I principali fattori del rischio biologico

Modalità di trasmissione degli agenti infettivi

Modena, 16 marzo 2013
Una Hotel—Via Settembrini 10
Baggiovara (MO)

UNIVERSITÀ DEGLI STUDI
DI MODENA E REGGIO EMILIA

Giovanni Guaraldi

Case narrative

- A 35-year-old nurse sustained a deep hand injury with a needle- stick whilst taking blood with a 0.25-inch needle attached to a syringe from a newborn hospitalised in a Neonatal Unit for several signs correlated to human cytomegalovirus (HCMV) infection.

- The baby's mother was a 40-year-old Italian woman and the father was her Namibian partner. The pregnancy was diagnosed in Zimbabwe in June 2006 and 3 weeks later the woman displayed an influenza-like syndrome that resolved in a few days

- In Octo- ber 2006, after 20 weeks of pregnancy, the woman moved to Italy where she underwent a serological test focussed only on Rubella virus (pos), human Cytomegalovirus (recent infection) and Toxoplasma gondii (neg)

- In February 2007, after 38 weeks of pregnancy, the woman gave birth spontaneously to a baby boy.

Journal of Clinical Virology 46 (2009) 374–377

Case narrative

- When the baby was 2 weeks old, a 35-year-old nurse sustained a needle-stick injury whilst taking blood from the newborn. The wound was described as a penetrating stab in the left index fin- ger to a depth of approximately 0.25 inch and sustained through a pair of gloves.
- Unfortunately, at the time of accident, the nurse did not activate preventive medical procedures with the hospi- tal management for still undetermined reasons and only reported the needle-stick injury 2 weeks later.
- Following notification of the accident, the nurse, newborn (after the mother's consent was gained) and mother were immediately submitted to HIV-specific serological and molecular analysis. The newborn showed: (i) anti- HIV-specific antibody detected by ELISA (Duo HIV-1/2 ELISA kit, Biomerieux, Lyon, France) further confirmed by Immunoblot

Journal of Clinical Virology 46 (2009) 374–377

Case narrative

- The nurse was analysed for specific antibody to HIV-1/2, 2 weeks after exposure, resulting negative. Since the time limit for antiretroviral treatment is scheduled within 72 h after the accident, HIV-related prophylaxis was not performed.
- At day 21, HIV-specific test disclosed specific HIV-1 antibody, high levels of viral repli- cation (HIV-1 RNA >500000copiesml−1), CD4 cell count at 618 per mmc (31%) with fever and skin rash spread over the neck and back. She was admitted to the Infectious Disease Ward and started antiretroviral therapy

Journal of Clinical Virology 46 (2009) 374–377

Documented occupational infections following exposure to blood or body fluids in healthcare workers or laboratory personnel

Viral infections	Bacterial and rickettsial infections	Fungal and parasitic infections
Bolivian viral hemorrhagic fever (needlestick, nonintact skin)	Corynebacterium diphtheriae (needlestick)	Blastomyces dermatitidis (scalpel cut)
Crimean Congo viral hemorrhagic fever (nonintact skin)	Corynebacterium striatum (scalpel cut)	Cryptococcus neoformans (needlestick)
Dengue (needlestick)	Mycobacterium leprae (needlestick)	Leishmania sp. (needlestick, nonintact skin)
Ebola viral hemorrhagic fever (nonintact skin)	Mycobacterium marinum (needlestick)	Plasmodium falciparum (nonintact skin)
Hepatitis B virus (needlestick, nonintact skin, mucous membranes)	Mycobacterium tuberculosis (needlestick)	Plasmodium malariae (needlestick, nonintact skin)
Hepatitis C virus (needlestick, nonintact skin, mucous membranes)	Rickettsia rickettsii (needlestick)	Plasmodium vivax (needlestick)
Hepatitis D virus (needlestick)	Staphylococcus aureus (needlestick)	Trypanosoma brucei (needlestick)
Hepatitis G virus (needlestick)	Streptococcus pyogenes (scapel cut)	
Herpes simplex 1 (needlestick, nonintact skin)	Streptococcus pyogenes {necrotizing fasciitis} (nonintact skin)	
Human immunodeficiency virus 1 (needlestick, nonintact skin)		
Lassa viral hemorrhagic fever (nonintact skin)		
Marburg viral hemorrhagic fever (needlestick, nonintact skin)		
Varicella zoster virus (needlestick)		
Yellow fever virus (nonintact skin)		

Adapted from: Tarantola, A, Abiteboul, D, Rachline, A. Infection risks following accidental exposure to blood or body fluids in health care workers: a review of pathogens transmitted in published cases. Am J Infect Control 2006; 34:367.

EPIDEMIOLOGY OF BLOODBORN EXPOSURE

Statistics on exposures

Worldwide in 2000 alone, percutaneous injuries led to:

- 16,000 cases of hepatitis C
- 66,000 cases of hepatitis B
- 1000 cases of HIV

Am J Ind Med. 2005;48(6):482.

The cost of managing one postexposure evaluation after HCV exposure has been estimated at $650.00 per event

Infect Control Hosp Epidemiol. 2007;28(7):774.

I.N.M.I. "L. Spallanzani" I.R.C.C.S.

Via Portuense, 292 - 00149 -ROMA

Progetto Appropriatezza AntibioticoProfilassi Perioperatoria | Progetto SIROH | Progetto IRAPEP | Progetto CRIPA

Progetto SIROH

Lo Studio Italiano Rischio Occupazionale da HIV e da altri patogeni a trasmissione ematica (SIROH) è un progetto di ricerca che da 25 anni, grazie al prezioso contributo volontario degli operatori di oltre un centinaio di ospedali di tutta Italia, consente di realizzare un importante studio degli incidenti occupazionali a rischio biologico con un significativo impatto in termini di prevenzione.

Linee Guida Italiane sull'utilizzo dei farmaci antiretrovirali e sulla gestione diagnostico-clinica delle persone con infezione da HIV-1

Luglio 2012

Su mandato del *Ministro della Salute*

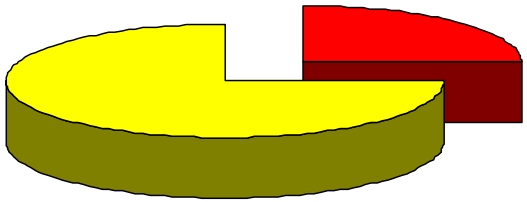
In collaborazione con

Ministero della Salute

Commissione Nazionale per la lotta contro l'AIDS
Consulta delle Associazioni per la lotta contro l'AIDS

e

http://www.salute.gov.it/imgs/C_17_pubblicazioni_1793_allegato.pdf



Esposizioni mucocutanee
25.1%

Esposizioni percutanee
74.9%

Risk by profession

34%	nurses
18%	physicians who are residents or fellows
14%	attending physicians
6%	surgery attendants
5%	phlebotomists
4%	non-laboratory technologists

Long work hours and sleep deprivation among medical trainees result in fatigue, which is associated with a **threefold increase** in the risk needlestick injuries

Infect Control Hosp Epidemiol. 2007;28(1):10.

