Panel: Experiencias com tecnologías en la mitigación para reducir el ITT para diferentes patógenos

Impacto que tiene la leucorreducción

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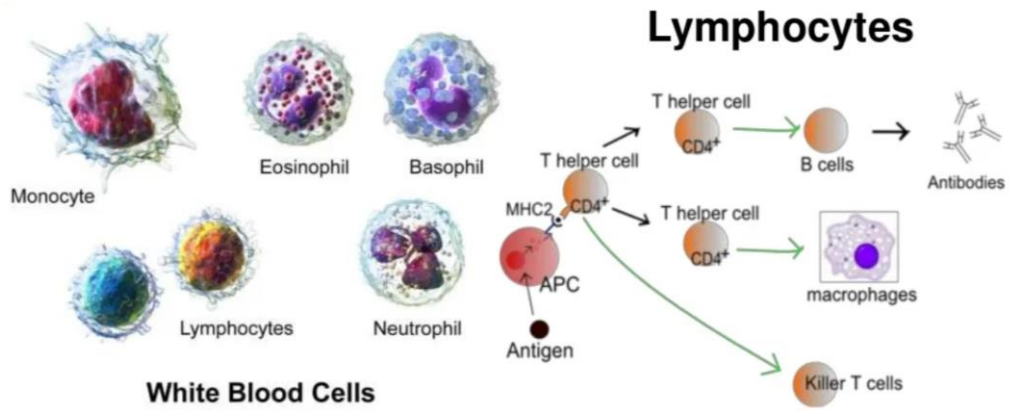
Vice-Medical Director Sírio-Libanês Blood Bank

The leukocytes present in donated blood play **no therapeutic role in transfusion** and may be a cause of adverse transfusion reactions:



Immunologically mediated:

- HLA Alloimmunization:
  - Febrile nonhemolytic transfusion reaction
  - Platelet Refractoriness
  - Transplant rejection
- Graft-vs-host disease
- Immunosuppression
- Viral disease reactivation

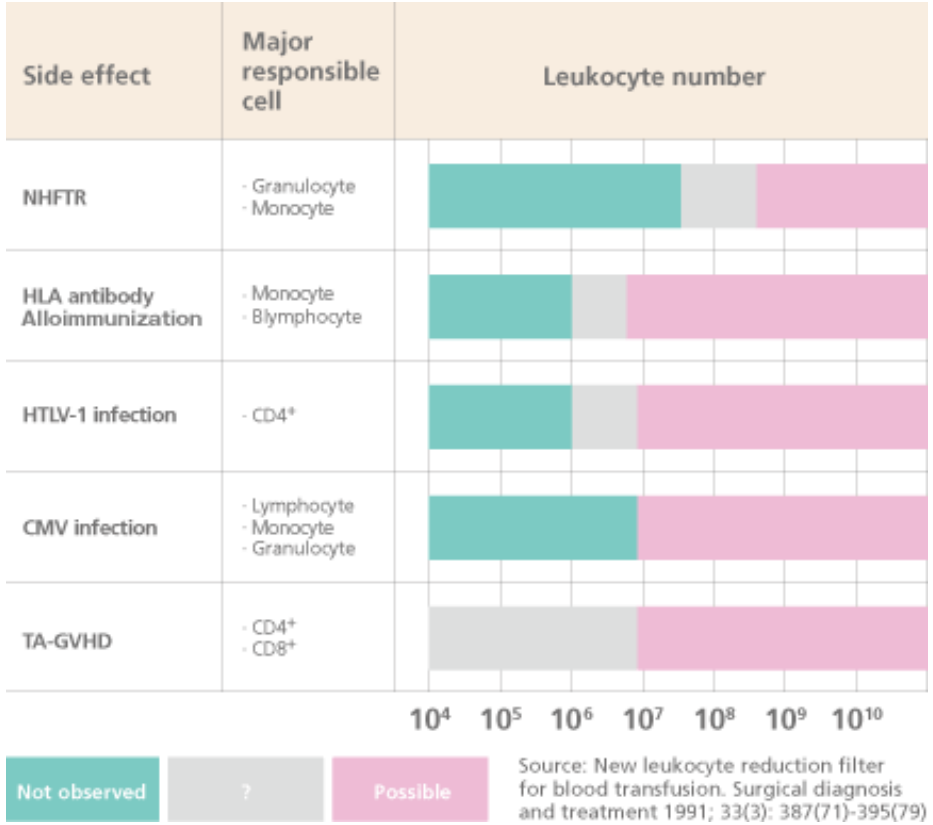
Infectious disease transmission:

- Viruses: CMV, EBV, HTLV-I, HTLV-II
- Bacteria (e.g., Yersinia enterocolitica)
- Protozoa (e.g., Leishmania and T. cruzi)

Removal of leukocytes may have several potential benefits for transfusion recipients,

Including the reduction of the **risk of TT-CMV** and **of a number of additional TTI** despite advances in the screening testing of donated blood.

The relationship between the number of residual leukocytes and adverse reactions:



Source: New leukocyte reduction filter for blood transfusion. Surgical diagnosis and treatment 1991; 33(3): 387(71)-395(79)

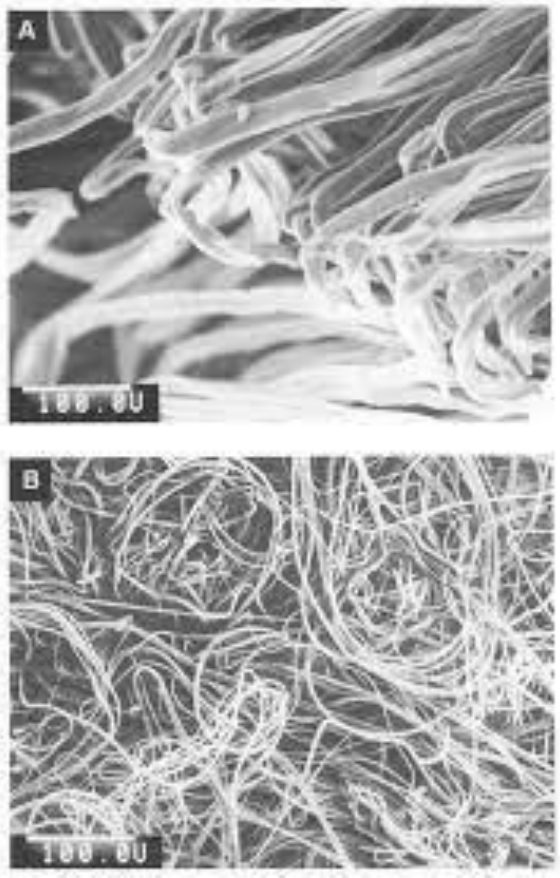
Approximate residual number of leukocytes in cellular blood components:

Component	No. of Leukocytes
Fresh Whole Blood	10^9
Red Blood Cells (RBCs)	10^8-10^9
Buffy-coat-depleted RBCs	10^8
Washed RBCs	10^7
Frozen deglycerolized RBCs	10^6-10^7
Whole-blood-derived platelets	10^7-10^8
Apheresis platelets	10^6-10^8
Leukocyte-reduced (LR) RBCs	$<5 \times 10^6$
LR whole-blood-derived platelets	$<0.83 \times 10^5$
LR apheresis platelets	$<5 \times 10^6$
Fresh Frozen Plasma	$<10^4$

Side effects can be avoided if residual leukocytes are reduced to around 10^6.

- US Standards for Blood Banks and Transfusion Services requires **< 5 x 10^6 / unit** (RBC and apheresis platelets);
- Concil of Europe's Guide to the preparation, use and quality assurance of blood componentes requires **< 1 x 10^6 / unit**.

FILTERING MECHANISMS



Typical example of the different diameters of fibers, used in
(A) traditional cellulose acetate fiber filters (Cellselect; NPBI) and
(B) current polyester fiber filters (Optima; NPBI).

- **FILTERS** composed of cellulose acetate, polyurethane, polycarbonate, or polyester are the most common method for leukodepletion of whole blood-derived components.
  - The pore size of these filters is designed to impede the passage of leukocytes, but allow the passage of erythrocytes and platelets.

- **TWO MAIN MECHANISMS ARE INVOLVED:**
  - the **mechanical** entrapment (sieving), dependent on the size of the pores (ranging from 5–50 µm) and of the diameter and surface morphology of cells (deformability),
  - and **physical–chemical** entrapment or **adhesion**. Different factors may be responsible for adherence of white cells to surfaces, such as: chemical characteristics, charge, and surface morphology (porosity and roughness).

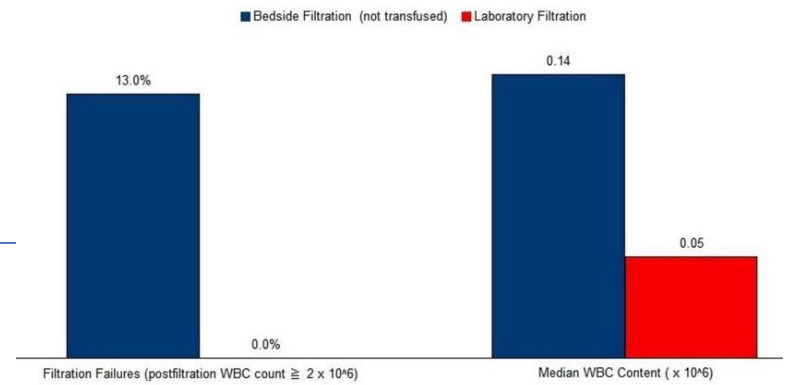
- Currently, third or fourth-generation filters **remove more than 99.9–99.99% (>3 log)** of leukocytes originally present in the donated blood.

Transfusion Medicine Reviews, Vol IX, No 2 (April), 1995: pp 145-166;
Polymer. 2011;52(5):1223-33.

MOMENT OF FILTRATION

The blood filtration may be done at the **time of processing, post-processing,** or **at the transfusion moment**. However, the **pre-storage leukodepletion** (72 h from collection to filtration) presents the following advantages:

- Minor **accumulation of leukocyte cytokines during storage**, which ensures greater efficiency in preventing febrile non-hemolytic transfusion reactions;
- It minimizes HLA alloimmunization risk, since it removes leukocytes intact during filtration. The filtration during transfusion (bedside) allows the passage of **leukocytes fragments and may alloimmunize the receptors**;
- It minimizes the risk of virus transmission, which with the degradation of leukocytes **after 72 hours of storage,** the **released intracellular organisms are no longer retained**.
- Besides, it allows the performance of laboratory analysis of **quality control**.



