

*Prevention and Residual risk of
Transfusion-Transmitted Viral Infections
(HIV, HCV and HBV)*

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Blood screening in France

1971 HBsAg EIA screening

1985 anti-HIV-1 Ab EIA screening

1988 anti-HBc Ab + ALT (suppressed in Dec 2003)

1989 anti-HIV-1/-2 Ab EIA screening

1990 anti-HCV Ab EIA screening

1991 anti-HTLV-I Ab EIA screening

(1998 Cellular products leucoreduction)

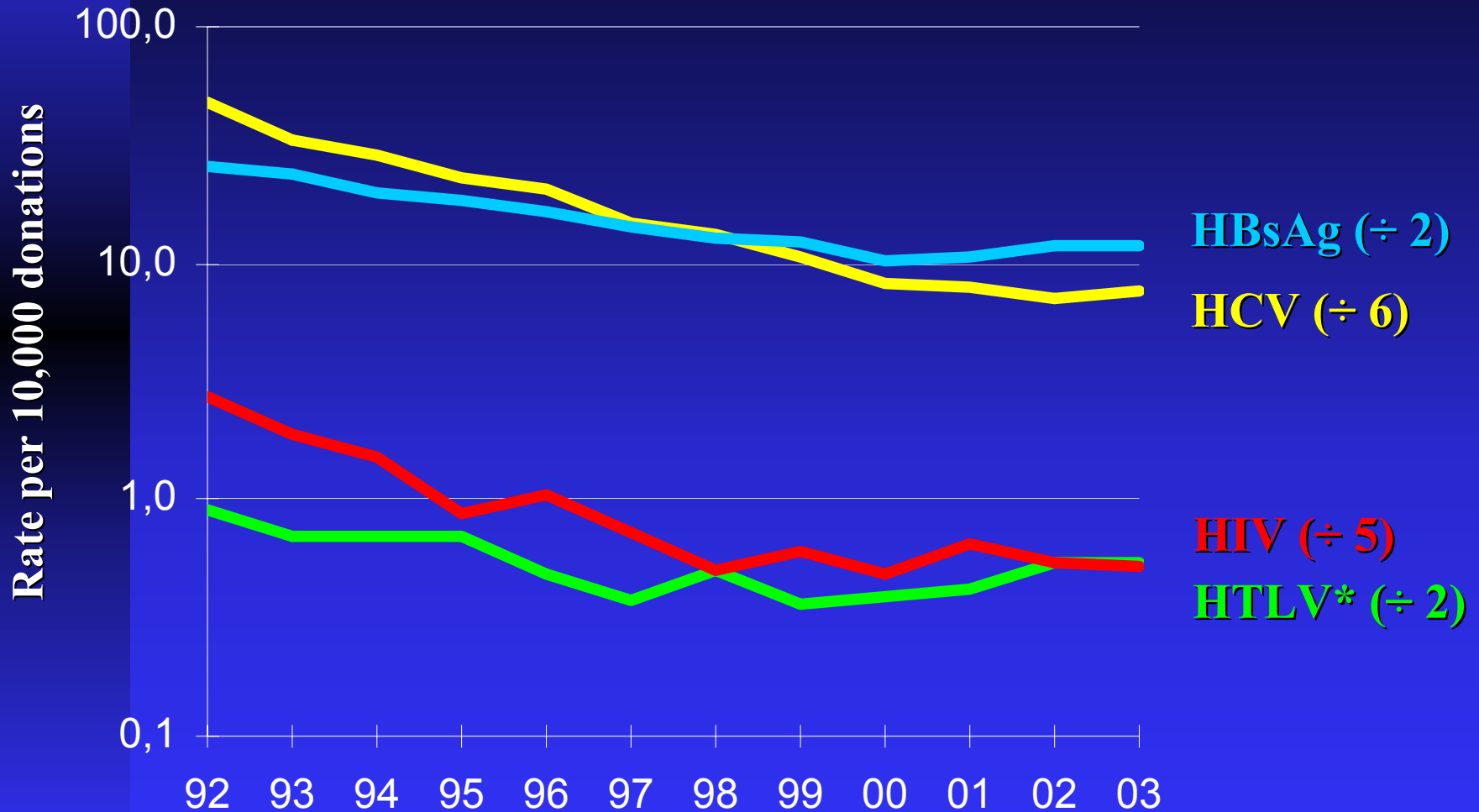
2001 NAT HIV-1 HCV

HIV, HTLV, HBsAg, HCV rates in French blood donors in 2003

		First-time blood donors	Repeat blood donors	Total
Number of donations		381,606	2,086,432	2,468,038
HIV	Number	20	10	30
	Rate p. 10 000	0.52	0.05	0.12
HTLV**	Number	22	1	23
	Rate p. 10 000	0.59	0.005	0.09
HCV	Number	290 *	16	306 *
	Rate p. 10 000	7.6	0.08	1.24
HBsAg	Number	447	4	451
	Rate p. 10 000	11.7	0.02	1.83