Devices associated with exposure

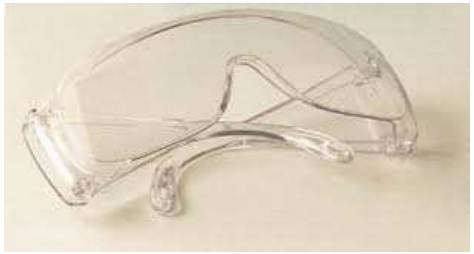
The two most common devices involved in injuries included:

- disposable syringes
- suture needles

The purpose of the sharp devices was most commonly for suturing, injections, or drawing venous blood

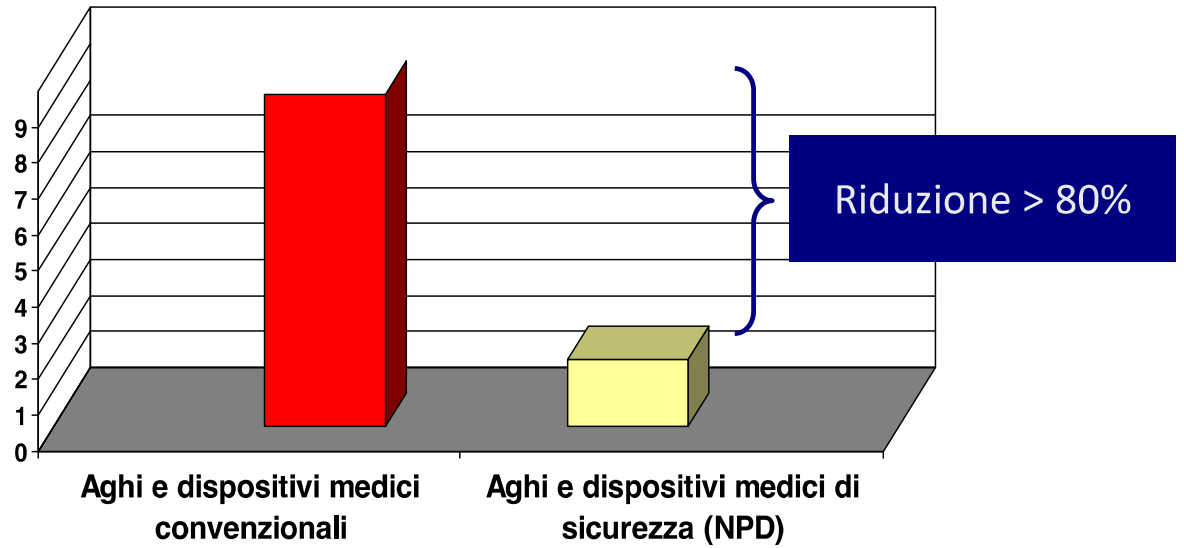
Minimizing risk

1. Personal Protective equipment (PPE)


2. Security devices


3. Leakproof secondary containers for transporting blood and impervious needle disposal containers

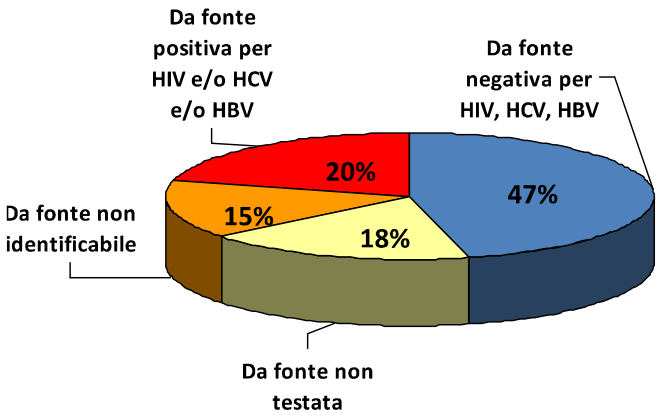
Nello stesso periodo nei restanti ospedali SIROH, 12 casi di HCV e 1 HIV per esposizione con ago convenzionale (11 evitabili con NPD)

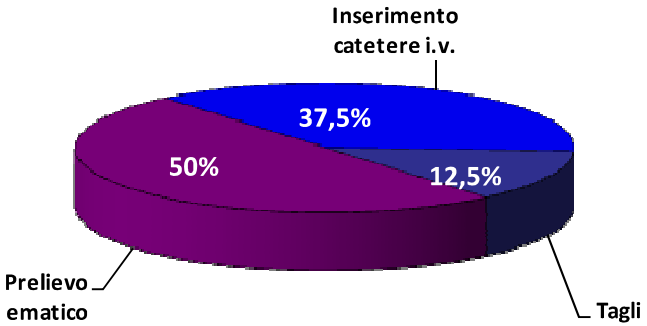
Minimizing risk

- All HCWs with "reasonably anticipated" exposure to blood or blood contaminated body fluids must receive **yearly education** on the epidemiology of bloodborne pathogen transmission and means of minimizing such risks.

- All at-risk HCWs must be offered **hepatitis B immunization** at no cost to the employee. HCWs who refuse immunization must sign an OSHA mandated declination form.

- **Clinical auditing** in case of occupational exposure


Da fonte positiva per HIV e/o HCV e/o HBV
Da fonte negativa per HIV, HCV, HBV
20%
47%
15%
18%
Da fonte non identificabile
Da fonte non testata


Inserimento catetere i.v.
37,5%
50%
12,5%
Prelievo ematico
Tagli

OCCUPATIONAL RISKS OF BLOODBORNE PATHOGEN

The risk that a HCW will acquire a bloodborne pathogen as a result of an occupational exposure will depend upon several factors:

- **Prevalence** of the infectious agent in the general aand within the patient population served by the healthcare
- **Frequency of exposures** capable of transmitting the infectious agent
- **Nature of the exposure and efficiency of transmission** for that exposure (ie, exposure via percutaneous, mucosal, or nonintact skin)
- **Which virus(es) are present in the contaminated fluid** and the titer of virus (viral load) in that fluid
- Availability and efficacy **of pre- and postexposure prophylaxis**

Risk of acquisition of bloodborne pathogens

	HBV	HCV	HIV
Seroprevalance, general population	0.42 percent (95 percent CI, 0.32-0.55)	1.8 percent (95 percent CI, 1.5-2.3)	0.31-0.42 percent
Seroprevalance in HCW compared to general population	Increased	Similar	Similar
Viral particles/mL of serum or plasma	10^2-10^8	1->10^6	1-10^7
Risk of infection by mode of exposure			
Percutaneous	6-30 percent	1.8 percent (range, 0-7 percent)	0.3 percent (95 percent CI, 0.2-0.5)
Mucosal	Risk not quantified, transmission documented	Risk not quantified, transmission documented	0.09 percent (95 percent CI, 0.006-0.5)
Nonintact skin	Risk not quantified, transmission not documented	Risk not quantified, transmission not documented	<0.1 percent, risk not completely quantified
Human bite	Risk not quantified, transmission documented	Risk not quantified, transmission documented	Risk not quantified, possible transmission reported
Infective material leading to HCW infection			
Documented	Blood, blood products	Blood, immunoglobulin preparations	Blood, blood products, bloody fluids
Possible	Semen, vaginal fluid, bloody fluids, saliva	Bloody products, bloody fluids, semen, vaginal fluid	Semen, vaginal fluid, cerebrospinal fluid, breast milk, exudates, serosal fluids, amniotic fluid, saliva (during dental exams)
Unlikely	Urine, feces	Saliva, urine, feces	Saliva, urine, feces

Courtesy of David Weber, MD, MPH.

Recommended postexposure prophylaxis for percutaneous or permucosal exposure to hepatitis B virus

	Treatment when source is:		
	HBsAg positive	**HBsAg negative**	**Not tested or unknown**
Vaccination and antibody response status of exposed person			
Unvaccinated	HBIG x 1; initiate HB vaccine series	Initiate HB vaccine series	Initiate HB vaccine series
Previously vaccinated			
Known responder	No treatment	No treatment	No treatment
Known non-responder	HBIG x 2 or HBIG x 1 and initiate revaccination	No treatment	If known high-risk source, treat as if source were HBsAg positive
Antibody response unknown	Test exposed person for anti-HBs	No treatment	Test exposed person for anti-HBs
	If adequate*, no treatment		If adequate*, no treatment
	If inadequate*, HBIG x 1 and vaccine booster		If inadequate*, initiate revaccination

