



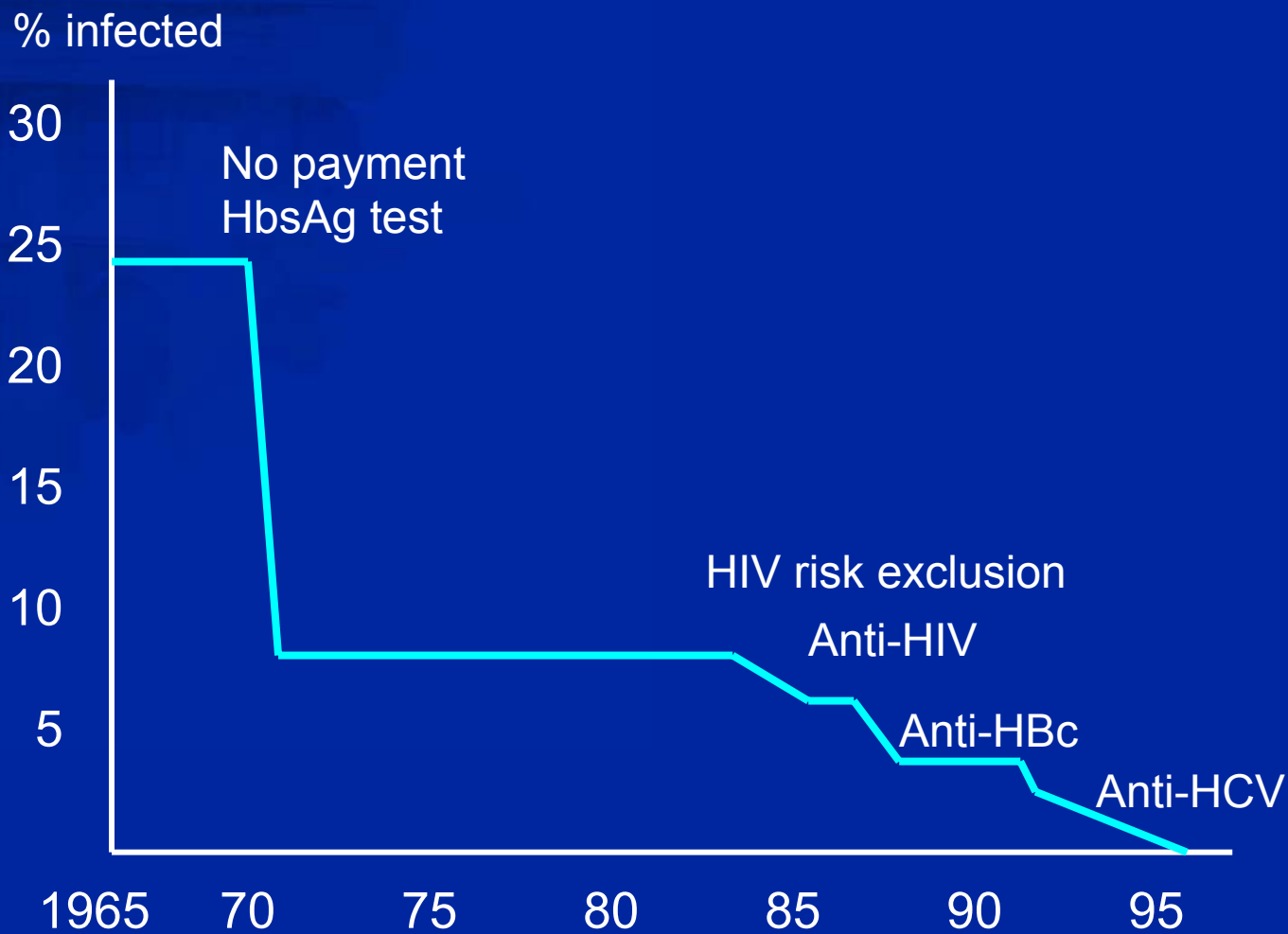
# **Treatment of Anemia: Limitations of Blood Transfusions**

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Sweden**



ANEMIA

# Risk Development for Hepatitis in Multitransfused Patients, USA



# Transfusion Risks

Risk factor	Frequency/ mill units	Deaths/ mill units
Hepatitis A	1	0
Hepatitis B	7–32	0–0.14
Hepatitis C	4–36	0.5–17
HTLV I and II	0.5–4	0
Parvovirus B 19	100	0