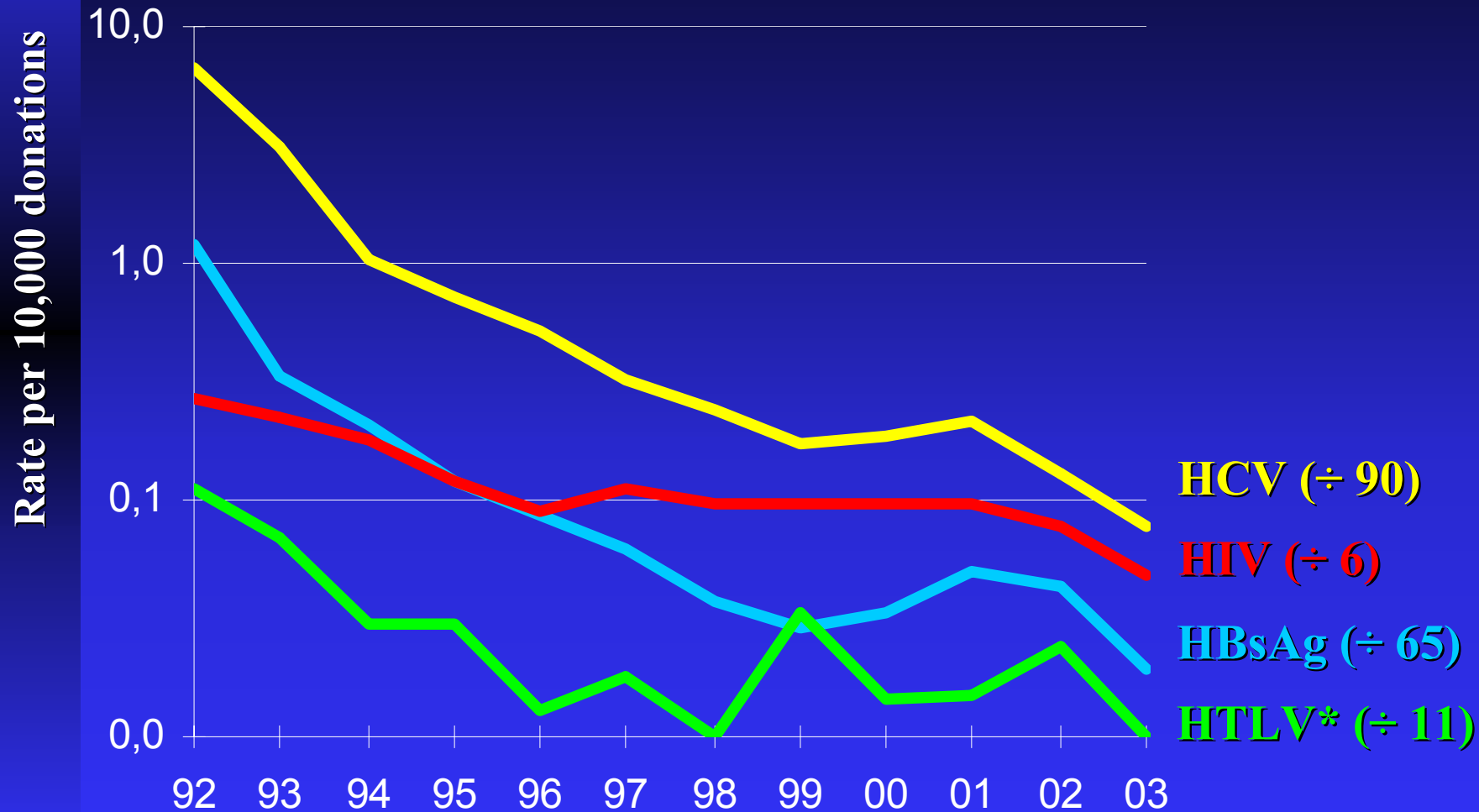
* 2 NAT +, Ab - ** Continental France

Trends in HIV, HTLV, HBsAg, HCV rates in first-time blood donors



* Continental France

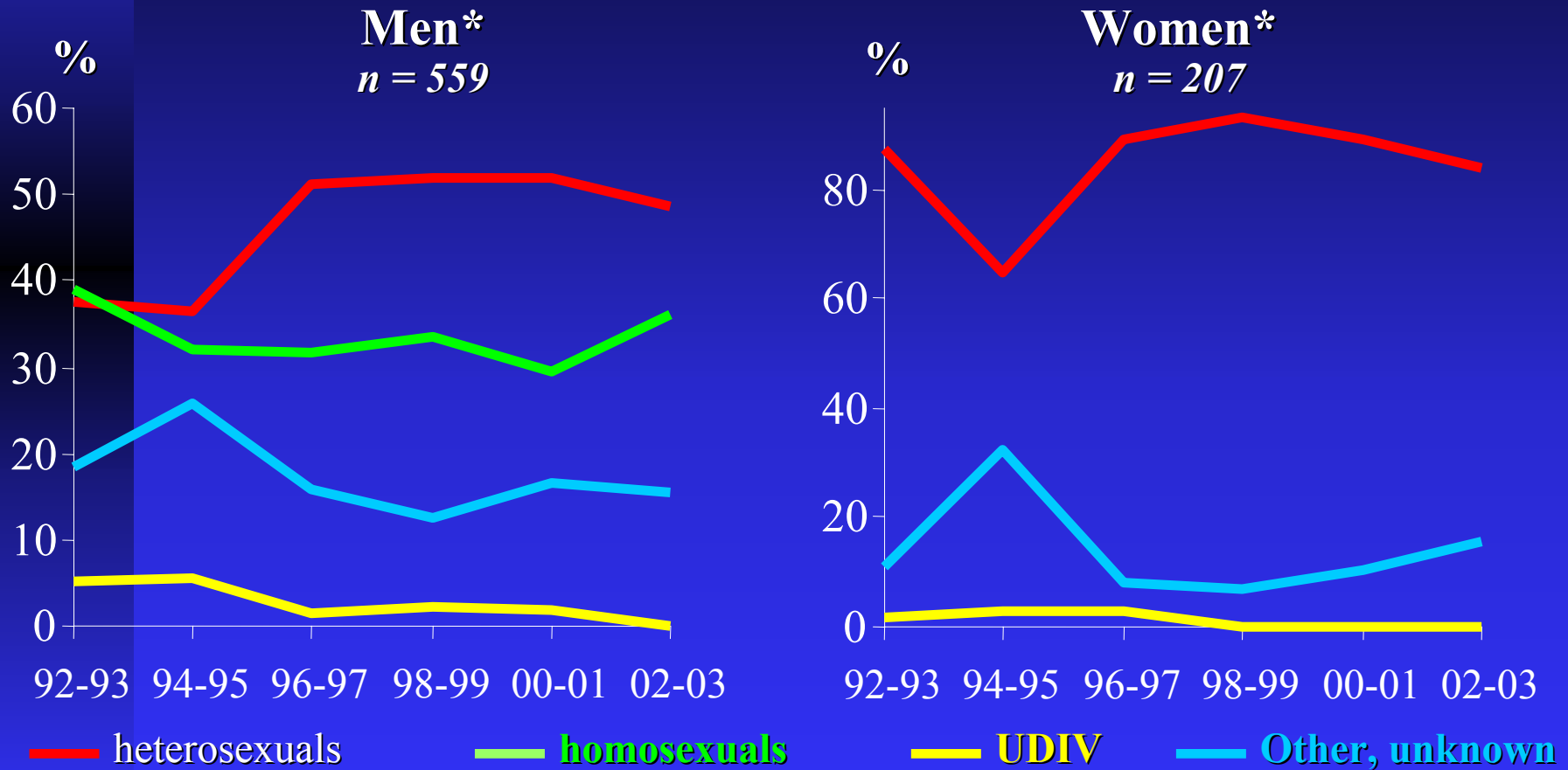
Trends in HIV, HTLV, HBsAg, HCV rates in repeat blood donors