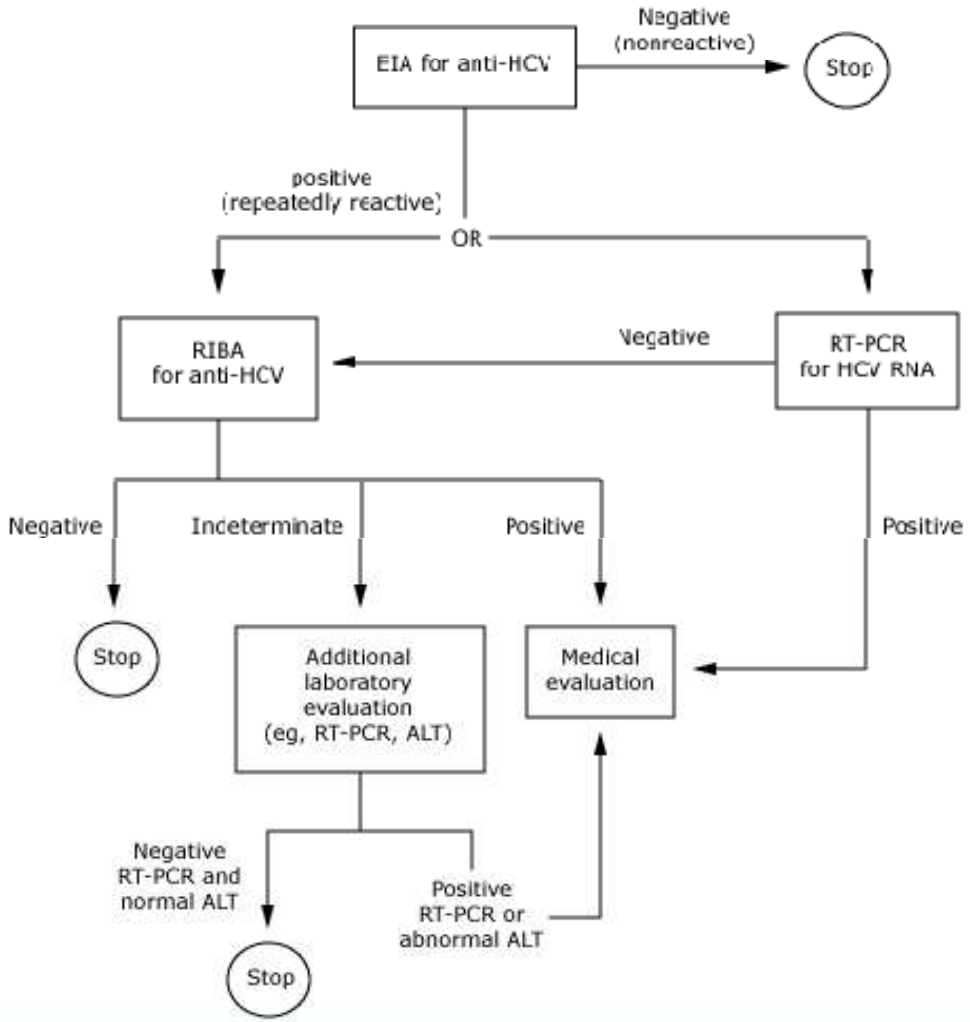
HBsAg: hepatitis B surface antigen; HBIG: hepatitis B immunoglobulin; HB vaccine series: hepatitis B vaccine; anti-HBs: antibody to hepatitis B surface antigen.
For dosing information see "Hepatitis B immune globulin: Drug information" and "Hepatitis B vaccine: Drug information".
* Responder is defined a person with adequate levels of serum antibody to hepatitis B surface antigen (ie, ≥10 mIU/mL); inadequate response to vaccination defined as serum anti-HBs <10 mIU/mL.
Courtesy of David Weber, MD, MPH.

HBV Vaccine dosing schedules — Approved schedules include the following:

- Engerix-B (Smith-Kline) — 1.0 mL (20 mcg) at 0, 1, and 6 months or 0, 1, 2, 12 months
- Recombivax-HB (Merck) —1.0 mL (10 mcg) at 0, 1, 6 months.

The 0, 1, 2, and 12-month schedule was designed for persons who have or may have been exposed to HBV; seroconversion has been documented by the third month after initiation of immunization in the vast majority of patients receiving this schedule, according to the package insert.

Algorithm for hepatitis C virus (HCV) testing for asymptomatic persons



ALT: Alanine aminotranferase; Anti-HCV: Antibody to HCV; EIA: Enzyme immunoassay; RIBA: Recombinant immunoblot assay; RT-PCR: Reverse transcriptase polymerase chain reaction.

Centers for Disease Control and Prevention. Recommendations for prevention and control of hepatitis C virus (HCV) infection and HCV-related chronic disease. MMWR Morb Mortal Wkly Rep 1998; 47:1.

HCV Tassi di sieroconversione (SC) per modalità di esposizione

(SIROH, 1992-2011)

Tipo di esposizione	**SC/ esp**	**Tasso %**	**I.C. 95%**
Esp. Percutanea	30/11476	0.26	0.18-0.37
Ago cavo con sangue residuo	*26/3320*	*0.78*	*0.51-1.15*
Ago cavo senza sangue	*0/2527*	-	-
Ago/tagliente solido	*4/5629*	*0.07*	*0.02-0.18*
Esp. Mucosa	2/6524	0.03	0.003-0.11
Esp. congiuntivale a sangue	*2/2181*	*0.09*	*0.01-0.33*
ad altri materiali biologici	*0/650*	-	-
Esp. altre mucose a sangue	*0/186*	-	-
ad altri materiali biologici	*0/53*	-	-
Esp. di cute lesa a sangue	0/1447	-	-

Serologic pattern of acute HCV infection with progression of chronic infection

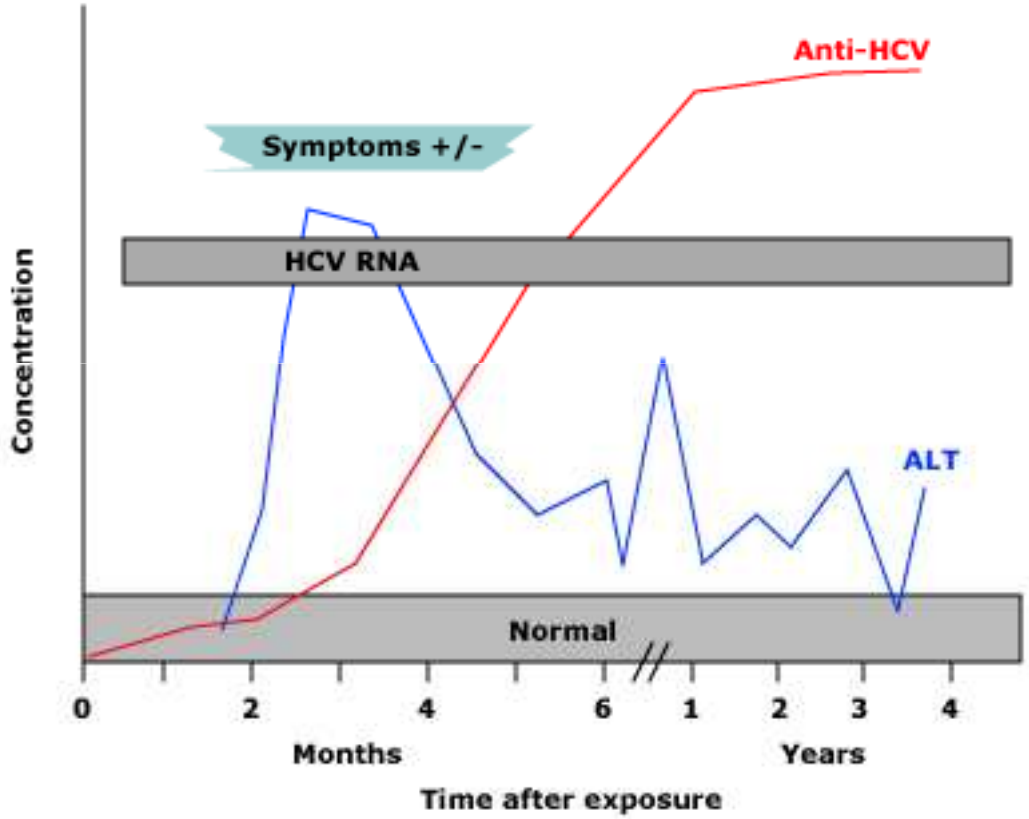


Figure provided by the Centers for Disease Control and Prevention.

