Groups at risk for hepatitis B infection
- who should be vaccinated

---

male homosexuals

heterosexuals with multiple sex partners (e.g. sex workers)

travelers to areas of high HBV endemicity

immigrants and refugees from areas of high HBV endemicity

household contacts and sex partners of HBV carrier

i.v. drug users

prison inmates and staff

clients and staff in institutions of the mentally disabled

health system (e.g. surgeon, dentist, nursing staff, cleaner)

hemodialysis patients, transplant recipients

Epidemiology of hepatitis B in Germany

Prevalence of anti-HBc (n=3505)*	**8.7%**
Prevalence of HBs-Ag	**0.6%**
Reported cases of hepatitis B infection (1990 – 1999)**	**6 000 p.a.**
Estimate of new hepatitis B infections	**50 000 p.a.**
Deaths due to hepatitis B***	**2 000 p.a.**

*Jilg, 2001
**Kirschner, 1996
***Anonymous, 1999

Hepatitis-B prevalence in immigrants from Vietnam/Laos and Ghana

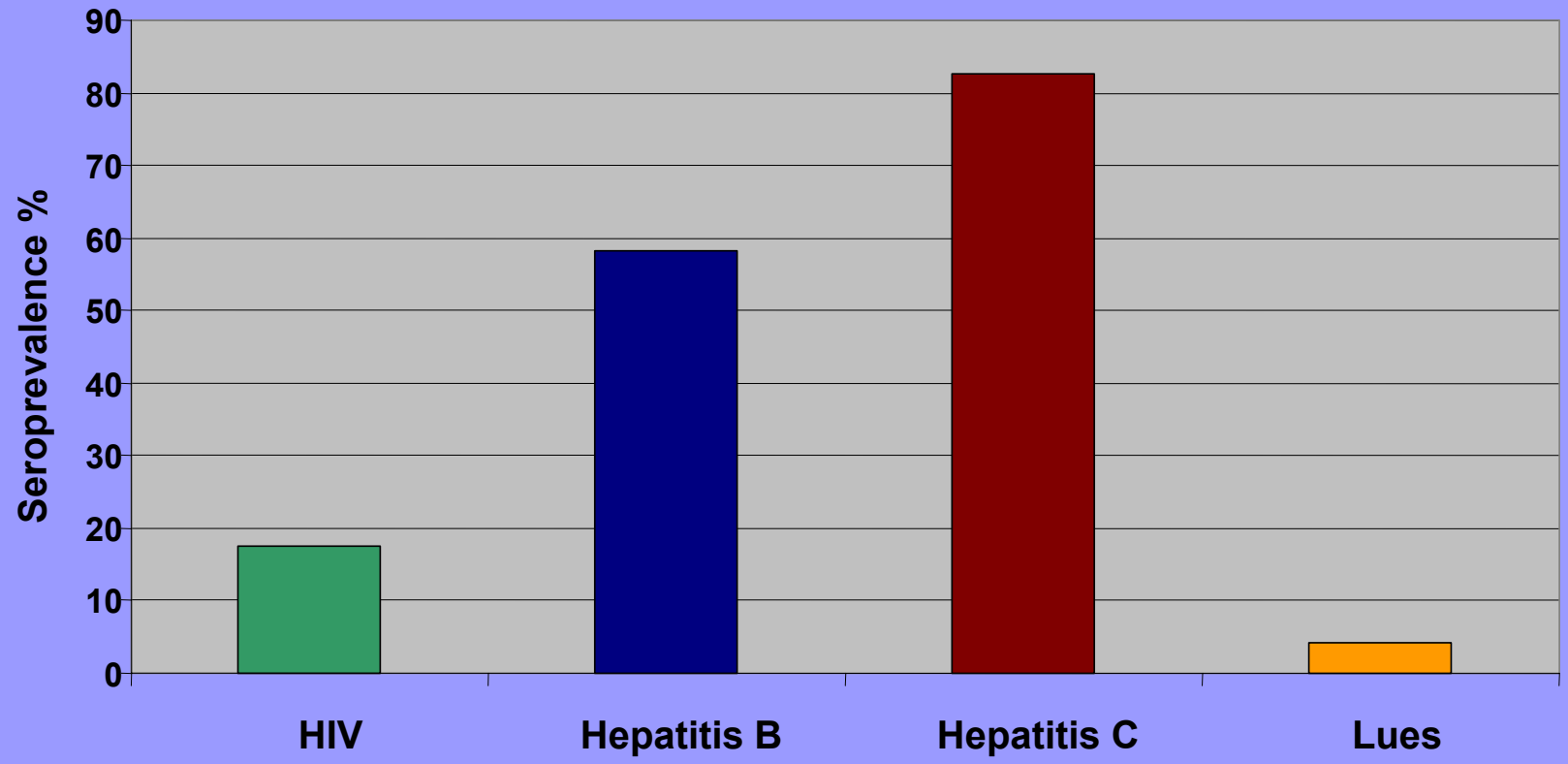
	Vietnam/Laos	Ghana
HBs Ag	**24%**	**13%**
HBe Ag	**8%**	**2%**

Bienzle, 2002

German populations at risk for hepatitis-B-infection

medical staff	**1.85 Mio**
male homosexuals	**1.23 Mio**
iv drug abusers	**0.12 Mio**
hemodialysis patients	**0.12 Mio**

HIV, Hepatitis B and C in IVDA in Berlin



Association between behavioural characteristics and HBV seropositivity among injecting drug users (Stark, 1997)