* Continental France

HIV Risk factors in blood donors (1992-2003)

1992-2003 : 931 HIV + donors, 766 (82%) investigated for risk factors



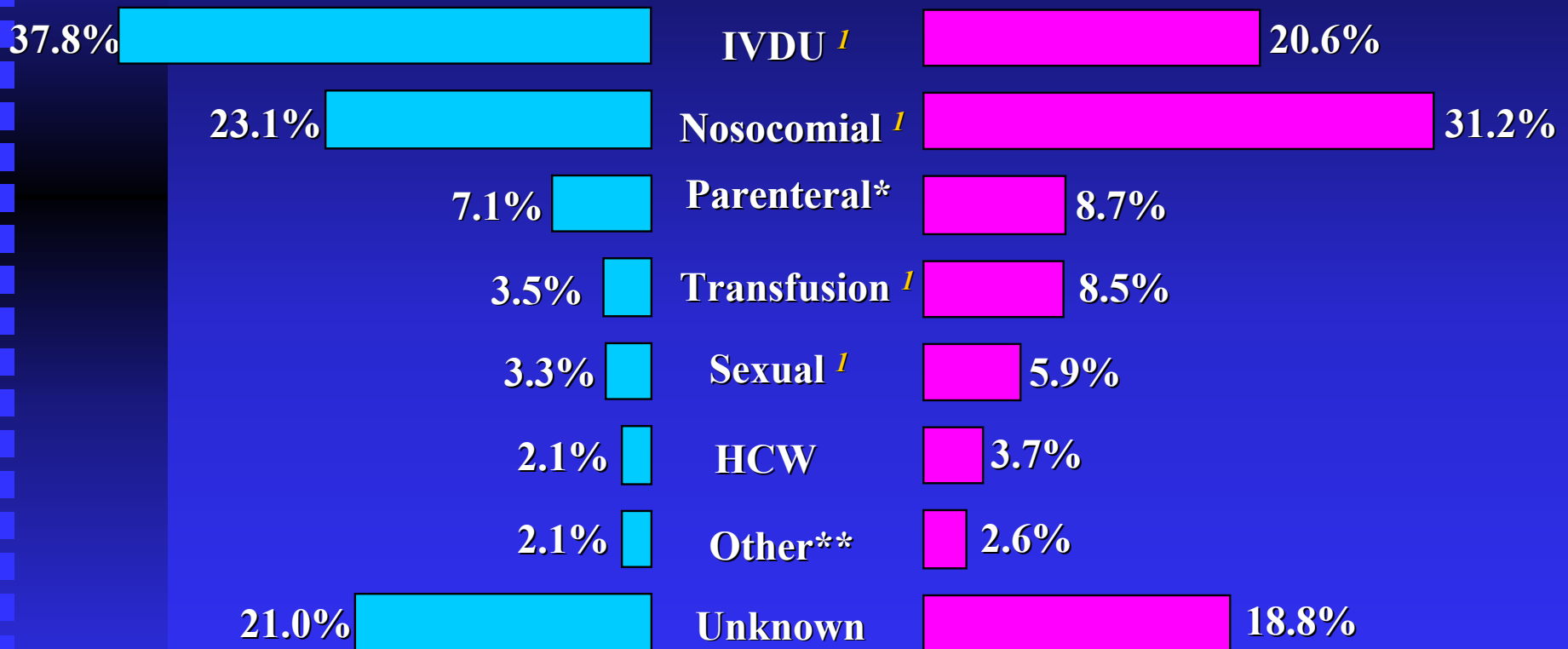
* Risk factors not investigated : 135 men and 30 women

HCV Risk factors in first-time blood donors (1998-2003)

2,240 HCV FTBD ; 1,205 (54%) investigated for risk factors

Men (n = 666)

Women (n = 539)