Time course of acute HCV infection with recovery

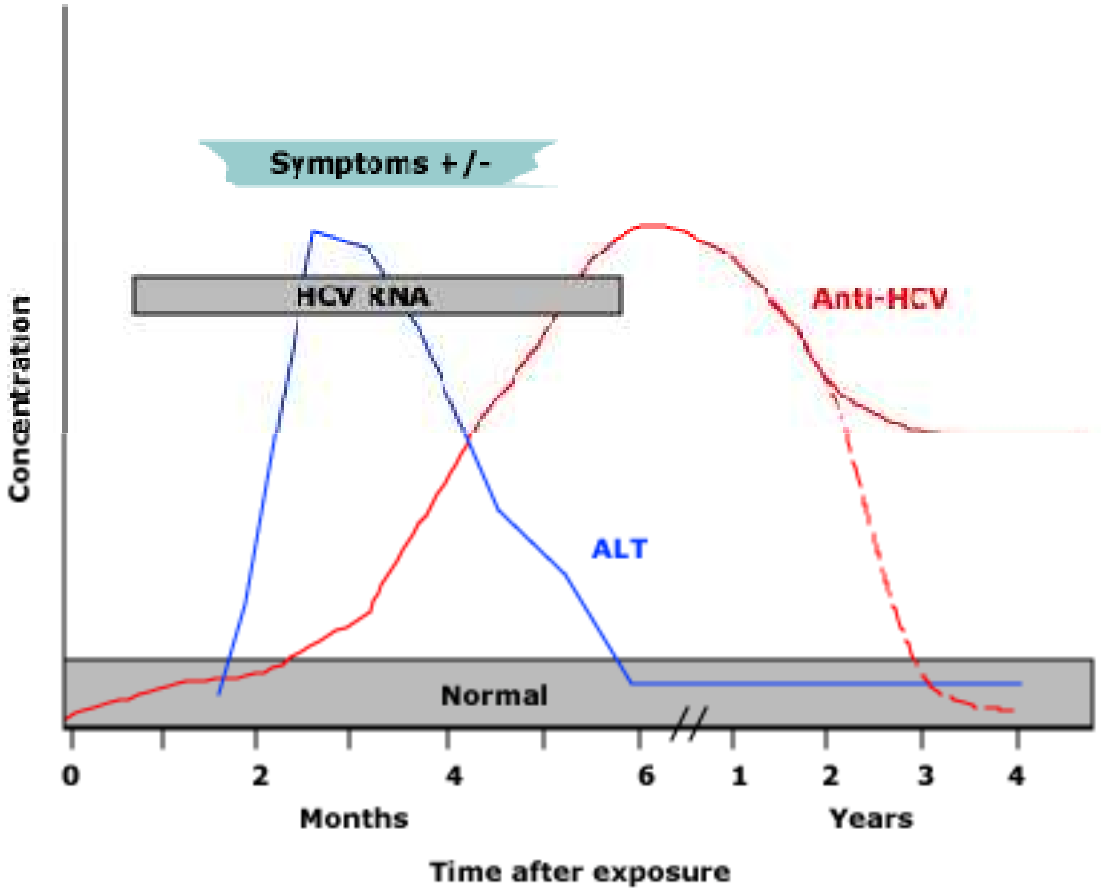
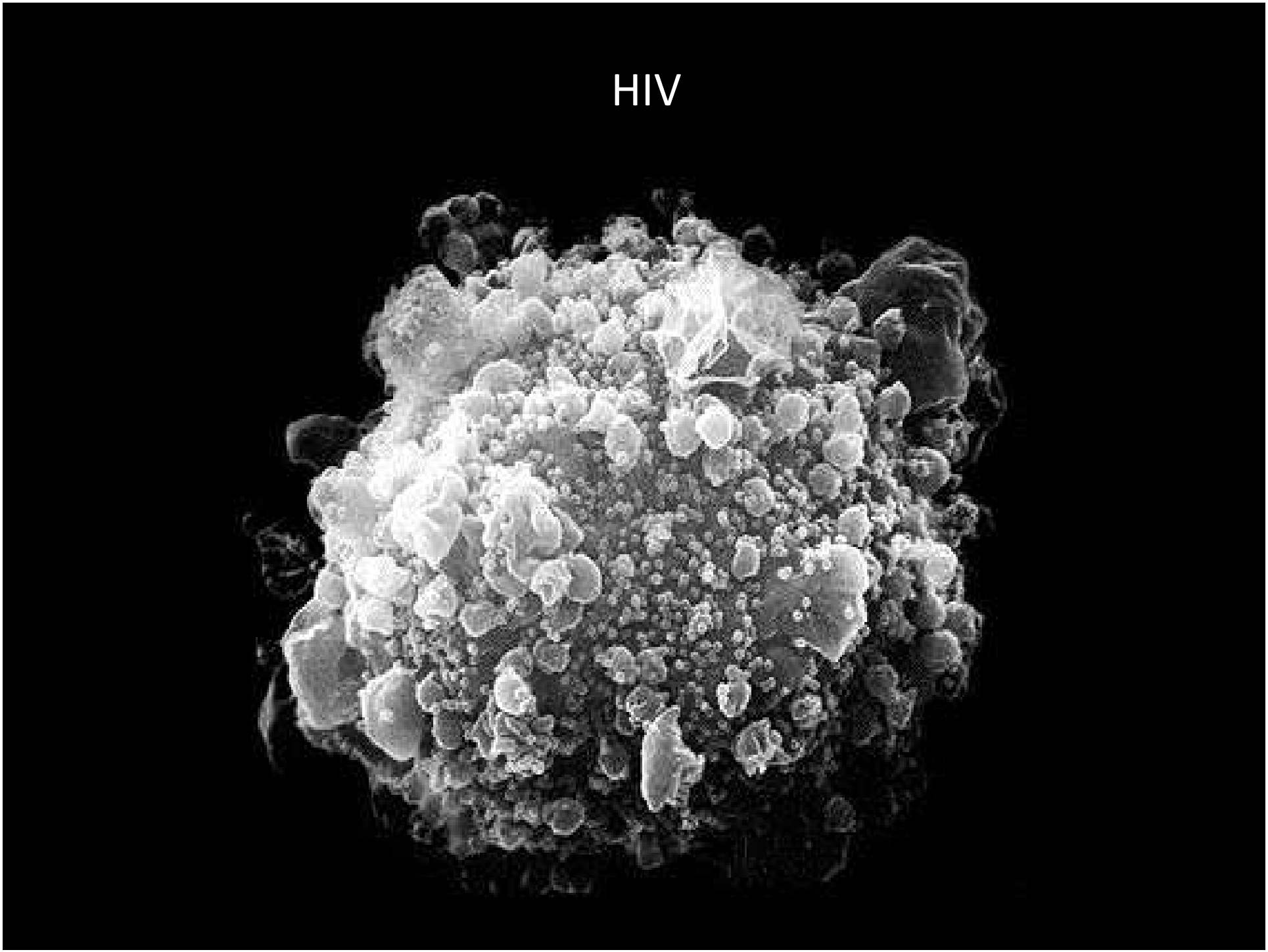


Figure adapted from: the Centers for Disease Control and Prevention.

HIV



Estimated per-act risk for acquisition of HIV, by exposure route*

Exposure route	Risk per 10,000 exposures to an infected source	Reference
Blood transfusion	9,000	1
Needle-sharing injection-drug use	67	2
Receptive anal intercourse	50	3, 4
Percutaneous needle stick	30	5
Receptive penile-vaginal intercourse	10	3, 4, 6
Insertive anal intercourse	6.5	3, 4
Insertive penile-vaginal intercourse	5	3, 4
Receptive oral intercourse	1	4•
Insertive oral intercourse	0.5	4•

* Estimates of risk for transmission from sexual exposures assume no condom use.
• Source refers to oral intercourse performed on a man.

CDC. Antiretroviral postexposure prophylaxis after sexual, injection-drug use, or other nonoccupational exposure to HIV in the United States. MMWR 2005; 54(RR-02):1.
1. Donegan E, Stuart M, Niland JC, et al. Infection with human immunodeficiency virus type 1 (HIV-1) among recipients of antibody-positive blood donations. Ann Intern Med 1990;113:733-9.
2. Kaplan EH, Heimer R. HIV incidence among New Haven needle exchange participants: updated estimates from syringe tracking and testing data. J Acquir Immune Defic Syndr 1995;10:175-6.
3. European Study Group on Heterosexual Transmission of HIV. Comparison of female to male and male to female transmission of HIV in 563 stable couples. BMJ 1992;304:809-13.
4. Varghese B, Maher JE, Peterman TA, Branson BM, Steketee RW. Reducing the risk of sexual HIV transmission: quantifying the per-act risk for HIV on the basis of choice of partner, sex act, and condom use. Sex Transm Dis 2002;29:38-43.
5. Bell DM. Occupational risk of human immunodeficiency virus infection in healthcare workers: an overview. Am J Med 1997;102:9-15.
6. Leynaert B, Downs AM, De Vincenzi I; European Study Group on Heterosexual Transmission of HIV. Heterosexual transmission of HIV: variability of infectivity throughout the course of infection. Am J Epidemiol 1998;148:88-96.