# Hemovigilance in Great Britain

**'The Serious Hazards of Transfusion (SHOT) initiative'**

- **A system for collecting complications of transfusion**
- **Started in 1996, latest report April 2002**

**Web address: [www.shot.demon.co.uk](http://www.shot.demon.co.uk)**

# SHOT Reports 1996–2001

	1996/97	1998/99	2000/01
<b>Incorrect component tf</b>	<b>81</b>	<b>144</b>	<b>213</b>
<b>Acute tf reaction</b>	<b>27</b>	<b>34</b>	<b>37</b>
<b>Delayed tf reaction</b>	<b>27</b>	<b>31</b>	<b>40</b>
<b>Acute lung injury</b>	<b>11</b>	<b>16</b>	<b>15</b>
<b>Infection transmission</b>	<b>8</b>	<b>9</b>	<b>6</b>
<b>GvHD</b>	<b>4</b>	<b>4</b>	<b>1</b>
<b>Total</b>	<b>169</b>	<b>255</b>	<b>315</b>

tf=transfused/transfusion

# Blood Safety, Sweden

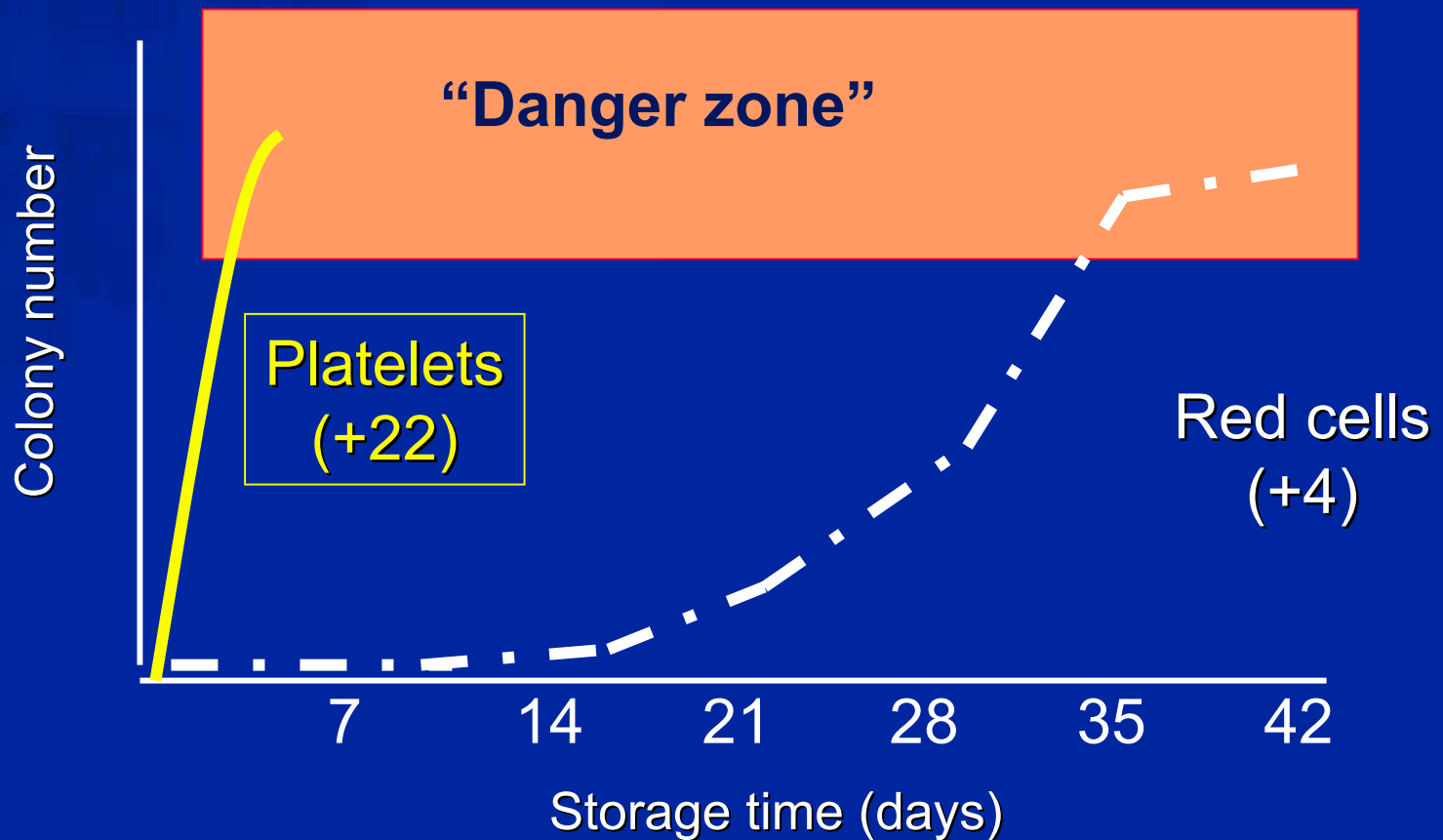
## Estimated risk for transmission of virus