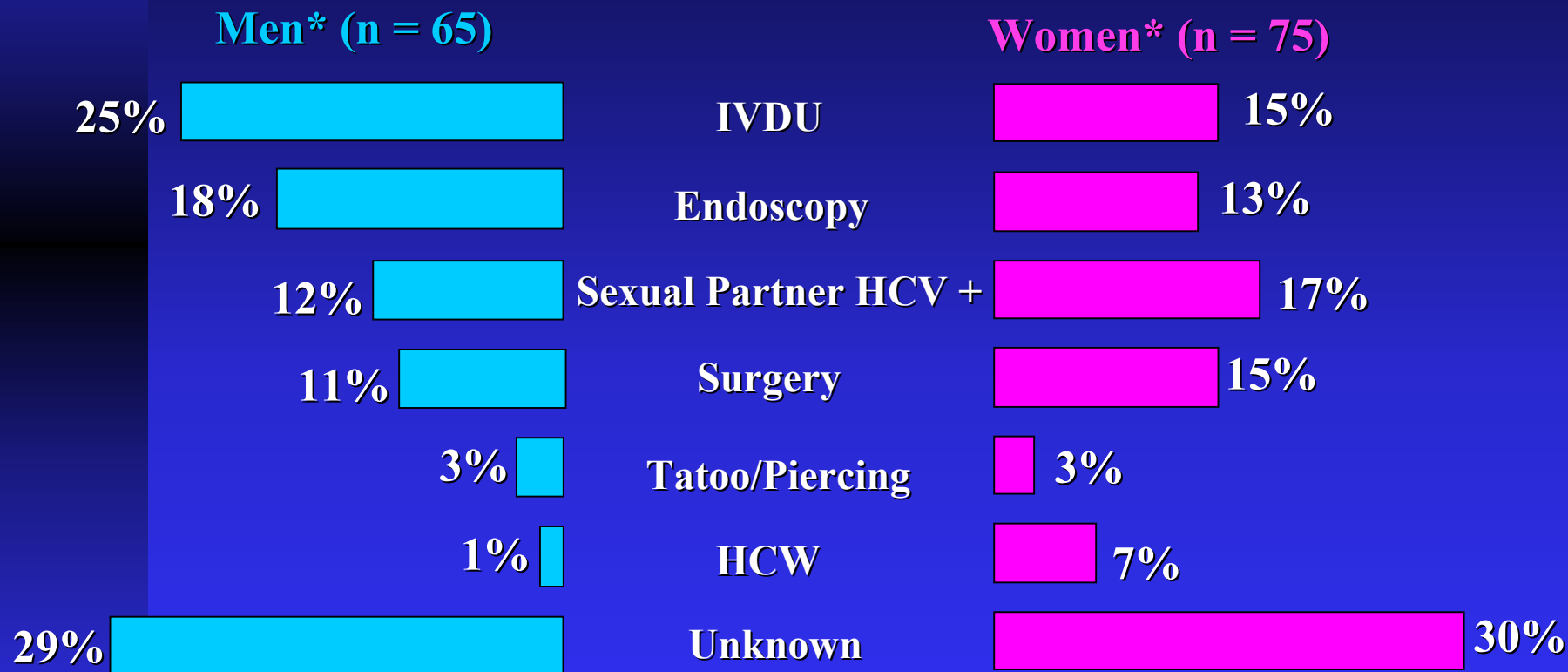
* tattoo, piercing, acupuncture.

** intra-family, other.

¹ significant difference according to sex

Risk factors of HCV seroconverters among repeat blood donors (1998-2003)

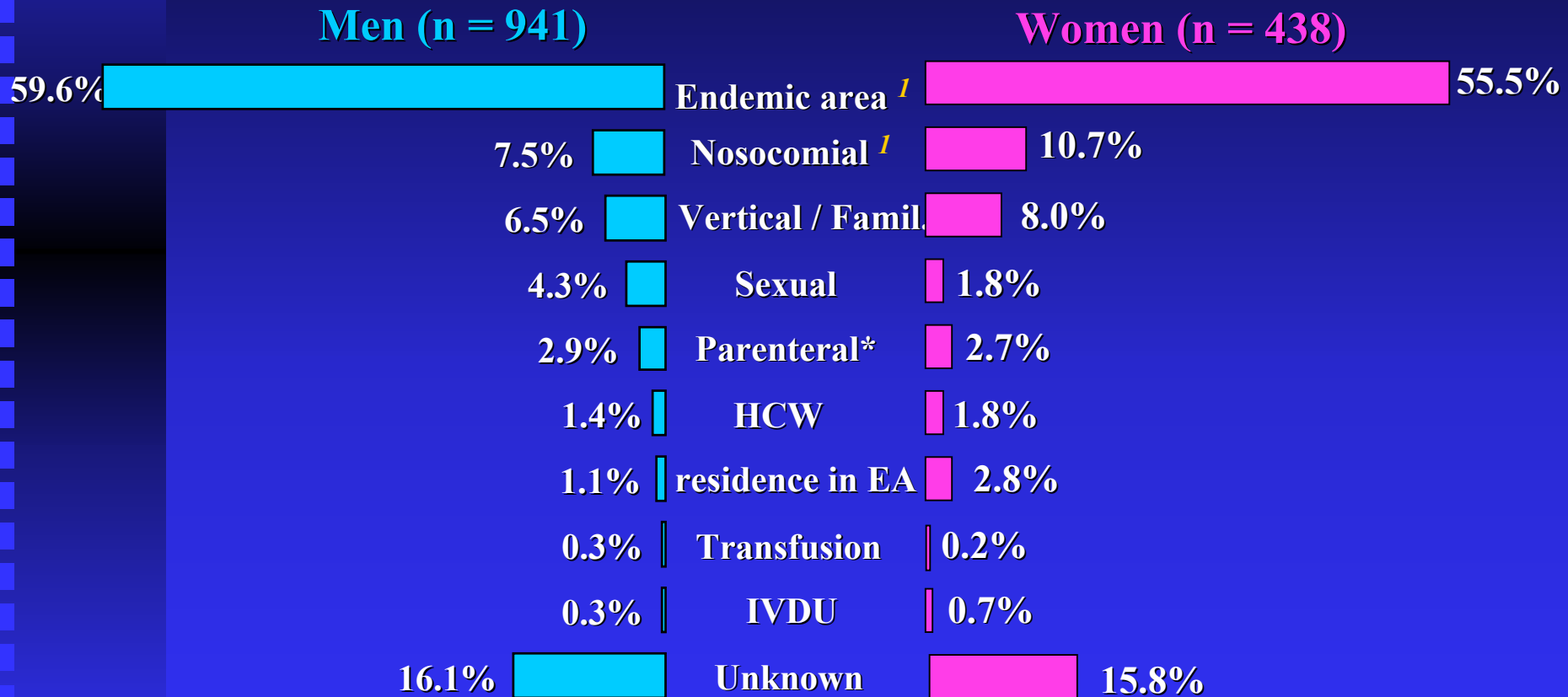
196 proved HCV seroconverters; 140 (71%) investigated for risk factors