Transfusion. 1989;29(9):757–760; Transfusion. 1993;33(3):195–199; Vox Sang. 1994;66(1):14-7;

Am J Clin Pathol. 2012;138(2):255-9; Transfusion 1995; 35(5):421-426

- Pre-storage leukocyte reduction was first introduced in **France in 1998** and has been adopted in major European countries, the USA, Canada, New Zealand, etc.

- Some countries have already **made the procedure obligatory** and achieved a **100% pre-storage leukocyte reduction rate**, while in the USA it is likely performed in approximately 80% of cases.

- In Asia, the Japan became the first country to make the procedure obligatory, in 2007.

- In most other countries, healthcare institutions voluntarily use leukocyte reduction filters to reduce white blood cells during bedside transfusion.

Prestorage leukocyte reduction application by countries

	Countries with an obligatory prestorage ULR* system	Year obligatory system introduced
1998	French	Apr. 1998
1999	Austria	Jan. 1999
	Canada	Jun. 1999
	Ireland	Sep. 1999
	Swiss	Oct. 1999
	United Kingdom	Oct. 1999
2001	Malta	Jan. 2001
	New Zealand	Apr. 2001
	Spain	May. 2001
	Portuguese	May. 2001
	Germany	Oct. 2001
2002	Qatar	Jan. 2002
	Benelux	Jan. 2002
	Norway	Jan. 2002
	Finland	Nov. 2002
2007	Japan	Jan. 2007

*ULR: universal leukocyte reduction

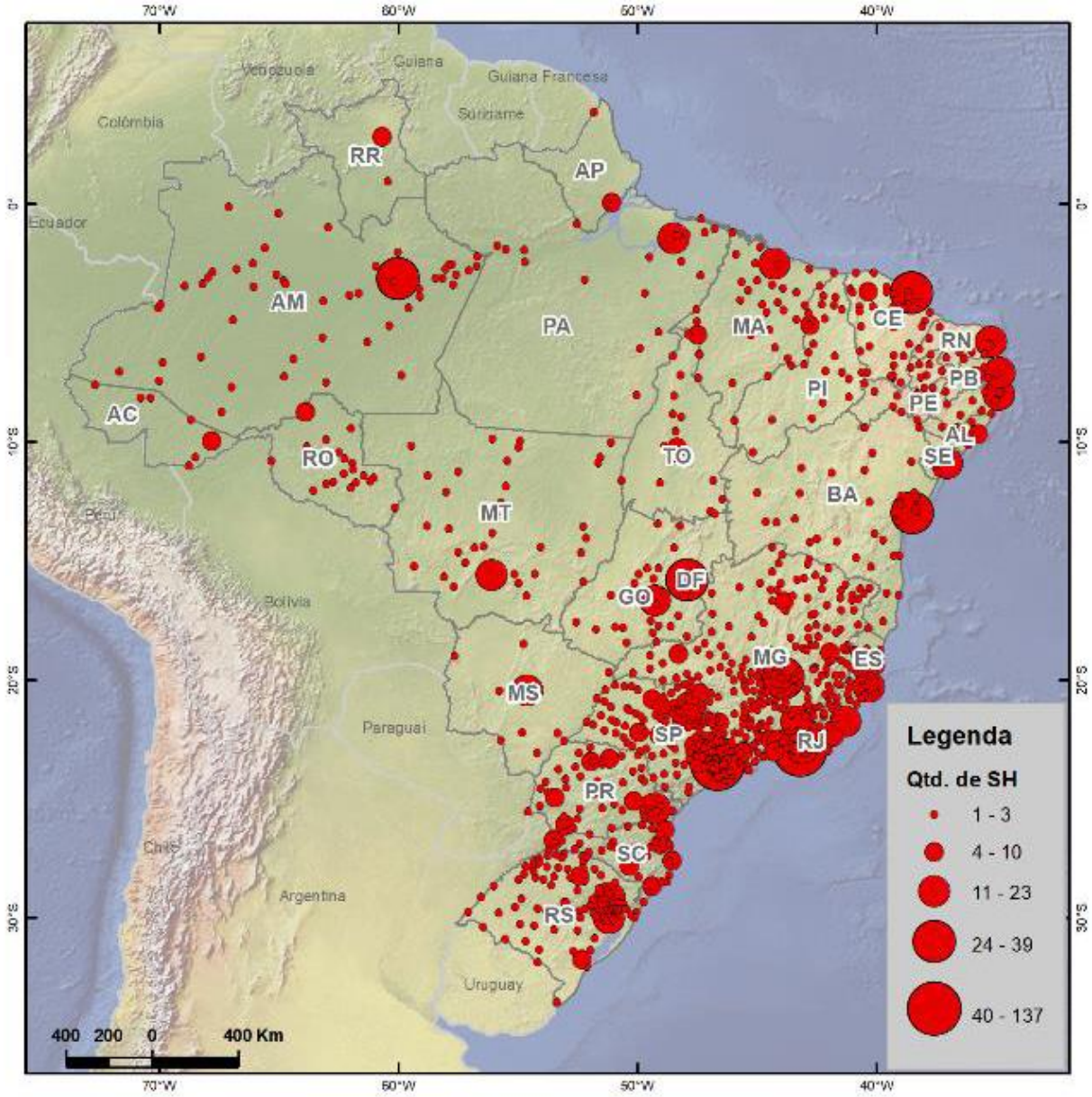
Brazil, a big country:

- 8.5 million km^2
- 211,823,204 population (August, 19th 2020)
  - 56.1% of population concentrated in 304 municipalities
- 5,570 municipalities
- 6,702 hospitals (2019)
  - ~ 60% private
- 41,225 hospital beds (1.95/1,000 hab.)

Transfusion services:

- ~ 3,500,000 donations/year (16.5 : 1,000 hab.)

- 2,156 Blood Transfusion Services
  - ~ 40% Public
  - ~ 26% Private
  - ~ 34% Private – contracted by Public



Fonte: Anvisa, 2019

Ministério da Saúde
Gabinete do Ministro

PORTARIA DE CONSOLIDAÇÃO Nº 5, DE 28 DE SETEMBRO DE 2017

Art. 91. Os concentrados de hemácias desleucocitados são concentrados de hemácias contendo menos que 5,0 x 10e6 leucócitos por unidade.

§ 1º Quando for realizada antes do armazenamento, a desleucocitação deve ser feita em até 48 horas após a coleta.

§ 2º Na desleucocitação, pode ser utilizado sistema de conexão estéril ou conjuntos de coleta com filtro, sendo que, nesse caso, o tempo de validade corresponde ao original do componente.

§ 3º Não é recomendada a utilização de filtros de desleucocitação em beira de leito.

§ 4º Caso o concentrado de que trata o "caput" seja preparado em sistema aberto, a validade será de 24 (vinte e quatro) horas.

§ 5º Os concentrados de que trata o "caput" são indicados para prevenção de reação transfusional febril não hemolítica e profilaxia de aloimunização leucocitária, aplicando-se, principalmente, a pacientes em programa de transfusão crônica, como pessoas com talassemia e com doença falciforme.

§ 6º Os concentrados de que trata o "caput" podem ser utilizados como alternativa para a redução da transmissão de citomegalovírus (CMV) em substituição a componentes soronegativos para CMV.

Hospital Sírio-Libanês (Sao Paulo)

469 Beds

147 ICU beds

21 Surgical rooms

Monthly:

7.855 Emergency

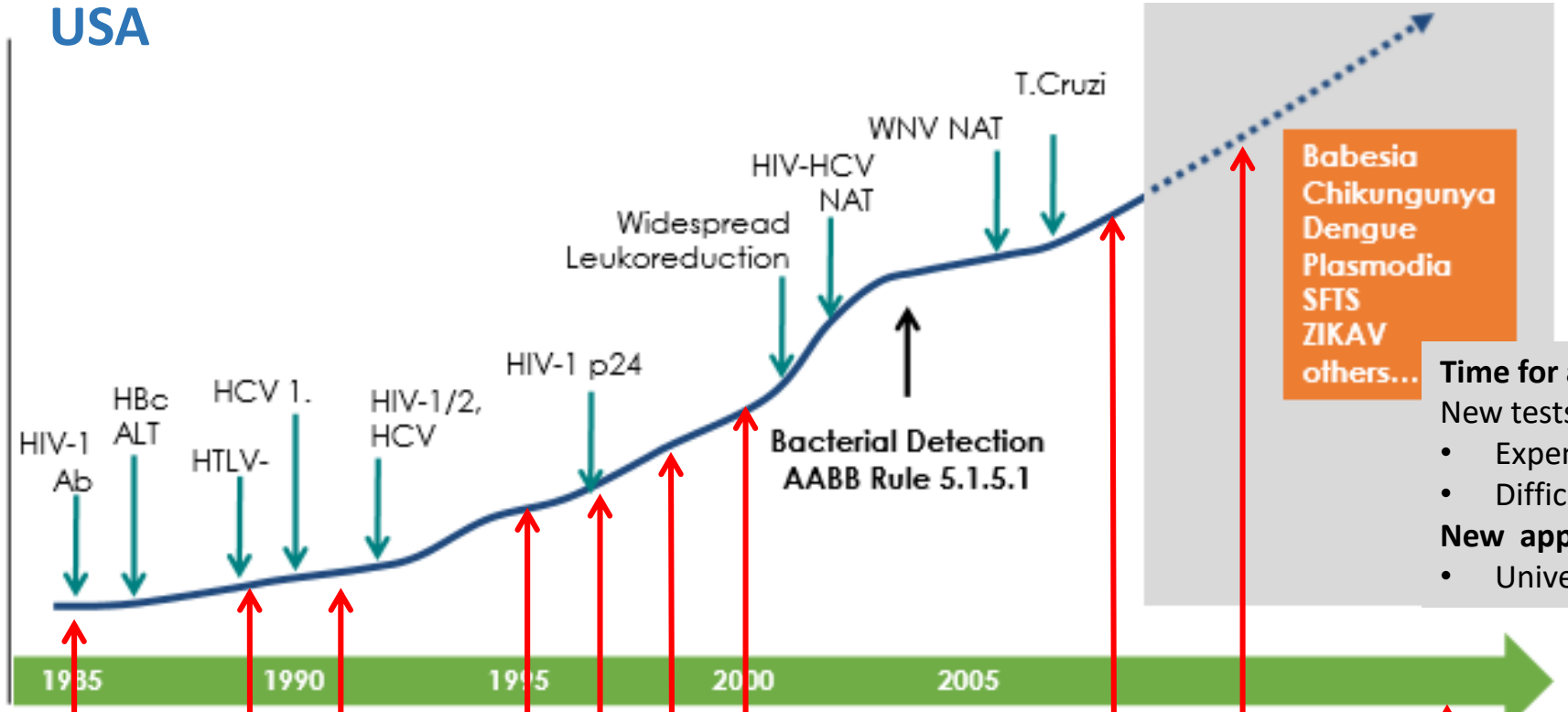
7.700 Oncology treatments

2.030 Hospitalizations

1.987: 1st TMO

Evolution of safety measures

USA



05/1985: a-HIV

06/1989 a-HTLV 1

11/1990: a-HCV

05/1996: p24

1997: Bacterial culture

07/1998: NAT HCV

2000: NAT HIV

2009: NAT HBV

02/2010: Universal leukoreduction

03/2015: IH Automation

03/2017: Pathogen reduction

Babesia
Chikungunya
Dengue
Plasmodia
SFTS
ZIKAV
others...

Time for a change!

New tests are:

- Expensive, not licensed
- Difficult to implement in Brazil

New approach:

- Universal Proactive PR

1983

Foundation Hospital Sírio-Libanês Blood Bank

In Summary: Clinical Indications for Leukocyte-Reduced Blood Components

Established Indications

- Reduce frequency of recurrent febrile nonhemolytic transfusion reactions to Red Blood Cells (RBCs)
- Reduce rate of alloimmunization to leukocyte antigens for patients with hematologic malignant disease
- Reduce risk of transmission of cytomegalovirus among persons at risk of infection by transfusion

Transfusion-**R**elated **I**mmuno-**M**odulation" (**TRIM**)

Emerging Indications

- Improved outcomes in cardiac surgery

Indications under Investigation*

- Reduce risk of bleeding due to platelet refractoriness
- Reduce risk of postoperative bacterial infection
- Reduce risk of immune modulation leading to tumor recurrence
- Reduce risk of bacterial overgrowth of *Yersinia enterocolitica* in stored RBCs
- Reduced risk of white-cell-associated viruses (Epstein-Barr virus, human T-cell lymphotropic virus)
- Reduce, but not eliminate risk of transfusion-associated graft-vs-host disease (GVHD)

Contraindications†

- Prevention of GVHD
- Prevention of transfusion-related acute lung injury caused by passive infusion of leukocyte antibody
- Prevention of the red cell or platelet storage lesion
- Prevention of virus reactivation among patients with human immunodeficiency virus infection
- Prevention of vCJD transmission

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* Inadequate evidence to suggest benefit from leukocyte reduction.

† Evidence demonstrates no benefit of leukocyte reduction.

TT-CMV

- Most are **self-limited**, but can cause **significant morbidity & mortality** in **immunocompromised** patients such as:
  - Hematopoietic or solid organ transplantation,
  - AIDS patients,
  - Low-birth-weight neonates.

The reported rate was as high as **10%** to **60%**.

- Almost exclusively transmitted through **leukocytes**.

- Even though it is **still under debate**, two methods have been **considered operationally equivalente** in many institucional policies to prevent TT-CMV:
  - **CMV-seronegative** cellular blood products
  - **Leukoreduced** blood products

Transfusion 2010; 50(4):776-86

Strategies for the reduction of TT-CMV infection (1)

The most obvious strategy for the prevention of TT-CMV infection is transfusion of blood products from only **CMV-seronegative donors to at-risk patients**.

Although this has proven to be an effective strategy since the 1980s, it carries a significant disadvantage of **excluding a large portion of the donor population**

↓

with the resultant difficulties in **maintaining an adequate supply** of CMV-seronegative blood products.

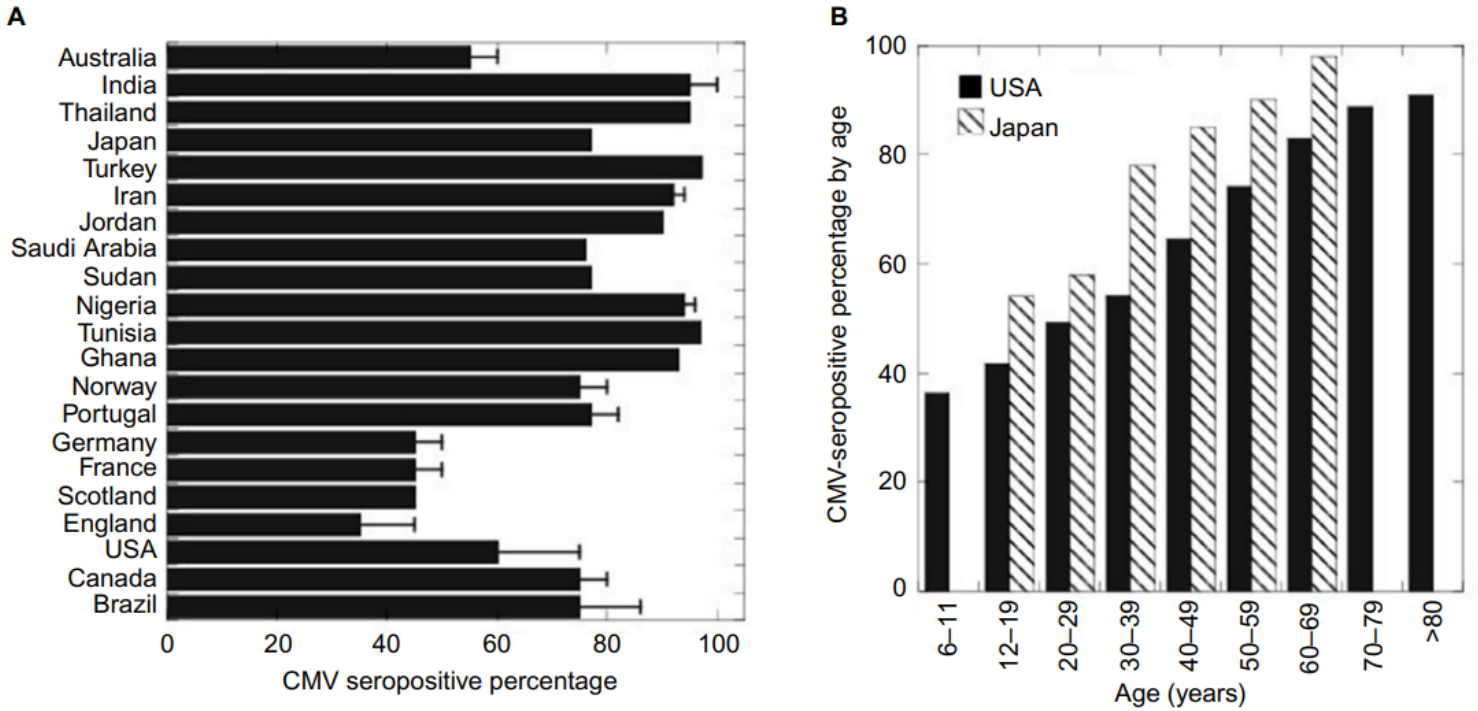
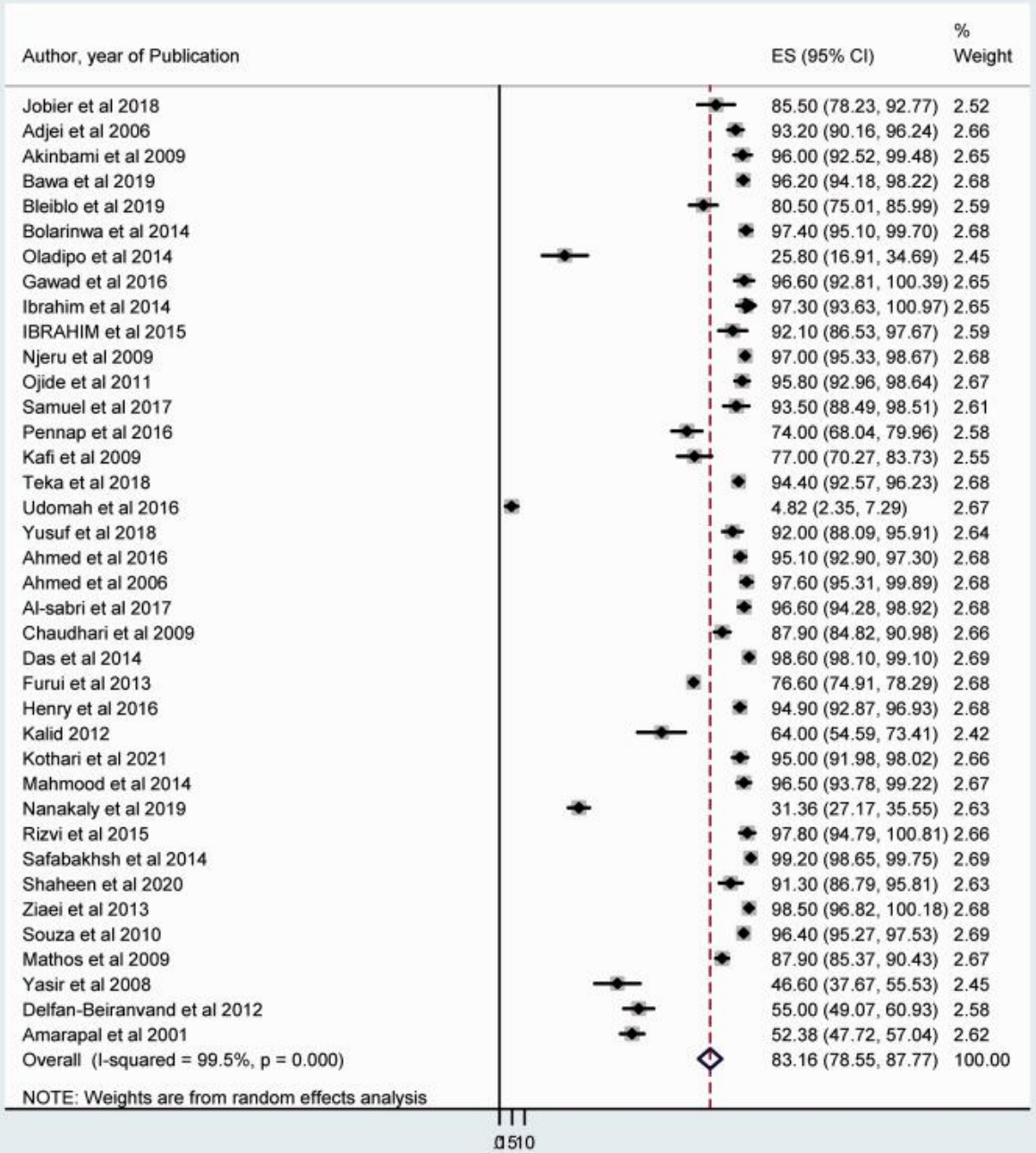