RISK OF TRANSMISSION OF HIV

Risk of HIV transmission from a male to female

Receptive anal intercourse
- One transmission per 200 sex acts

Receptive vaginal intercourse
- One transmission per 1000 sex acts

Insertive vaginal intercourse
- Five transmissions per 10,000 sex acts

Epidemiology. 1994;5(6):570.

Needle and trauma exposures

Needle or syringe sharing
- 0.67 % per needle-sharing contact

Mucous membrane exposure to blood (eg, splash to eye)
- 0.1 % per exposure

Other exposure (eg, human bite)
- 0.004 % per exposure

J Acquir Immune Defic Syndr Hum Retrovirol. 1995;10(2):175.

Pre-HAART (1980-1996) † sangue su congiuntiva, un fallimento della PPE con ZDV	2/480	0.41	0.03-1.48
Post-HAART (1997-2011)	0/835	0	-0.44
Contaminazione di cute lesa *Pre e post-HAART*	0/792	0	-0.40

Fattori che aumentano il rischio di SC [ref. 2]	**Odds ratio**	**I.C. 95%**	**P****
Puntura profonda	15.34	6.01-41.05	< 0.001
Sangue visibile sul presidio	6.18	2.15-20.74	0.001
Ago usato in vena o arteria	4.33	1.17-11.89	0.003
Paziente fonte in fase terminale* * indicativa di alta viremia	5.60	1.99-16.06	0.001

Fattori di rischio per infezione occupazionale dopo puntura accidentale con sangue

Fattore di rischio	Rischio aggiuntivo di acquisire HIV (adjusted OR, IC 95%)[1]	Rischio aggiuntivo di acquisire HCV (adjusted OR, IC 95%)[2]
Lesione profonda	15,34 (6,01-41,05)	155,2 (7,1-3417,2)
Sangue visibile sul dispositivo	6,18 (2,15-20,74)	
Ago posto in vena o arteria	4,33 (1,71-11,89)	100,1 (7,3-1365,7)
Paziente fonte in stadio terminale	5,60 (1,99-16,06)	
Viremia > 6 $\log_{10}$ cp/mL		11,0 (1,1-114,1)
Profilassi post-esposizione	0,19 (0.06-0,52)	

Documentation of the exposure

Definition of exposure

Determining HIV status of the source

Initial actions following exposure

- The initial response to any exposure of HCP to blood should be immediate cleansing of the exposed site.
  - For skin exposures, the area should be washed with soap and water.
  - Small wounds and punctures may be cleansed with an antiseptic such as an alcohol-based hand hygiene agent, since alcohol is virucidal to HIV, hepatitis B virus (HBV), and hepatitis C virus (HCV).
  - For mucosal surface exposure, the exposed mucus membranes should be flushed with copious amounts of water.
  - Eyes should be irrigated with saline or water.
- There is no evidence that expressing fluid by squeezing the wound will further reduce the risk of bloodborne pathogen transmission.

Definition of exposure

- A **percutaneous injury** (eg, a needlestick or cut with a sharp object)
- Contact of **mucous membrane or nonintact skin** (eg, exposed skin that is chapped, abraded, or afflicted with dermatitis)

Body fluids of concern include:

- blood, semen, vaginal secretions, other body fluids contaminated with visible blood.

Potentially infectious body fluids (undetermined risk for transmitting HIV):

- cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluids

Fluids that are not considered infectious unless they contain blood include:

- feces, nasal secretions, saliva, gastric secretions, sputum, sweat, tears, urine, and vomitus.

Determining HIV status of the source

- If unknown, the presence of HIV infection in the source patient should be determined with a rapid HIV test

- If testing in the source patient is delayed, PEP should still be initiated while awaiting test results. If the source is found to be HIV-negative, PEP should be discontinued.

- Clinicians should also be aware of rare case reports where the source patient tested HIV-seronegative and was later found to have primary HIV infection; these rare events do not alter guidelines for routine antibody testing but do highlight the importance of testing for HIV RNA if clinically indicated.

Counseling of healthcare personnel

- Risk assessment is particularly important for HCP to make **educated decisions** about PEP since the consequences are great and the stress is extraordinary.
- They should also be well informed of the **benefits and risks of PEP** and of the importance of close follow-up.
- HCP should be informed of the risk associated with the specific exposure experienced.
  - With percutaneous or sharps injuries from an HIV-infected source, the risk of HIV infection averages **3/1000**, but varies greatly depending on the inoculum size (source viral load and volume of blood), the depth of penetration, and exposure to a hollow bore versus suture needle.
  - **Exposure of source blood to intact skin is considered "no risk".** There are no confirmed cases of HIV transmission in HCP with skin abrasions, cuts, sores, or other breaches in skin integrity, but a theoretical risk is estimated at 1/1000.
  - All documented transmissions have involved source blood, bloody body fluids, or laboratory cultures of HIV. **Bites** have never been implicated in transmission to HCP, but have resulted in HIV transmission in other settings.
  - **The risk is likely considerably lower if the source has unknown HIV status** or if prior tests were negative.
  - The HCP may also be at risk for **other bloodborne pathogens, such as hepatitis B or C.**

Data campione 09/01/2012

Reparto MALATTIE INFETTIVE AMBULATORIO **Rif.** 3552

GENOTIPO RT RNA plasma

Data lettura 23/01/2012

ESITO 41L (Altre mutazioni:36D 60I 135T 196E 202V 211K 215E 245M)

Resistenza prevista

Subtype B

NULLA	3TC ABC DDI EFV ETV FTC NVP TDF
TRASCURABILE	AZT D4T
PARZIALE	
CONSISTENTE	
ELEVATA	

NRTI: 3TC=lamivudina, AZT=zidovudina, D4T=stavudina, DDI=dicarosina, DDC=zalcitabina, ABC=abacavir

NNRTI: DLV=delavirdina, EFV=efavirenz, NVP=nevirapina, ETV=etravirina NRTI: TDF=tenofovir

Note

GENOTIPO PRO RNA plasma

Data lettura 23/01/2012

ESITO 13V 16E (Altre mutazioni:15V 57K 63A 64V 72V)

Resistenza prevista

Subtype B

NULLA	ATV ATV/rtv DRV/rtv FPV/rtv LPV/rtv NFV SQV/rtv T
TRASCURABILE	
PARZIALE	
CONSISTENTE	
ELEVATA	

APV=amprenavir, ATV= atazanavir, IDV=indinavir, LPV=lopinavir/r, NFV=nelfinavir, SQV=saquinavir, RTV=ritonavir, TPV=tipranavir, DRV=Darunavir

Note

Il saggio individua mutazioni presenti in almeno il 20% della popolazione virale totale. Per una corretta utilizzazione del dato genotipico si raccomanda di considerare la storia terapeutica del paziente e il risultato di eventuali precedenti valutazioni della farmacoresistenza