**26 men and 30 women not investigated for risk factors*

HBV Risk factors in first-time blood donors (1998-2003)

2,461 HBsAg donors + in continental France; 1,379 (56%) investigated for risk factors

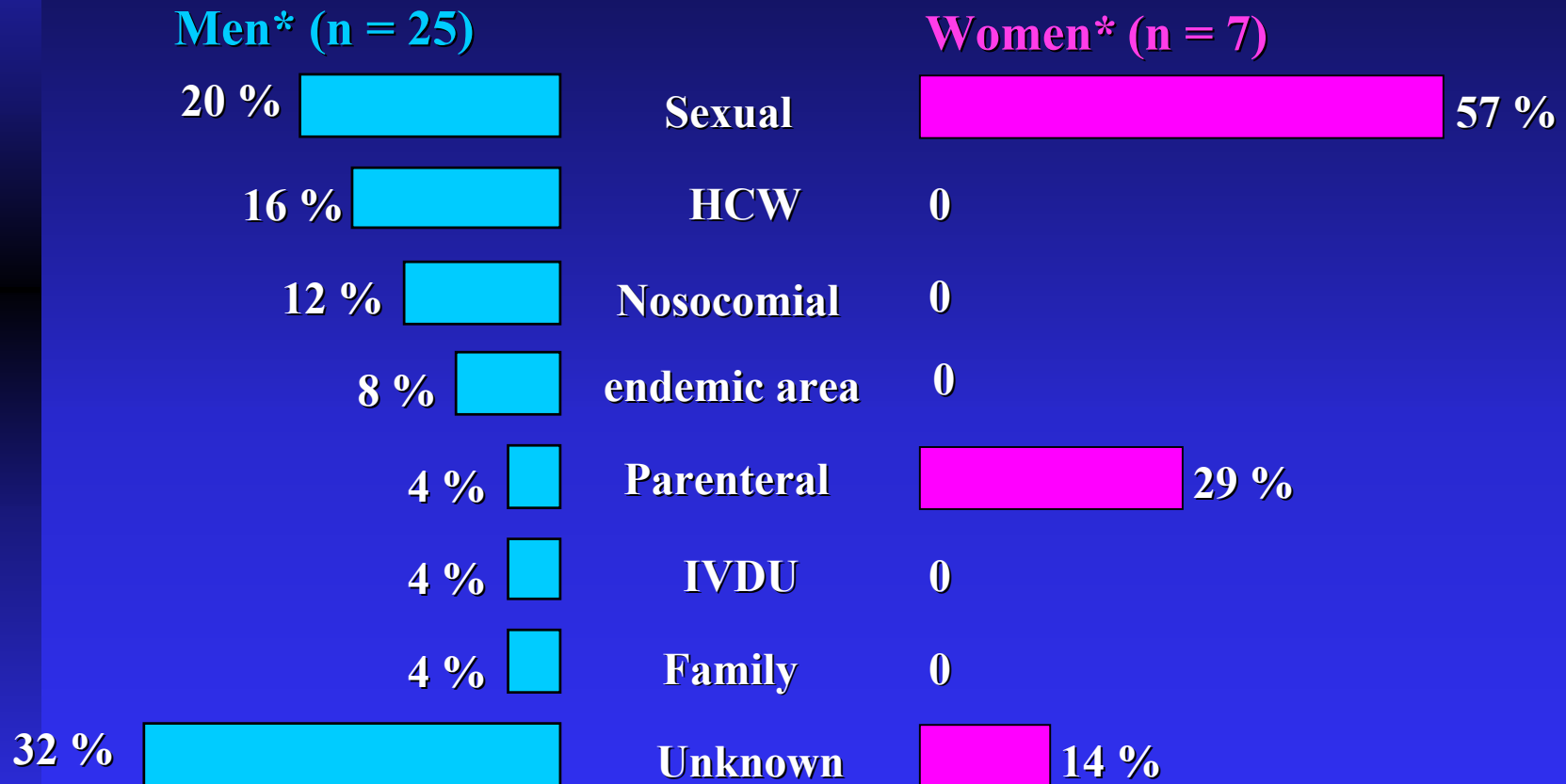


* Parenteral = tattoo, piercing, acupuncture.