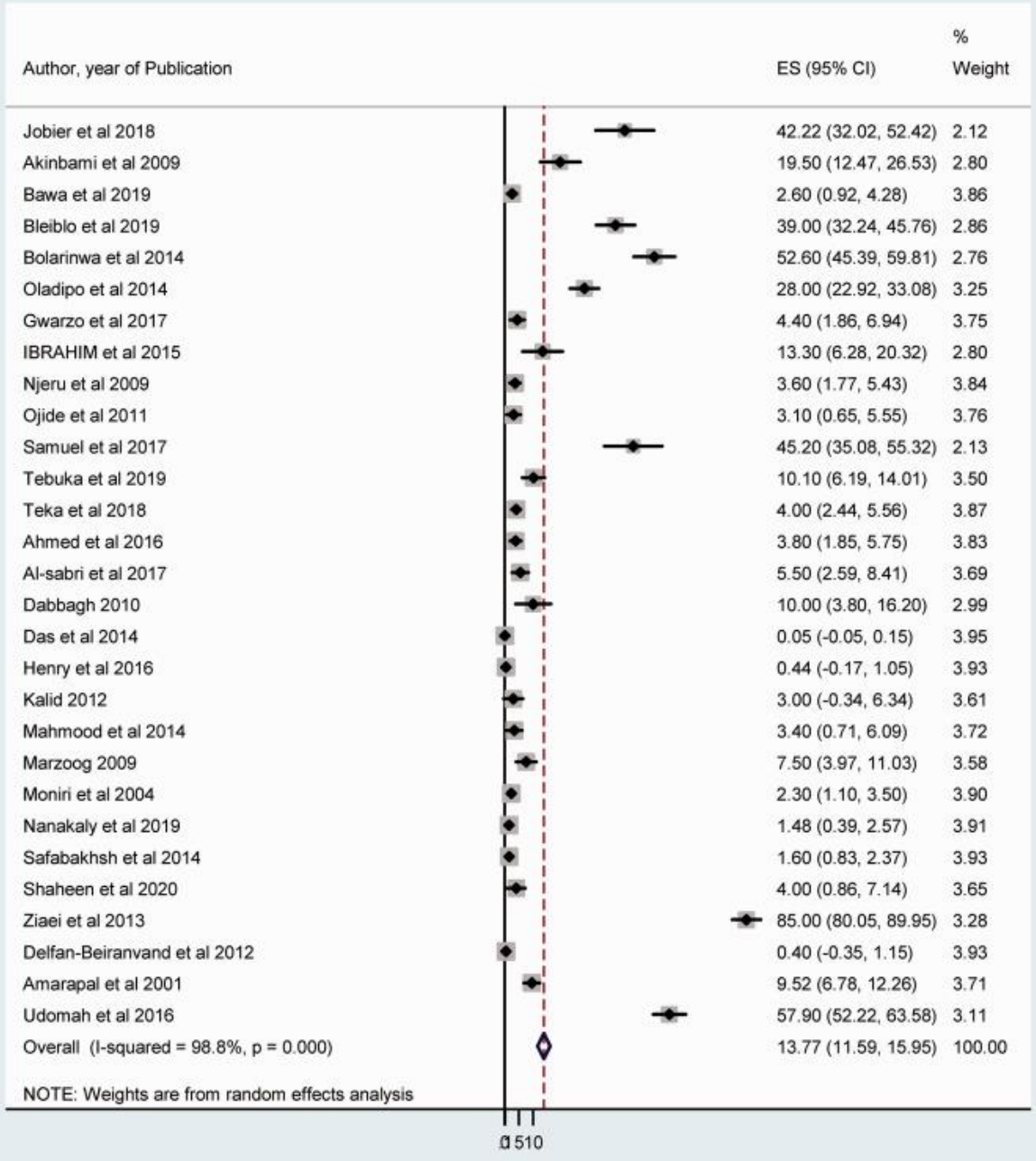
Figure 1 Incidence of CMV seropositivity (**A**) by country and (**B**) by age.
Notes: Data from Manicklal et al,[8] Shaiegan et al,[9] Das et al,[10] Furui et al,[11] and Staras et al.[12]
Abbreviation: CMV, cytomegalovirus.

International Journal of Clinical Transfusion Medicine 2017:5 49–59

Forest plot of the prevalence of anti-CMV IgG among blood donors.



anti-CMV IgM

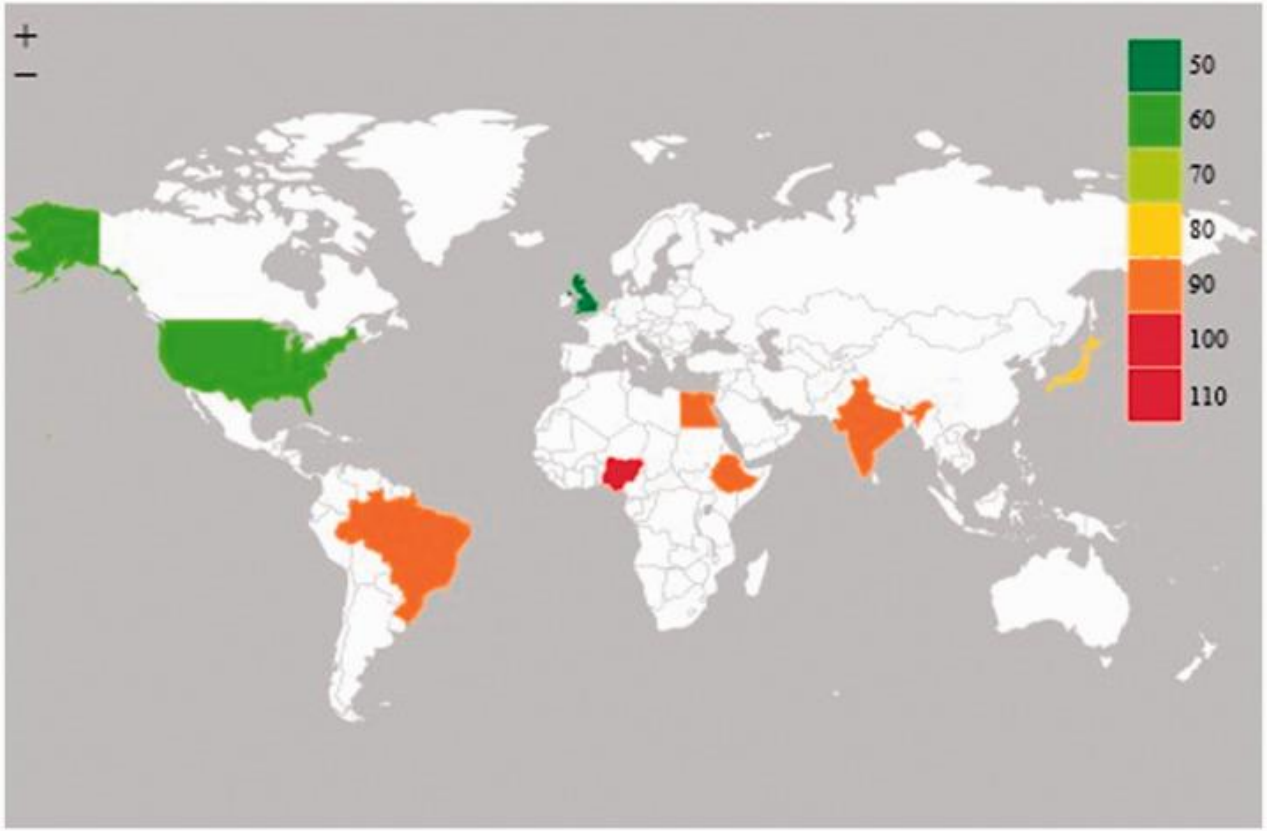


J Int Med Res. 2021 Aug; 49(8): 03000605211034656.

Estimated global CMV seroprevalence among blood donors.