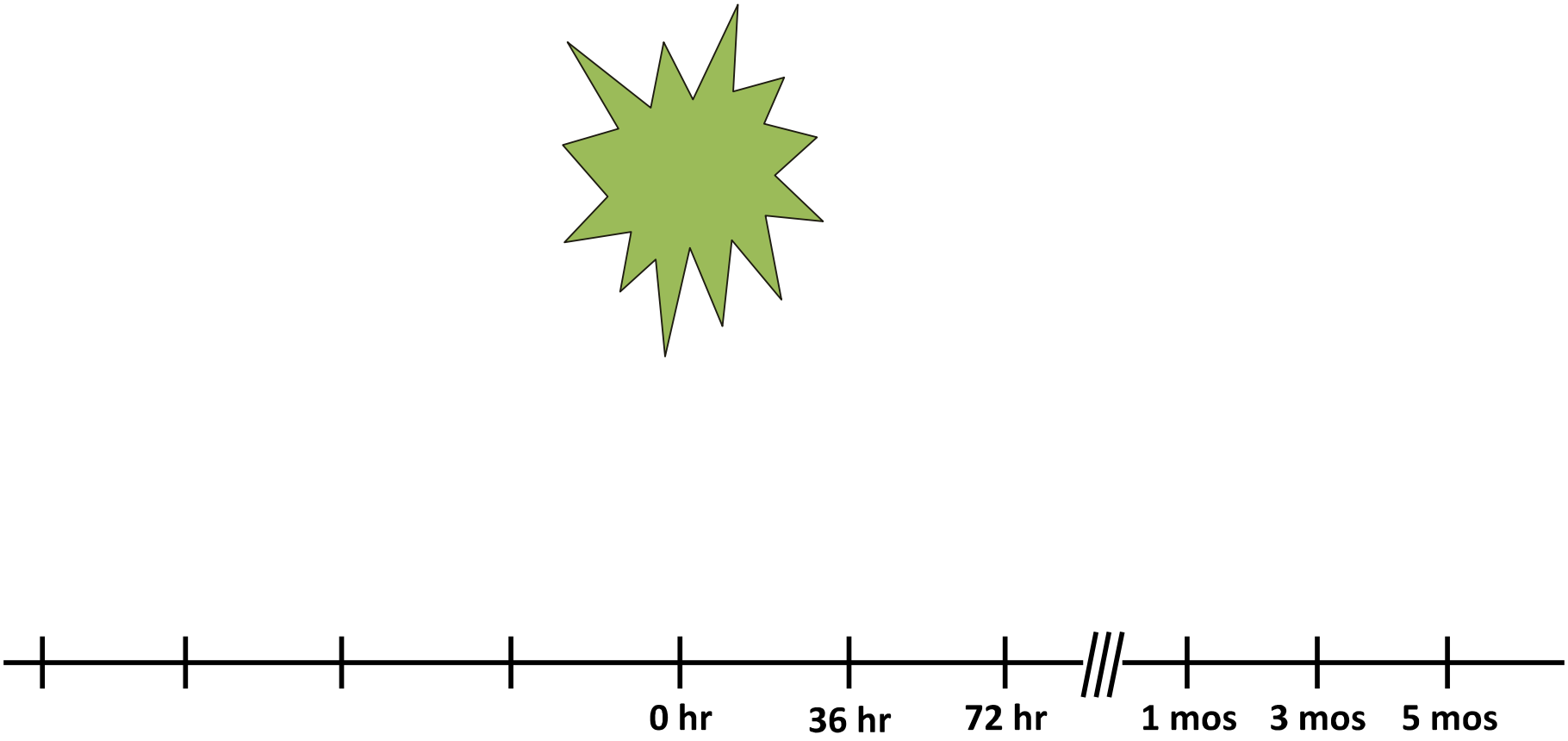
AntiRetroScan 2.x - Interprete Versione del 10/01/2009.