¹ significant difference according to sex

HBV Risk factors in 44 HBsAg seroconverters (1998-2003)

1998-2003: 44 HBsAg seroconversions; 2 (73%) investigated for risk factors

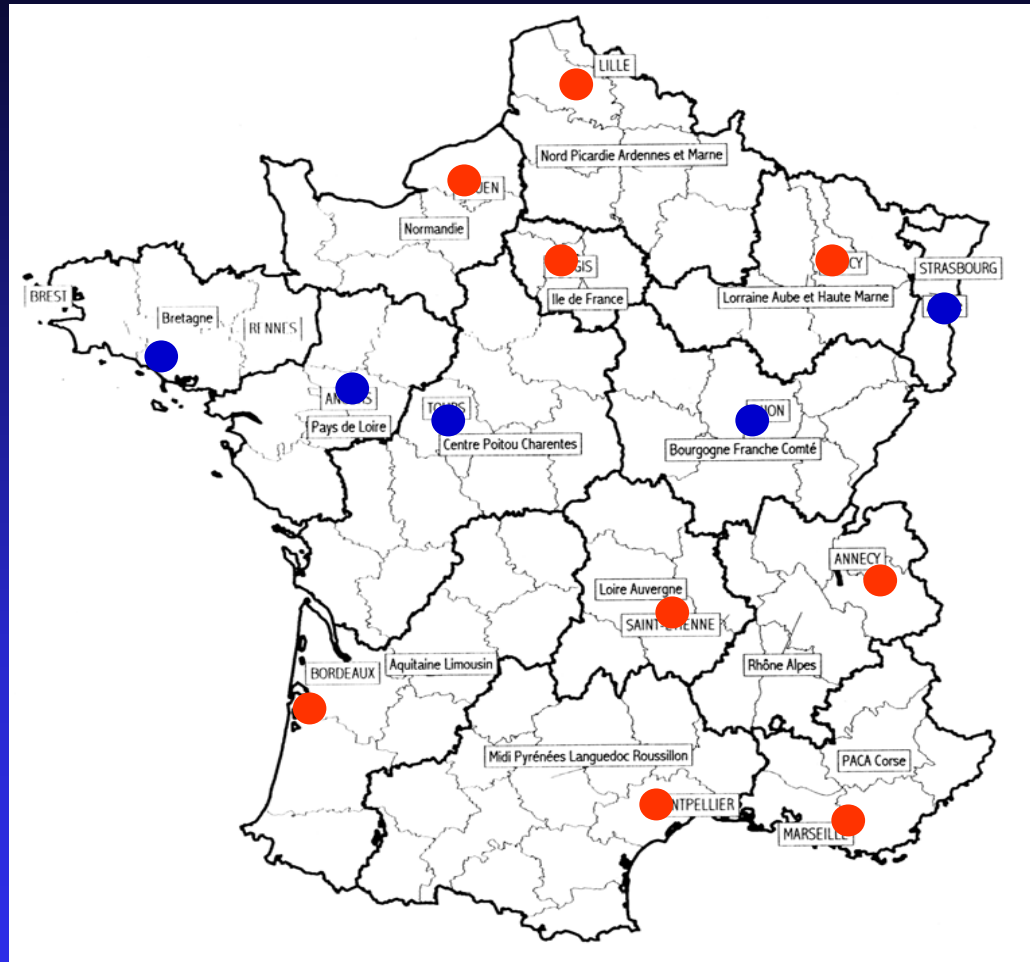


**10 men and 2 women not investigated for risk factors*

NAT in France

- July 1st 2001 : NAT was introduced in France, for HIV-1 and HCV RNA
- Mandatory on homologous blood donations in addition to serologic screening.
- 2 technologies selected :
 - ↳ *Procleix HIV-1 / HCV Assay (GenProbe/Chiron) (40% of BD)*
 - 8-sample pools
 - Individual donor testing : (overseas territories)
 - ↳ *BioMérieux / Roche system : 24-sample pools : (60% of BD)*
 - *NucliSens Extractor* for sample preparation
 - *Cobas Amplicor System* for amplification and detection
 - ✓ *Cobas AmpliScreen HCV v.2.0*
 - ✓ *Cobas AmpliScreen HIV-1 v.1.5*

NAT in France in 2004



- 9 : bioMérieux/Roche, pool 24
- 5 : TMA/Chiron, pool 8
- 4 : TMA/Chiron, individual testing

- Réunion
- Guyane
- Guadeloupe
- Martinique

Results of HIV screening from July 2001 to December 2003 : 6.14 million donations

NAT	Antibody	N=90
positive	positive	87
positive	negative	2
negative	positive	1
<i>negative</i>	<i>negative</i>	<i>1</i>

Results of HCV screening from July 2001 to December 2003 : 6.14 million donations

NAT	Antibody	N = 775
positive	positive	600
positive	negative	4*
negative	positive	171 (22%)
<i>negative</i>	<i>negative</i>	<i>0</i>

*1 ALT, 1 WP, 1 Immunosilent, 1 not investigated

Observed versus predicted yield of NAT in France, July 2001 - Dec. 2003

	No of WP donations per million [# in 2.5 years]	Predicted	Observed	
		<i>Yield of MP-NAT* per million** [# in 2.5 years]</i>	<i>RNA-pos Ab-neg per million** [# in 2.5 years]</i>	<i>RNA-neg Ab-neg in 2.5 years</i>
HIV	0.59 [3 to 4]	0.27 [1 to 2]	0.33 [2]	1
HCV	0.64 [4]	0.54 [3 to 4]	0.49 [3]	0