Characteristic	No. of studies	Sample size	Prevalence (95% CI)	I^2 (%)	P-value
CMV IgG					
Region					
Africa	18	3881	82.64% (67.47–97.81%)	99.8	<0.001
Asia	18	9388	82.75% (78.20–87.30%)	99.3	<0.001
America	2	1681	99.23% (83.90–100.56%)	97.2	<0.001
Global	38	14743	83.16% (78.55–87.77%)	99.5	<0.001
Method of anti-CMV antibody detection					
ELISA	32	10847	85.34% (82.44–88.24%)	98.6	<0.001
Others	6	3896	75.51% (47.87–103.15%)	99.9	<0.001
CMV IgM					
Region					
Africa	14	3389	22.52% (15.89–29.16%)	98.4	<0.001
Asia	15	6878	8.06% (5.70–10.43%)	98.9	<0.001
Global	29	10267	13.77% (11.59–15.95%)	98.8	<0.001
Method of anti-CMV antibody detection					
ELISA	26	9419	13.41% (10.97–15.85%)	98.7	<0.001
Others	2	558	1.87% (−1.55–5.30%)	79.0	0.029

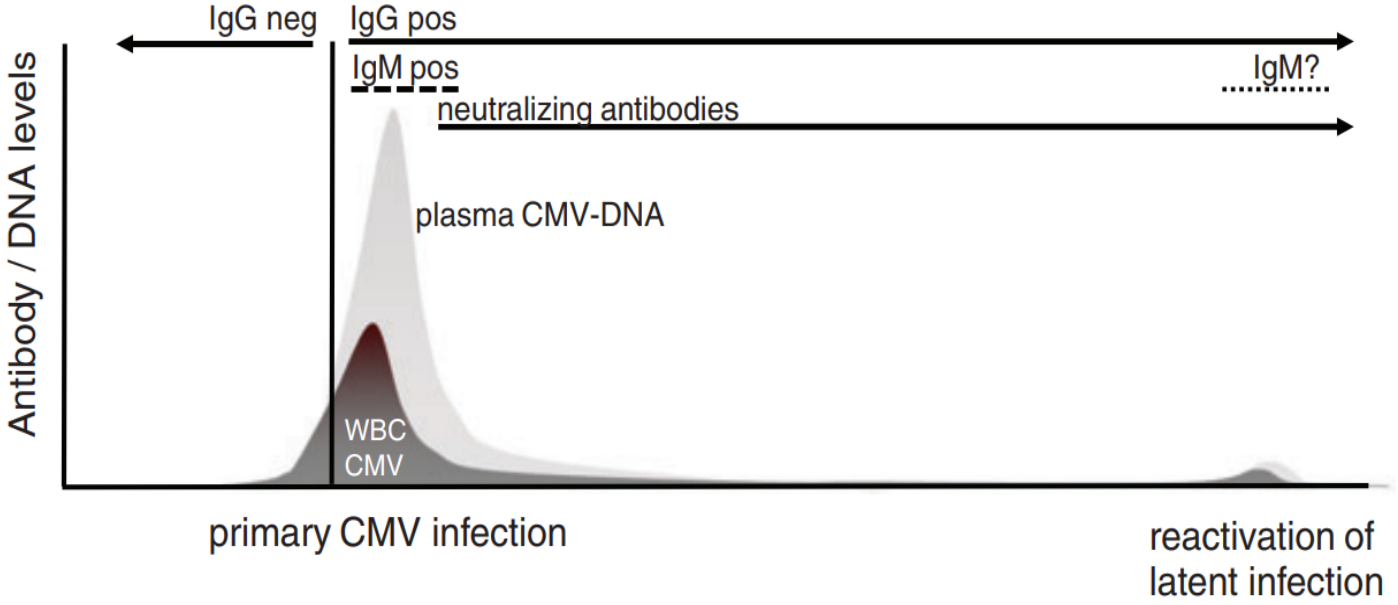
CMV, cytomegalovirus; CI, confidence interval; ELISA, enzyme-linked immunosorbent assay.



J Int Med Res. 2021 Aug; 49(8): 03000605211034656.

- In addition, the use of CMV-seronegative blood **cannot completely eliminate the risk of TT-CMV infection**, given the real possibility of **window period donations**.

- However, the risk of TT-CMV infection as a result of window period donations seems to be **low**, especially given that the **peak levels of CMV DNA in primary infection occur only after seroconversion**.



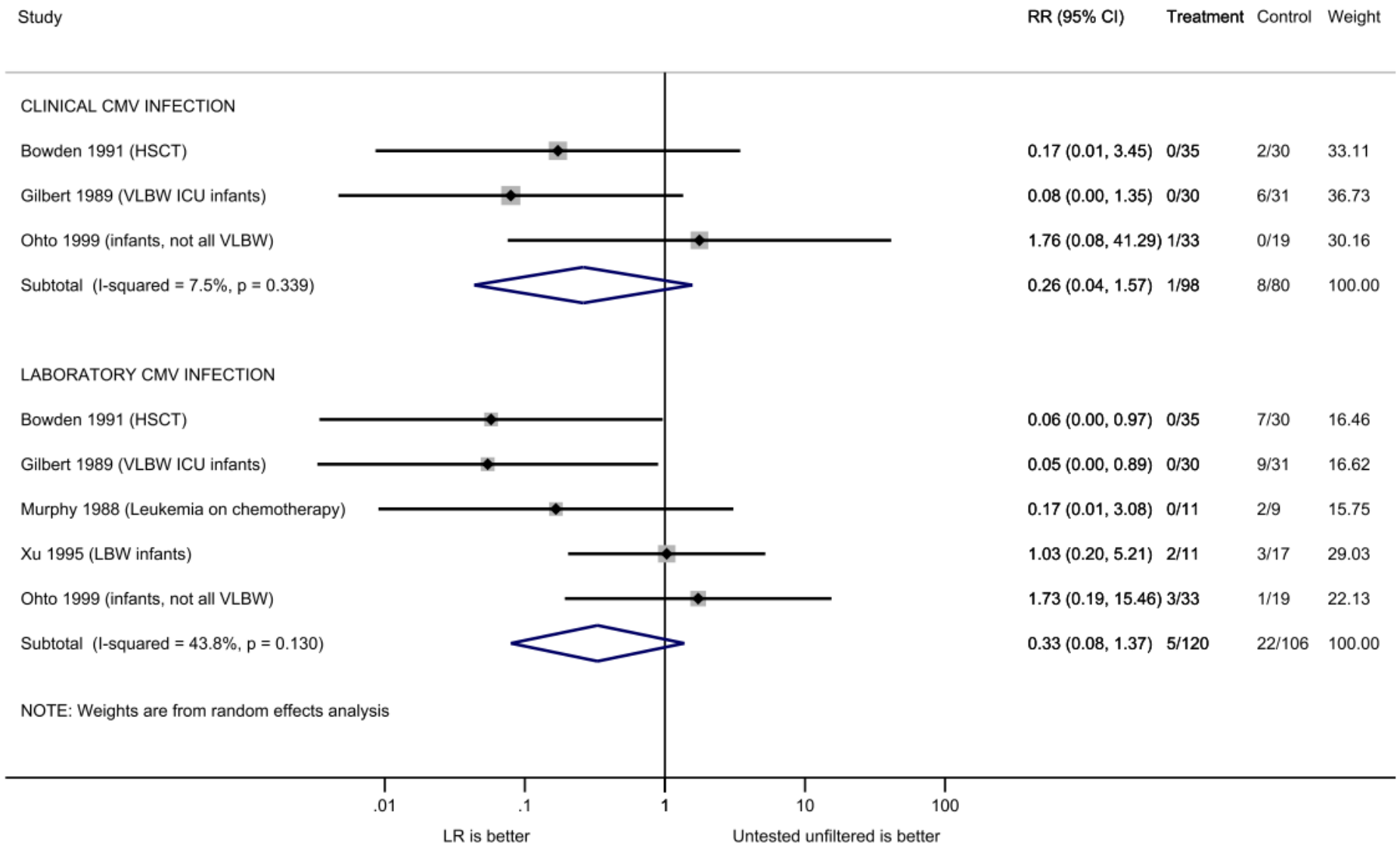
- A study that included polymerase chain reaction (PCR)-based testing of plasma samples from 18,405 individual donors identified only one CMV DNA-positive window-period donor (**0.005%**).

- In another study that included testing of 13,236 blood samples from CMV-seronegative donors, only two of them (**0.02%**) were positive for plasma CMV DNA.

J Clin Microbiol. 2015;53(10):3219–3225.
Transfusion. 2013;53(10):2183–2189.

Strategies for the reduction of TT-CMV infection (2)

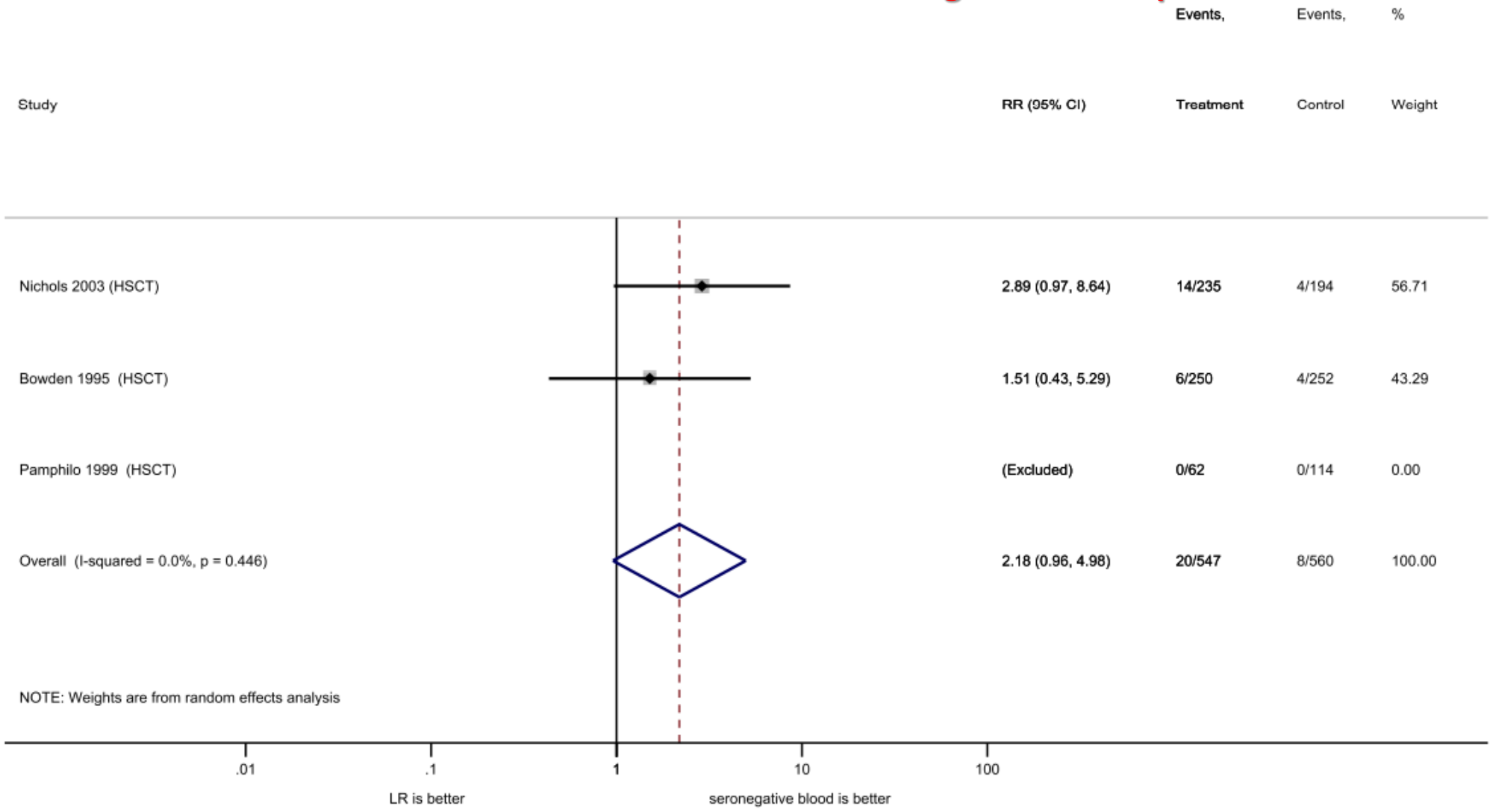
Leukoreduction ***vs.*** **not tested, not filtered blood products**