Il Responsabile
Dr.ssa Monica Pecorari

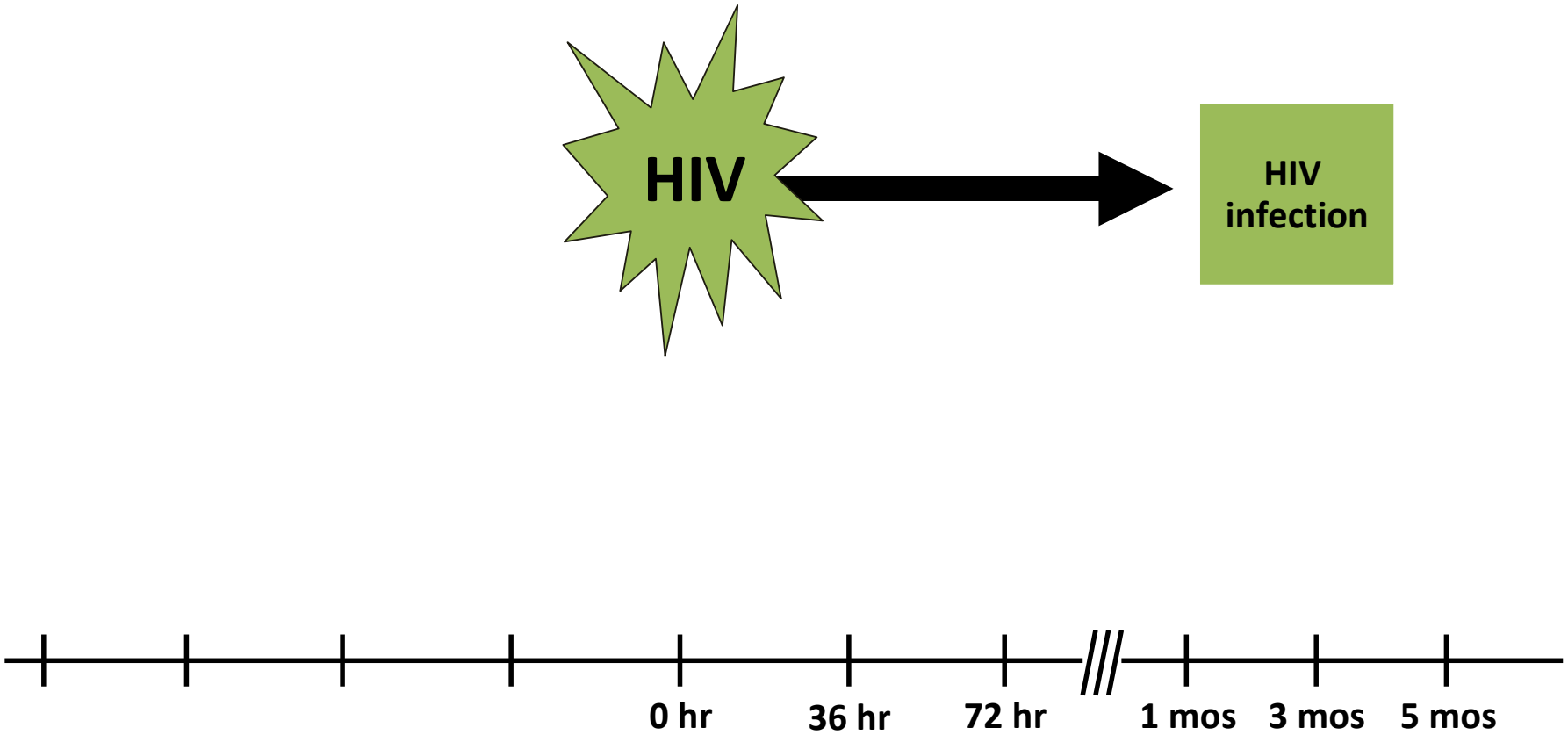
23/01/2012

Temi dell' impatto psicologico dell' infortunio a rischio biologico

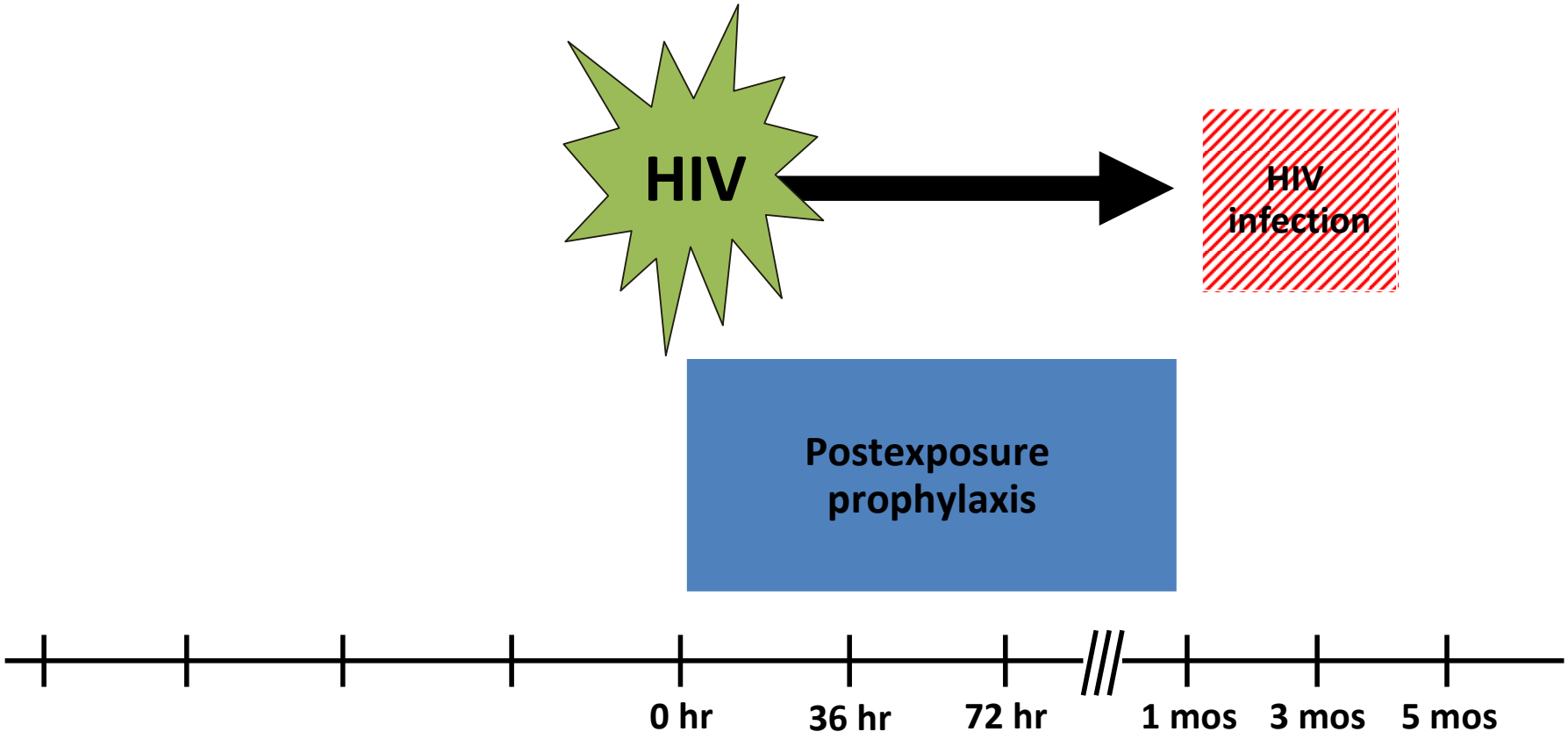
- Ansia
- La comunicazione del basso tasso di rischio e invece la indicazione a prolungate e impegnative terapie sono messaggi fra di loro contraddittori
- L' attesa per i risultati sierologici (non sono raccomandati test diretti come p24 Ag e PCR)
- Limitazioni tese a evitare casi secondari (condom, donazioni di sangue)