* *mini-pools NAT (HIV WP = 12 d. and HCV WP = 10 d.)*

** *2.4 million donations collected per year in France*

Method : Residual risk estimates

Residual risk = incidence rate X window period duration

Incidence rate = seroconversions / Person-Years

Window period =

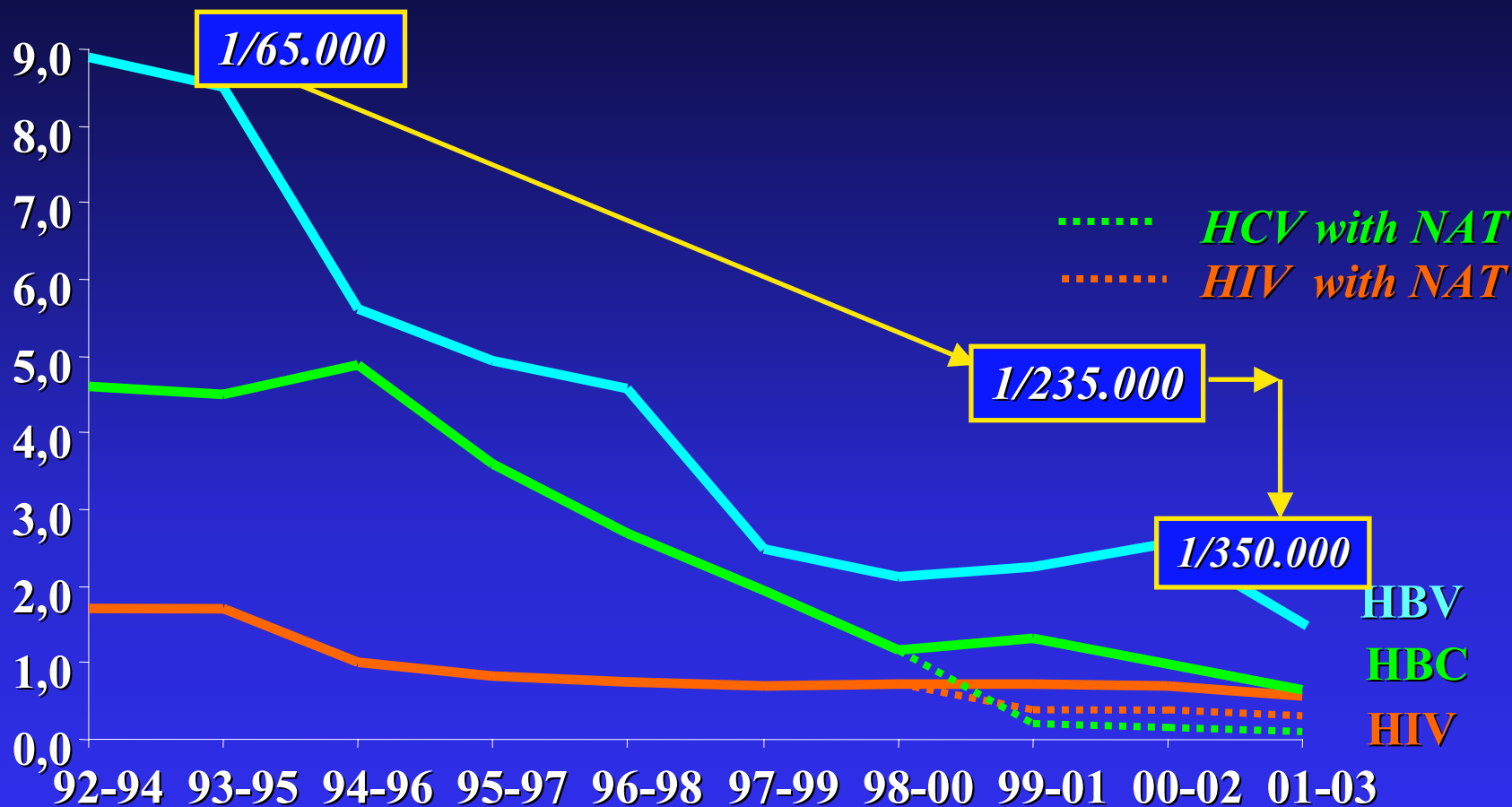
HIV	22 days (6 - 38) without NAT
	12 days with NAT
HCV	66 days (38 - 94) without NAT
	10 days with NAT
HBsAg	56 days (25 - 109)

Residual risk in France 2001-2003

	Incident cases	IR /10 ⁵ PY (CI 95 %)	Residuel risk estimates	
			without NAT	with MP NAT
HIV	22	0.97 (0.62 - 1.49)	1/1 700 000	1/3 150 000
HCV	8	0.35 (0.3 6- 0.72)	1/1 560 000	1/10 000 000
HBV	8 (HBsAg)	1.02** (0.66 - 1.56)	1/640 000	