LBW: low birthweight; VLBW: very low birthweight

TRANSFUSION 2016;56;1569–1580

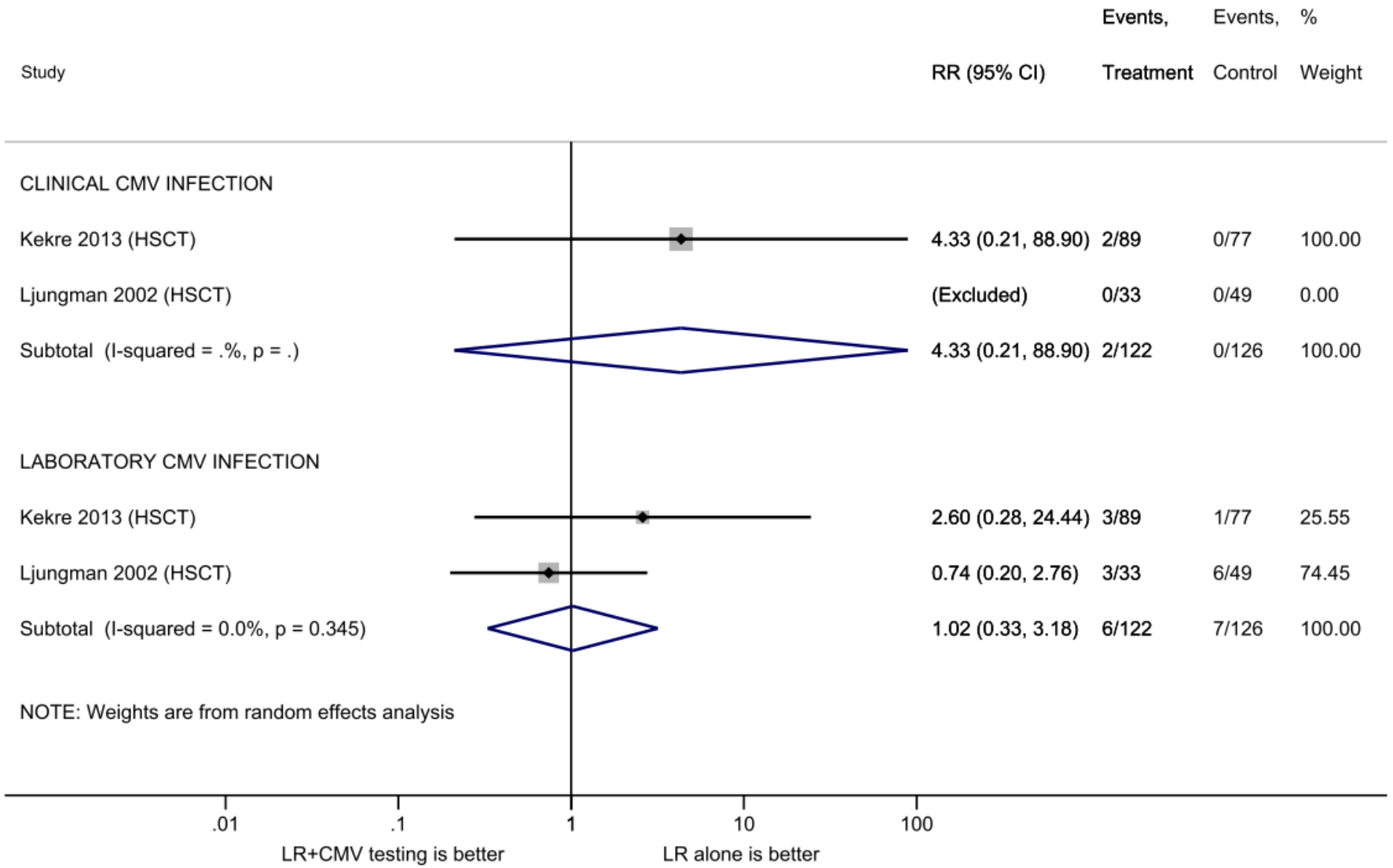
Leukoreduction *vs.* CMV-seronegative blood products



The intervention used in the study by Pamphilon and coworkers was CMV-seronegative RBCs. This study had zero events in both arms which does not allow the estimation of RR. If this study was included in analysis using a continuity correction (replacing 0 by 0.5), the pooled RR would be 2.17 (0.97-4.85).

TRANSFUSION 2016;56;1569–1580

Leukoreduction plus CMV testing *vs.* leukoreduction alone

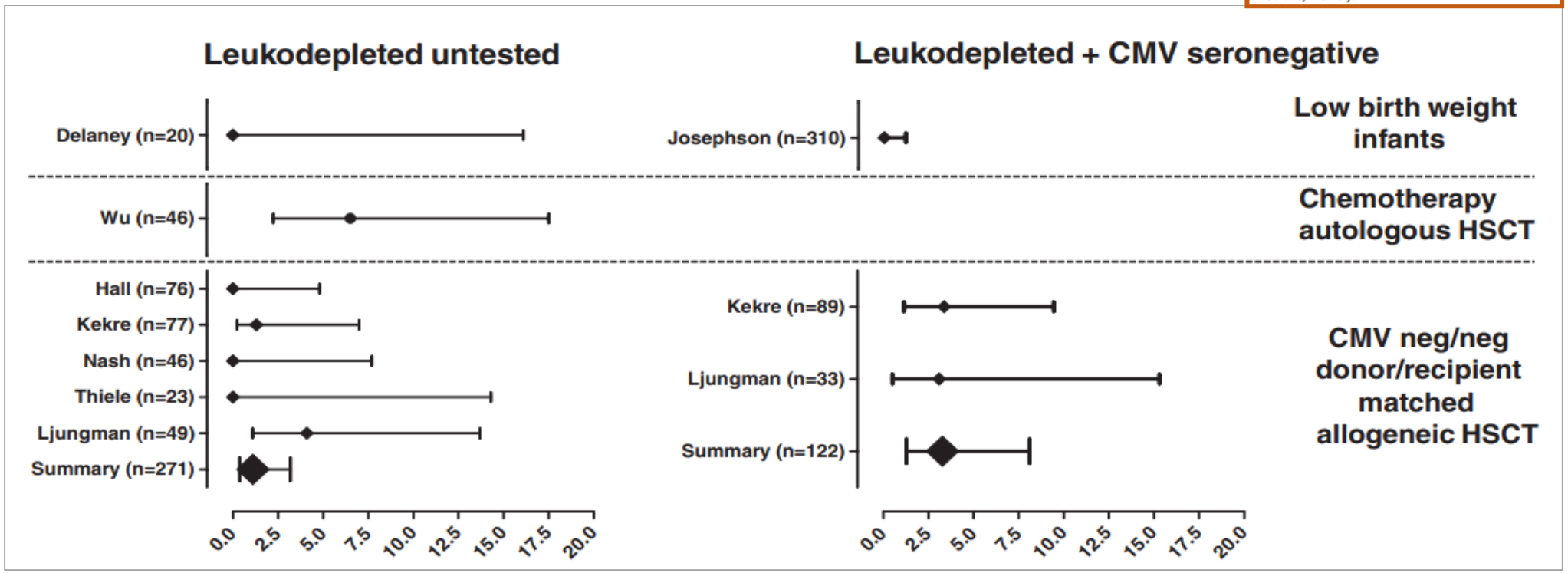


Ljungman and colleagues had zero events in both arms, which does not allow the estimation of RR. If this study was included in analysis using a continuity correction (replacing 0 by 0.5), the pooled RR would be 2.89 (0.266-31.43)

TRANSFUSION 2016;56;1569–1580

Table 2. Strategies to reduce the risk of transfusion-transmitted CMV infections

Strategy	Advantages	Disadvantages	Evidence
Leucoreduction	• Other beneficial effects (e.g. reduction of transfusion reactions, HLA immunisation, etc.). • Universally introduced in many countries. • Reduces infected WBCs by up to 4 log10-steps.	• No reduction of free CMV (especially due to primary infections, more seldom even due to reactivations). • Low number of residual, CMV-infected WBCs. • Technical failures can lead to increased numbers of WBCs in single cases.	Good clinical evidence. Several randomised studies; according to a meta-analysis (Vamvakas, 2005), about 92% reduction in risk.
CMV-seronegative blood products	• Avoids latently infected WBCs. • Avoids donations in the early seropositive stage of primary CMV infections (which contain peak viral load).	• Decreased donor pool (especially in areas with high seroprevalence). • Additional expense for testing and dual inventories. • Increased proportion of window-phase donations. • Products contain no neutralising antibodies.	Good clinical evidence. Several randomised studies; according to a meta-analysis (Vamvakas, 2005), about 93% reduction in risk.
Leucoreduction and CMV-seronegative products	• Potentially increased effect by combining two validated methods (see above) • Avoids even low concentrations of latently infected WBCs.	• Decreased donor pool. • Additional expense for testing and dual inventories. • Increased proportion of window-phase donations without neutralising antibodies.	Poor clinical evidence. Two small studies showed no additional effect compared to leucoreduction alone (Ljungman *et al.*, 2002; Kekre *et al.*, 2013).