- Hepatitis B            1 / >2 million transfusions
- Hepatitis C            1 / >2 million transfusions
- HIV                      1 / >6 million transfusions

**HIV: no case since 1985**

**Hepatitis C: no case the last 10 years**

# Bacterial Growth in Platelet and Erythrocyte Concentrates



# Bacterial Contamination of Platelet Concentrates in Sweden, 2000

- 30,606 platelet concentrates transfused
- Bacteria verified in 2.8%

Two serious cases in Sweden, one death

# Cost-benefit of Safety Measures

## Testing of every blood donation by ELISA

<b>Test</b>	<b>Cost per protected patient €</b>
<b>Anti-HCV</b>	<b>250 000</b>
<b>Anti-HIV</b>	<b>0.5 million</b>
<b>Anti-HTLV/II</b>	<b>1,800 million</b>
<b>Quarantine plasma and virus inactivated plasma</b>	<b>50–300 million</b>

# Frequency of PCR-Positive / Seronegative Blood Units Per Million Donations

	Germany	USA	England	Japan
HCV	0.9	3.8	0.8	3.5
HIV	0.2	0.3	nd	<0.4
HBV	0.6	nd	nd	7.8

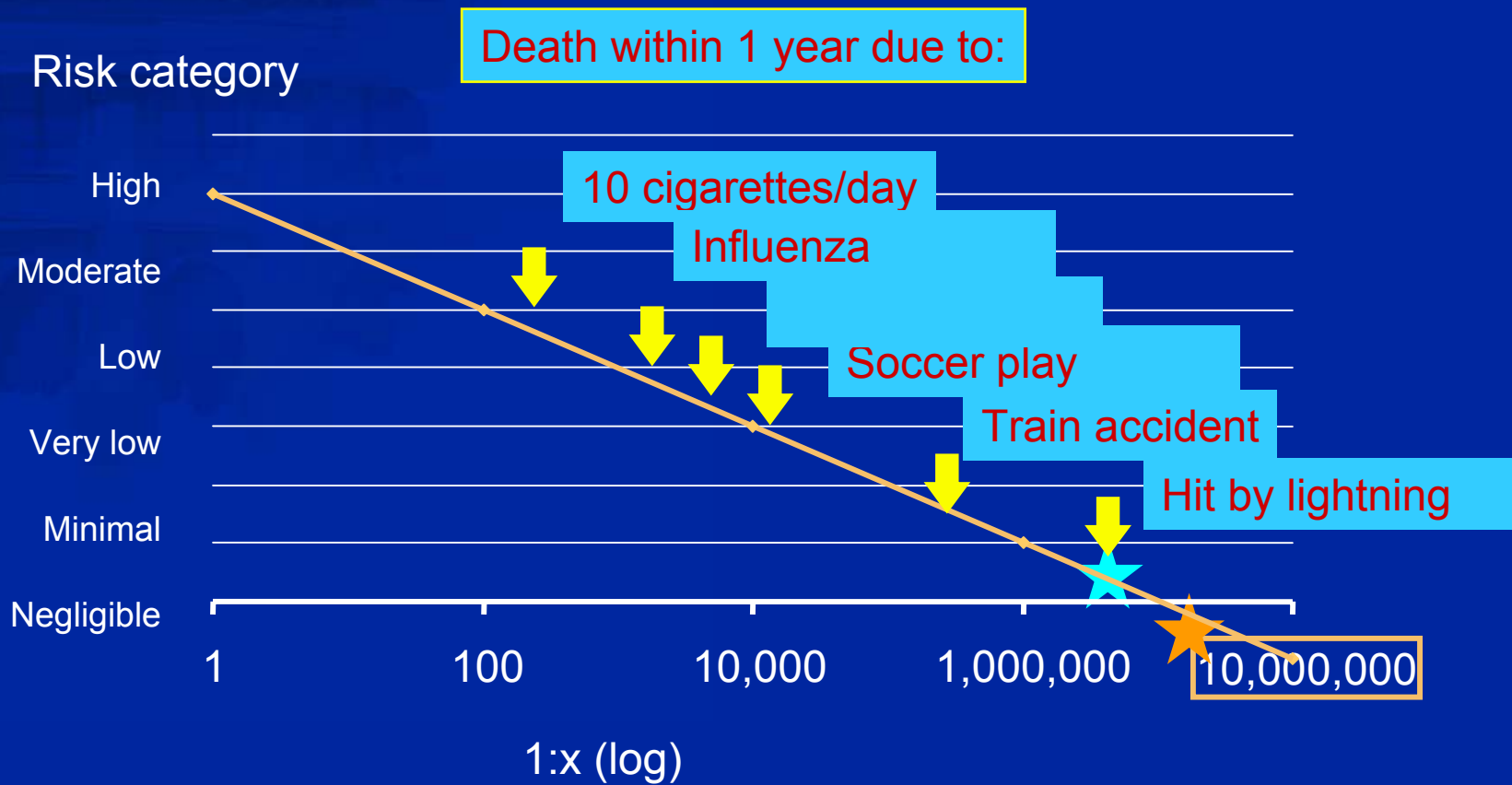
# Cost-benefit of safety measures

## ■ Testing

ELISA + PCR for hepatitis C

	Cost per life saved €
Blood pools	84.6 million
Every blood donation	891.1 million

# Risk of Infection From One Blood Donation for HCV (★) and HIV (★), Compared With Other Risks



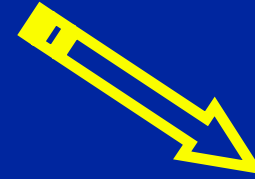
# Strategies for Further Risk Reduction

- Better selection of donors
- Better serological tests
- Nucleic acid testing (PCR) ??
- Microbial inactivation (psoralen?)

*Human error at bedside most common source of complication*

**Main focus now on quality control programs for the whole 'transfusion chain'**

# Immunologic Effects of Transfusion



Up-regulation of humoral immunity

