ومن باحبل الشوك



- Smoldering
- Chronic
- Lymphomatous
- Acute



# HTLV diagnosis, treatment, and prevention



- HTLV infection can be diagnosed by the presence of antibody to HTLV-1 (usually by ELISA), confirmed by Western blot or molecular detection by PCR. *Viral DNA*
- ATL is treated with aggressive chemotherapy.
- Attempts to treat HAM have been unsuccessful. *اضغط على الماء* *وهو الماء العصبي* *ومناعي*
- For prevention, screening of blood units can be done, experimental vaccines are tested.



# HIV Infection/AIDS- Background

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Where did HIV come from?





**Thank You...  
Wishing you all the best!**