Incidences and 95% intervals of confidence based on confirmed CMV DNA-positive patients are shown (x-axis).

doi: 10.1111/tme.12437

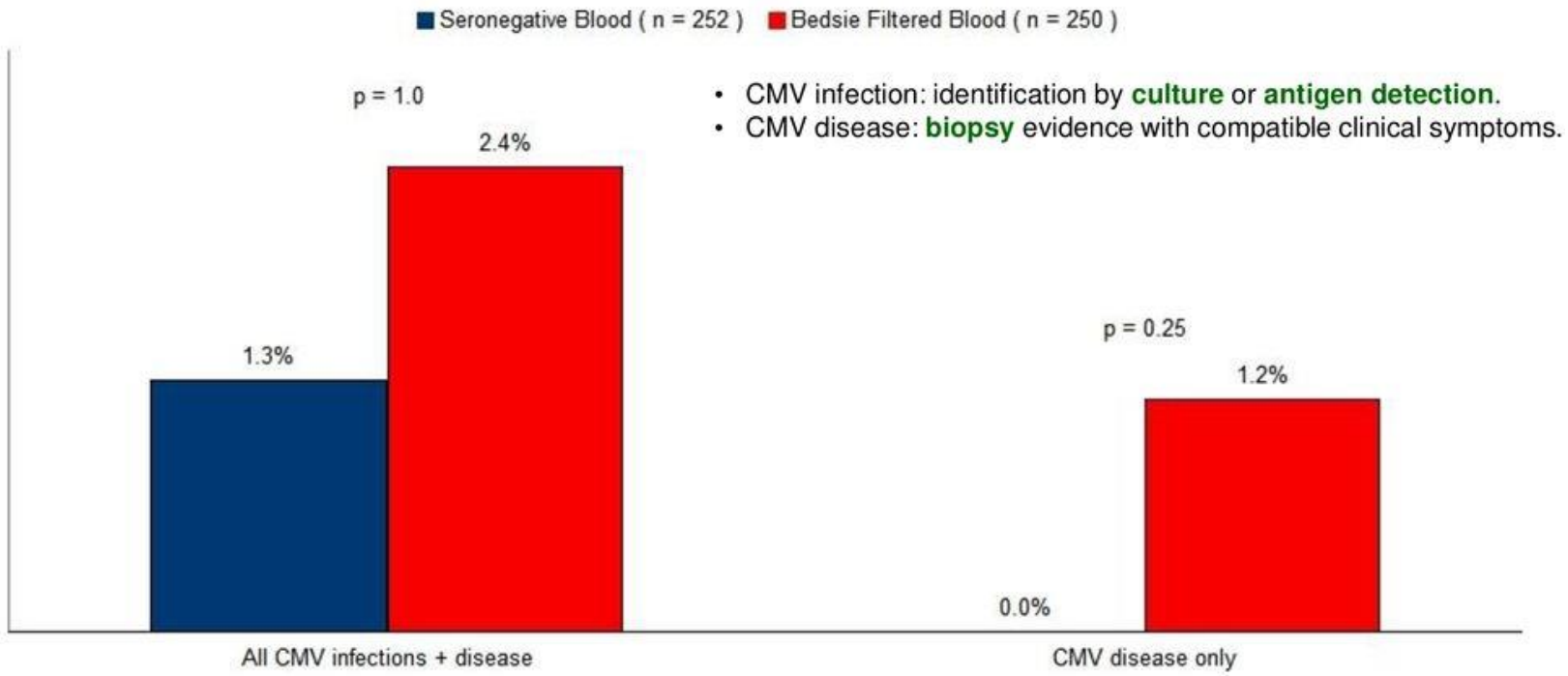
Strategies for the reduction of TT-CMV infection (2)

blood 1995 86: 3598-3603

A comparison of filtered leukocyte-reduced and cytomegalovirus (CMV) seronegative blood products for the prevention of transfusion-associated CMV infection after marrow transplant [see comments]

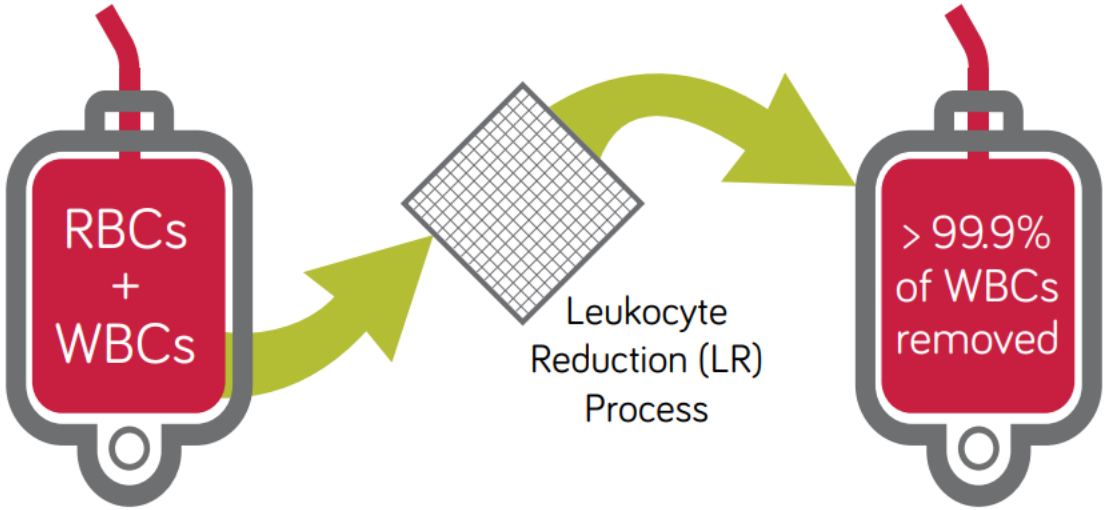
RA Bowden, SJ Slichter, M Sayers, D Weisdorf, M Cays, G Schoch, M Banaji, R Haake, K Welk and L Fisher

- The **first large RCT** demonstrated similarly low rates (<3%) of CMV infection in 502 marrow transplant recipientes:
  - **Seronegative** (n=252)
  - **Bedside filtration** (n=250)



- These results prompted the AABB to publish guidelines stating that **leukocyte-reduction** reduces TT-CMV to a level that is **at least equivalente** to that observed with the use of **CMV-seronegative componentes**.

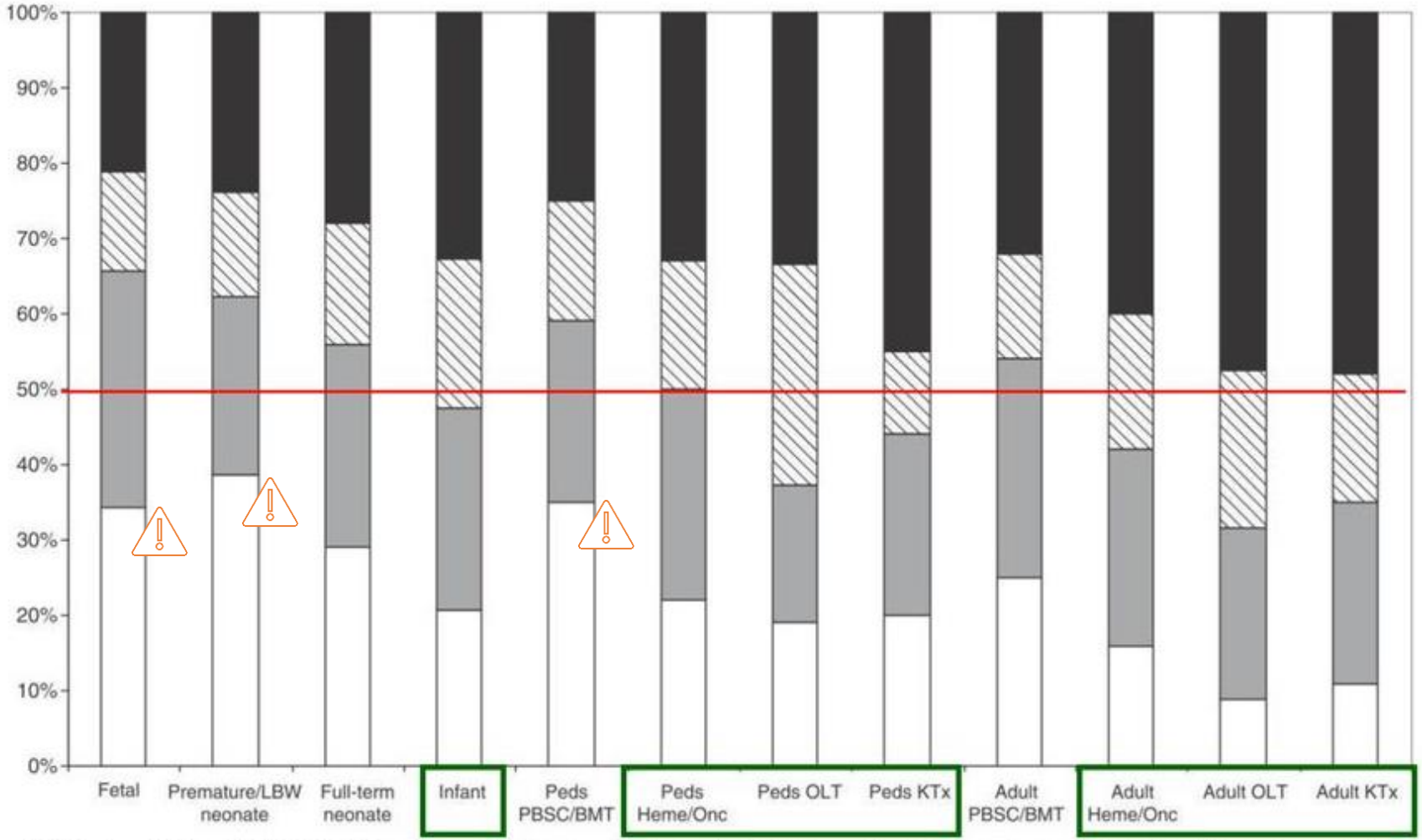
Transfusion 2010; 50(4):776-86



From the 4 observational studies where over 9000 transfusion episodes of LR only blood was given to more than 300 HSCT patients there was only 1 incident of CMV viremia and NO CMV disease.