0 hr
36 hr
72 hr
1 mos
3 mos
5 mos

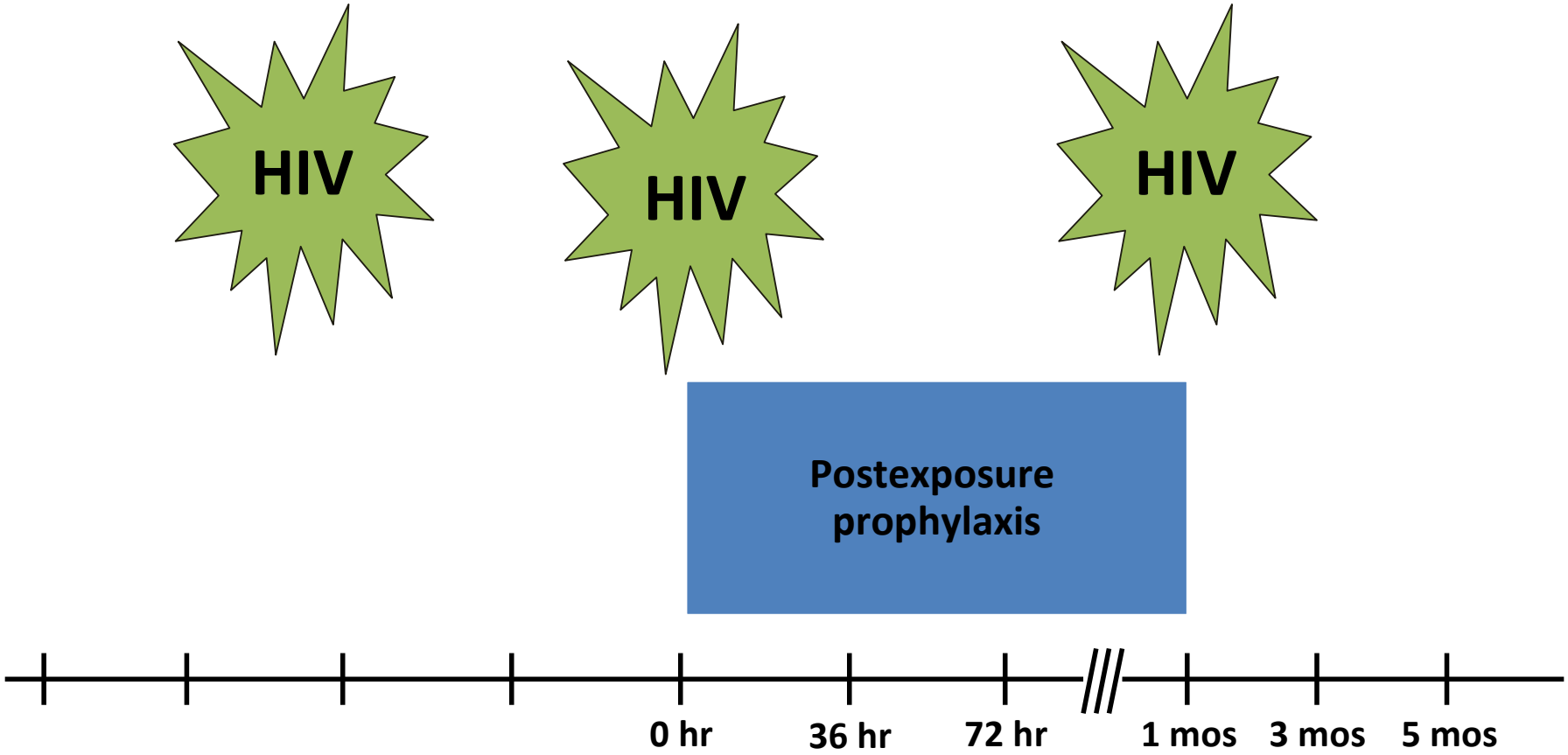
Post- vs Pre-Exposure Prophylaxis

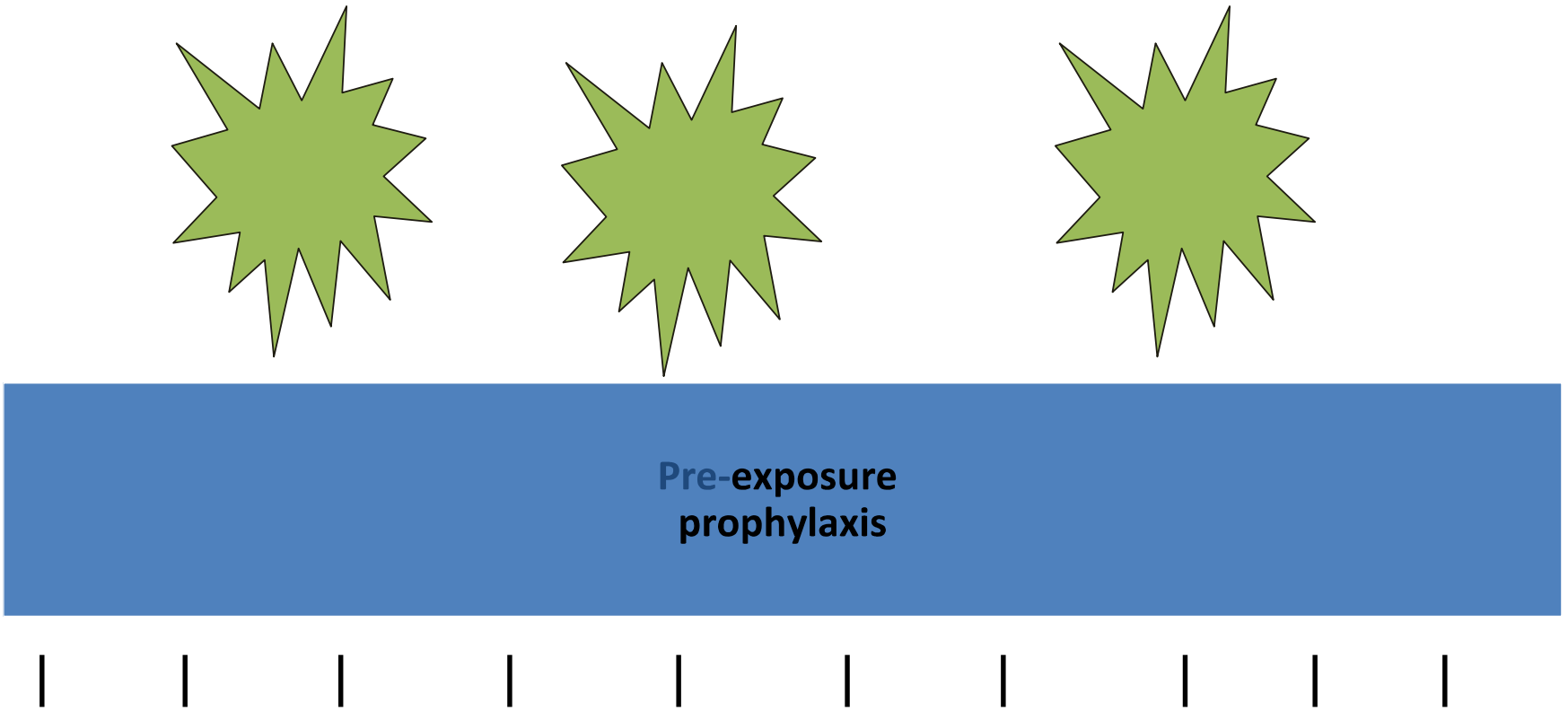


Post- vs Pre-Exposure Prophylaxis



Post- vs Pre-Exposure Prophylaxis




Pre-exposure
prophylaxis

Raccomandazioni per l'offerta PPE occupazionale

Raccomandazioni per l'offerta

A) ESPOSIZIONI OCCUPAZIONALI	
Modalità di esposizione	**Paziente fonte**
Puntura con ago usato in vena o arteria Lesione profonda con ago o tagliente solido visibilmente contaminato da sangue	HIV+* **oppure** HIV negativo ma con storia o patologia in atto indicative di esposizione a rischio molto recente (per esempio epatite virale acuta, IST, endocardite del cuore destro) **oppure** che rifiuta di sottoporsi alla sierologia per HIV
Contaminazione congiuntivale con sangue o liquor Esposizione a materiale ad elevata concentrazione virale (per esempio colture, sospensioni concentrate di virus) con qualsiasi modalità	HIV+*
*Il rischio è significativamente ridotto se la fonte è in terapia ARV con viremia stabilmente non rilevabile negli ultimi mesi. **In situazioni diverse da quelle indicate, la PPE può essere presa in considerazione da un esperto sulla base di una attenta valutazione del rischio che tenga conto della efficienza di trasmissione propria della modalità di esposizione e della contagiosità della fonte.**	

Antiretroviral regimens for occupational postexposure prophylaxis of HIV infection*

Preferred regimen
Tenofovir-emtricitabine 300/200 mg coformulation once daily **plus** raltegravir 400 mg twice daily
Alternative regimens
Tenofovir-emtricitabine 300/200 mg coformulation once daily **plus** atazanavir 300 mg once daily with ritonanvir 100 mg once daily
Tenofovir-emtricitabine 300/200 mg coformulation once daily **plus** darunavir 800 mg once daily with ritonanvir 100 mg once daily taken with food
Additional possible regimens
Tenofovir-emtricitabine 300/200 mg coformulation once daily **plus** lopinavir-ritonavir 400/100 mg coformulation twice daily
Efavirenz•-tenofovir-emtricitabine 600/300/200 mg coformulation once daily
Stavudine 30 mg twice daily **plus** either lamivudine 150 mg twice daily or emtricitabine 200 mg once daily, in place of tenfovir-emtricitabine in one of the above regimens, if tenofovir should be avoided (eg in setting of renal insufficiency)

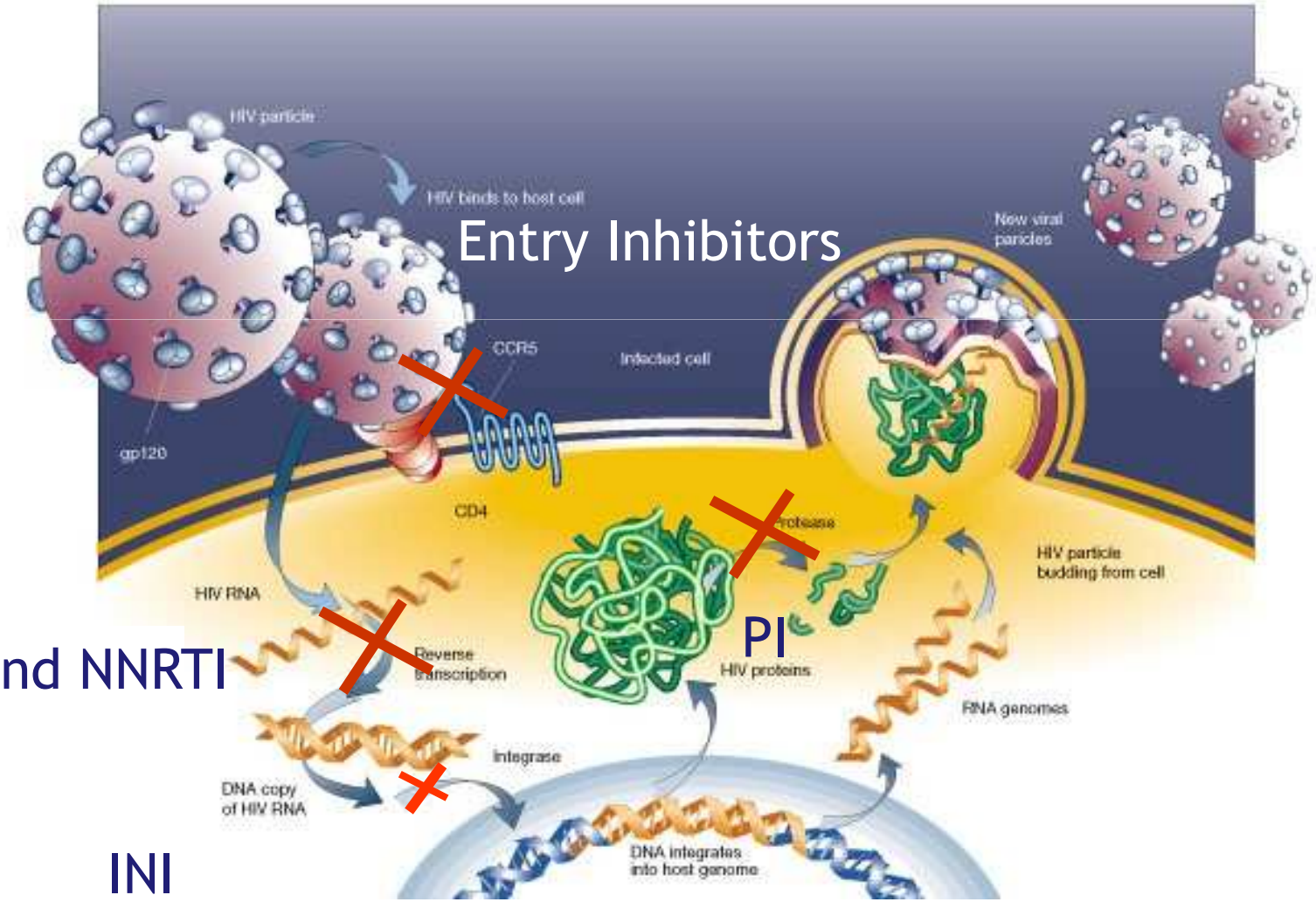
These are recommendations of the authors and are consistent with the 2012 United States Department of Health and Human Services guidelines for treatment of HIV-infected adults.

* Usual duration of post-exposure prophylaxis (PEP) is 28 days. Doses shown are for adults with normal renal function. Dose adjustment for renal insufficiency may be needed.

• Efavirenz is preferably avoided in women of child-bearing potential. Cognitive side effects due to efavirenz may be better tolerated by taking the coformulation at bedtime.

Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the use of antiretroviral agents in HIV-1 infected adults and adolescents. Department of Health and Human Services. 1-239. Available at http://aidsinfo.nih.gov/contentfiles/lvguidelines/adultandadolescentgl.pdf Accessed 27 November 2012.

HIV-1 replication cycle



NRTI and NNRTI

INI