Variable	(n)	HBV (%)
Duration of iv drug use		
< 5 years	181	46
5 – 9	144	56
10 – 14	111	72
≥ 15	139	78
Frequency of syringe sharing		
Never	141	58
1 – 50 times	289	59
> 50 times	145	70
Imprisonment		
Never in prison	189	49
In prison, but not injecting	204	63
Syringe sharing 1 – 50 times	88	68
Syringe sharing > 50 times	41	85
Prostitution		
No	421	60
Yes	153	65

Characteristics of injecting drug users before and after start of syringe exchange program in prison (n = 166)

Variable	Baseline investigation	Follow-up (median 12 months)	
Syringe sharing in prison (and previous 6 months)	71%	1. follow-up 2. follow-up 3. follow-up	11% 2% 0%
Seroprevalence			
HBV	53%	no seroconversion	
HIV	18%	no seroconversion	

Stark, 2003

Candidates for hepatitis B vaccination before traveling to highly endemic regions

---

Travelers routinely traveling to, or spending prolonged periods in high-endemicity regions

Occupational groups (e.g. military, aid workers etc.)

Travelers whose activities or lifestyle place them at risk (e.g. heterosexuals or homosexuals engaging in casual sex, intravenous drug users)

Travelers likely to engage in acupuncture, tattooing or body piercing

Travelers who may need to undergo medical or dental procedures while abroad

---

Data regarding destination, type and duration of travel in 2 024 travelers consulting the Institute of Tropical Medicine Berlin for travel-associated infections between 1. 1. and 31. 12. 2000

Sex	**Female 50.1% (mean age 34 y); Male 49.9% (mean age 35 y)**	
Age groups	**< 20 years**	**7%**
	20 - 39	**58%**
	40 – 59	**29%**
	≥ 60	**6%**
Destination	**West Africa 13.3%; East Africa 8.5%; South Africa 6.2%; Southeast Asia/China 18.5%, South Asia 13.9%; Central America 13.9%; South America 6.9%; Mediterranean 4.6%; Oceania 0.7%**	
Reason	**Holiday 90%; Business 10%**	
Duration	**Median 10 days (2 days – 6 months)**	

Harms, 2002

Risk of Hepatitis B infection in travelers

Exposure (voluntary or involuntary) to blood and body fluids by travelers: 10% - 15%

Monthly incidence for HBV infection: 80 – 420/100 000 travelers

Monthly incidence for symptomatic HBV infection: 25/100 000 travelers

---

Steffen 1993; Löscher 1999

Risk for expatriates working in developing countries of acquiring STD (n = 845)

Sexual relationship with local individuals	Men	Women
Steady relationship	21%	19%
Casual relationship	28%	16%
Use of condoms (steady relationship)	69%	64%
Use of condoms (casual relationship)	20%	21%

De Graaf et al, 1996

Accelerated hepatitis B vaccination schedules for travelers (and drug addicts)

I

Standard dose at 0, 1, 2 and 12 months

Seroprotection rates

3 months after first dose: 84 - 100%

13 months after first dose: 97 - 100%

II

Standard dose at 0, 1(2) and 3(4) weeks and 12 months

Seroprotection rates in both groups

7-8 months after first dose: 93 - 95%

Recommendations for Hepatitis-B vaccination in healthcare workers

---

1. **Three dose 0-, 1(2)-, 6(12)-month schedule**
2. **Booster vaccination if anti-HBs titer <100 IU/L 4-8 weeks after third dose (anti-HBs follow-up)**
3. **Additional doses (n?) for non-responder**
4. **Booster vaccination after 10 years**

Monophosphoryl Lipd A (MPL) and Quil A Saponin (QS21)

Both adjuvants belong to the group of immunostimulatory adjuvants possessing pathogen associated molecular patterns (PAMP)

They activate cells of the innate immune system and induce Th1 (IL-2, IFN-α) and antibodies of the IgG2a isotype

---

Hepatitis B vaccination of non-responders* with standard vaccine (n=37) and HBsAg/AS04 (3-deacylated monophosphoryl lipid A / MPL)(n=40)**
Seroprotection rates and geometric mean titers***

	HBsAg	HBsAg/MPL
Seroconversion rate	**67.6%**	**97.5%**
GMT	**111 IU/L**	**1 937 IU/L**

*Non-responder = ≤ 10 IU/L anti-HBs after 4 doses of standard vaccine

Risk of infection following transplantation

Increased susceptibility

Severe disease

Higher rate of complications

Graft rejection

Immunization in organ transplant recipients

Lower seroconversion rates

Lower peak antibody levels

Faster decline of antibody titers

Hepatitis B vaccination in liver transplant recipients with adjuvant AS02

Study population	**n = 20**	
Sex	**18 m; 2 w**	
Age	**35 – 69 (median 54.7 y)**	
HBV status before LTX	**HBs-Ag +; HBe-Ag -;**	
	HBV-DNA -;	
Immunosuppression	**Ciclosporin A**	**6**
	Tacrolimus	**11**
	Tacrolimus/Mofetil	**3**
Time period since LTX	**2 – 13 J (median 6.5 y)**	
Underlying disease	**Liver cirrhosis**	**18**
	Acute hepatitis and	
	Liver failure	**2**

Bienzle, 2003

Hepatitis B immunization in liver transplant recipients for HBV-related disease with adjuvanted HBsAg/AS02 vaccine

HBIG prophylaxis during vaccination	**>100 IU/L anti-HBs**
Seroconversion cutoff	**500 anti-HBs IU/L**
Maximum anti-HBs IU/L of responders median (range)	**25 344 (1 255 - 83 121)**
Observation period after immunization months: median (range)	**13.5 (6 – 22)**

Bienzle, 2003