** *ajusted for transient antigenemia (Koralitz)*

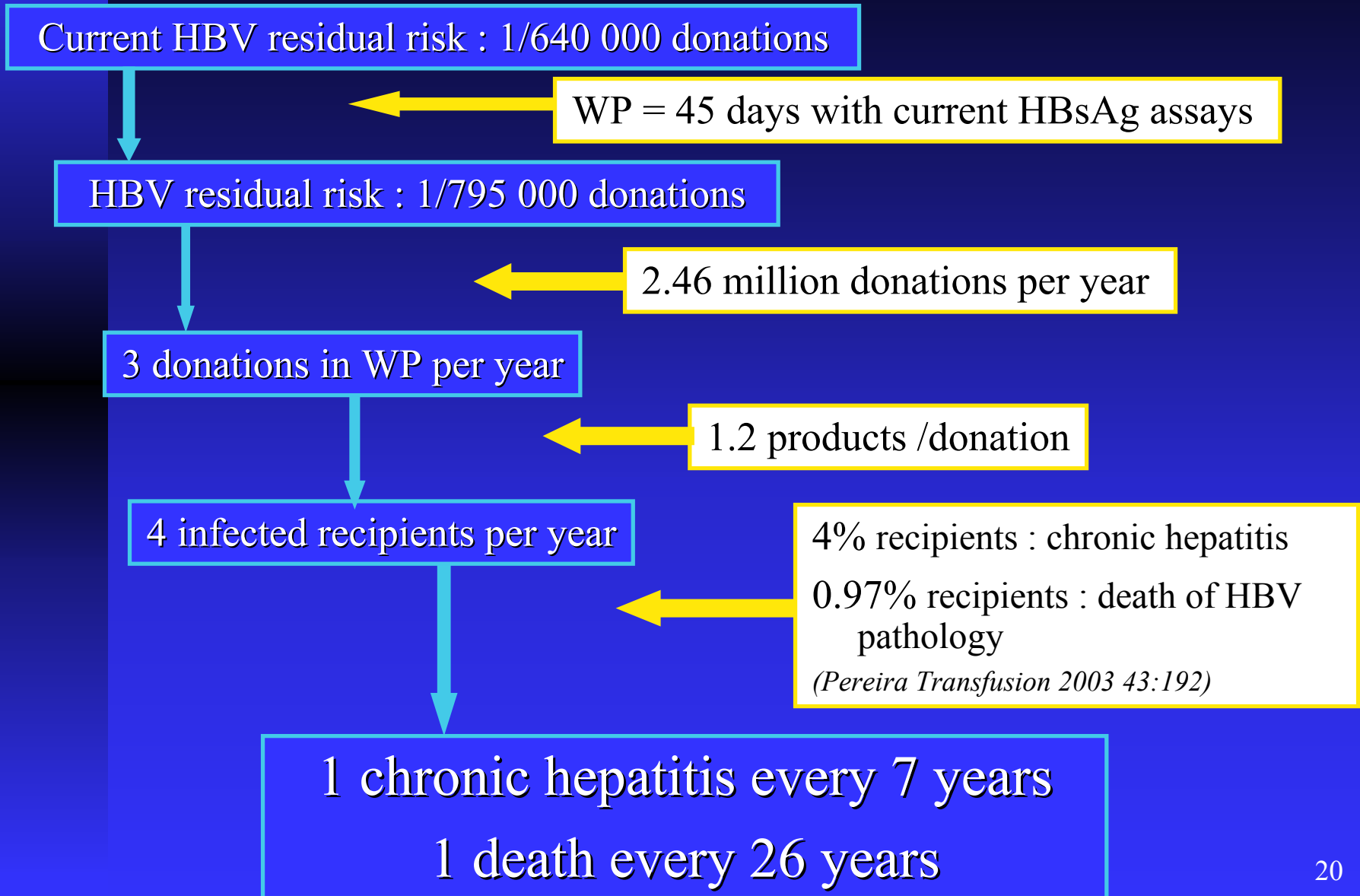
Trends in residual risk of transfusion-transmitted infections in France per million donations (1992-2003)



Residual risks were calculated over 10 periods :
 from 1992-94 to 1998-2000 : in 15 blood centers belonging to the study group (TTAG)
 on the 3 last periods : on the overall blood supply

**Should we move on HBV NAT
screening?**

Post transfusion hepatitis B due to the HBV RR in France



Estimation of the HBV NAT yield

HBV residual risk (WP = 45 days) : 1/795 000 donations

3 donations in WP per year
(2.46 million donations per year)

MP NAT (WP 39 days :- 13%)
**Jackson Transfusion 2003;43:721*

IT NAT (WP 20 days : - 55%)
**Jackson Transfusion 2003;43:721*

Yield

1 donation in WP in 2.5 years
avoided 1 infection / 2 years
 1 CH / 64 years
 1 death / 264 years

Yield

1-2 donations in WP per year
avoided 2 infections per year
 1 CH / 15 years
 1 death / 63 years

- **Due to the limited impact of HBV NAT in France**
 - ✓ limited clinical impact of NAT
 - ✓ High sensitivity of HBsAg assays
 - ✓ Single nucleic acid testing still not available
 - ✓ 22% of French population received a complete HBV vaccination
- **We have decided to not implemented HBV-NAT in France**

Conclusion (1)

- Before NAT

- ✓ Residual risk for the 3 virus combined (HIV, HBV and HCV) was **1/235 000 donations in 1999-2001** (1992-1994: 1/65 000)

- ✓ This 4-fold decrease is linked to the decline of both HCV and HBV incidence:

- **Improved donor selection**
- **Preventive measures taken to avoid nosocomial infections**
- **HB vaccine campaign**

- After NAT

The current global residual risk is **1/350 000 donations** and the main part of this risk is related to HBV

Conclusion (2)

- NAT contribution:

- ✓ introduce a new method in the blood screening
- ✓ high level of blood component safety
- ✓ the suppression of ALT screening
- ✓ improvement of the diagnostic of infection in blood donor population

- NAT limits :

- ✓ additional and complementary information
- ✓ further studies and follow-up required before withdrawing serological markers
- ✓ high cost-efficacy ratio : to be evaluated