Down-regulation of cellular immunity



Allo-immunization



T-cell proliferation down  
NK-cells lower activity  
Defective antigen presentation

# Transfusion and Prognosis in Cancer



Worse prognosis

Is there a causal relationship or are both expression of more severe disease?

??

??

# Secondary Hemochromatosis

- 400 ml of erythrocyte concentrate: ~225 mg of Fe
- 50 units ~12 g of Fe (normal stores 0.3–0.9 g)
- Organ damage after ~75 units
- Earlier damage if erythropoiesis is ineffective

# Secondary Hemochromatosis Organ Damage

S-ferritin mirrors total iron stores and liver damage



**Myocardial damage underestimated**

Myocardial iron load must be diagnosed with new MR technique

# Adjustment to Anemia

## Physiologic adjustment

- 2,3-bisphosphoglycerate in red cells increase
- Heart rate and cardiac output increase
- Selective vasoconstriction, etc.

## Psychologic adjustment

- Acceptance of situation
- Avoidance of symptoms, reducing activities

# History-taking in Anemia

Ask about fatigue, mood, sexuality,  
dyspnea, social activity

Ask about change in functional capacity  
and way of life

# Well-Treated Transfusion Patients Have...

- A 'stable' Hb level through frequent blood tests
- An individualized, negotiated trigger level
- Iron chelating therapy before gross hemochromatosis

# Transfusion Treatment in Cancer

- If the patient has severe anemia, transfuse while waiting for rHuEPO effect
- Transfusion risks are minimal and should not deter from treatment of cancer patients

**Don't forget that rHuEPO non-responders still need treatment!**