Transfusion 2012; 52:2270-2
Transfusion 2011; 52:2620-6
ASBMT 2013; 19:1719-24
Transf Med 2015; 25(6):418-23

TxMD News. Accelerate Change. Improve outcomes. Reduce costs. Volume 19.



The **Council of Europe**, the **AABB** and the **BCSH**（British Committee for Standards in Haematology） all consider that components **leucocyte-reduced before storage** are **equivalent in safety** to those tested as **CMV seronegative**.

Although some physicians prefer to use units that test seronegative for CMV for CMV (-) hematopoietic progenitor transplantation (HPT) recipients, **neither testing nor leucoreduction eliminates transmission** and **both result in equivalently 'safe' components**.

Vox Sang 2010; 98(1):29-36

Policies related to the use of CMV-negative and leucoreduced products in 18 countries:

the **primary goal of patient safety** while **attempting to balance issues such as cost and product scarcity**

Country	Universal LR	CMV Ab testing	NICU	IUT	Pregnancy[a]	SCT[b]	Solid organ transplant[b]
Australia	Y	Y	1	1	1	1	1
Austria	Y	Y	1	4	4	1	2
Belgium	Y	Y	2	1	2	1	2
Brazil	Y	Y	2	2	4	2	2
Canada	Y	Y	2	1	1	1	2
China	Y	Y	4	4	4	4	4
Finland	Y	N	2	2	2	2	2
France	Y	Y	3	4	3	3	3 (lung only)
Germany	Y	Y	1	4	1	1	4
Hong Kong	N	Y	1	1	1	1	2
Ireland	Y	Y	1	1	1	1	1
Italy	Y	Y	1	1	1	1	2
New Zealand	Y	Y	1	1	1	2	4
Singapore	Y	N	2	2	2	2	2
Spain	Y	Y	1	4	1	2	4
Sweden	Y	Y	2	4	4	2	2
Switzerland	Y	N	4	1	1	2	2 (lung only)
UK	Y	Y	1	1	1	2	2
USA (clinical)	N	Y	2	2	2	2	2

PRBC, packed red blood cell; LRK, leucoreduced; Plt, platelet; TT, transfusion transmitted; SD, single donor; Y, yes; N, no; Ab, antibody; NICU, neonatal intensive care unit; IUT, intrauterine transfusion; SCT, stem cell transplant; CMV, cytomegalovirus; LR, leucoreduced; TT-CMV, transfusion-transmitted cytomegalovirus.

Numerical legend: 1: Provides CMV-negative and leucoreduced product; 2: provides leucoreduced product or CMV alone; 3: provides LR and either CMV-negative or pathogen-inactivated product; 4: practice unspecified or unknown.

[a]Refers to cases when mother is CMV negative.

[b]Refers to cases when recipient and donor are CMV negative.

There was a lack of consensus regarding who should receive specialized products.

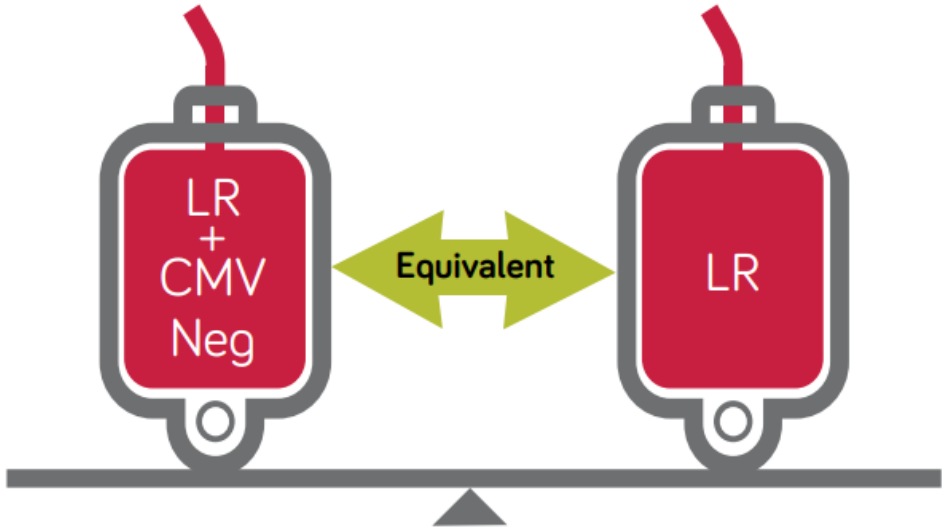
- Some countries provide products that are both CMV negative and leucoreduced for neonatal, intrauterine transfusions and pregnant mothers only;
- other sites provide CMV-negative and leucoreduced products for all risk groups,
- while other sites provide leucoreduced products alone as they do not assess donor CMV status due to the high prevalence of CMV-sero-positive blood donors locally.

Given the limited number of high-quality studies in these specialized populations, the variability in practice is not surprising.

Vox Sanguinis (2014) 107, 276–311

Summary of Recommendations:

Equivalency of Leukoreduced (LR), CMV Negative versus LR, CMV Unscreened for Blood Selection in Specific Patient Populations



Indications	LR + CMV Neg		LR, CMV Unscreened
Allo CMV Neg HSCT pts/candidates	✓		✓
CMV Neg solid organ transplant pts/candidates	✓		✓
CMV Neg pts w/ HIV	✓		✓
CMV Neg pregnant female	✓		✓
VLBW Neonates	✓		Likely

- The estimates for the probability of transmission of CMV in a pre-storage LR blood product are very low, reported at **1 in 13.5 million**.
- Since there is no current evidence that favors one strategy over the other for reducing the risk of TT-CMV in infants, it is generally believed and practiced that LR alone is adequate.

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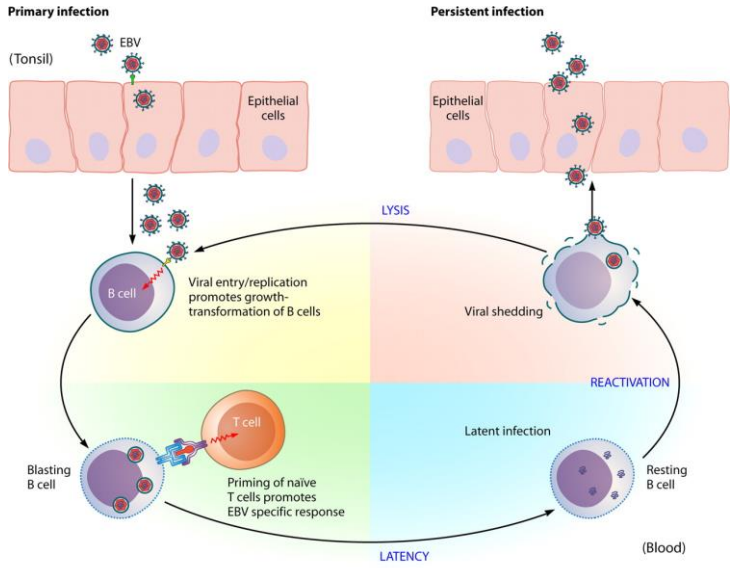
Vox Sanguinis 2015; 109:11-7

LR to prevent other infections…

VIRUS, BACTERIA, PROTOZOA

EBV

- The prevalence of **latent EBV infection** in the general population is **~90%.**
- EBV-seronegative blood transfusion recipients who are immunocompromised or immunologically naive are at risk of acquiring EBV disease.
- **LR eliminates the need to screen blood for EBV for at-risk patients**.

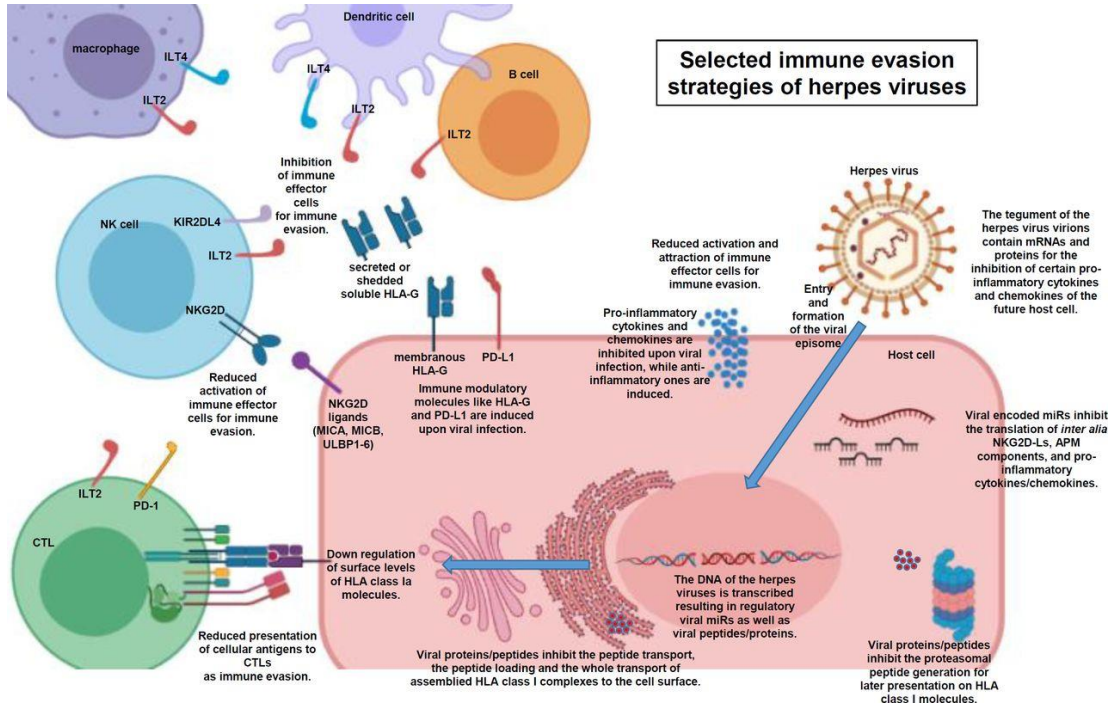


Transfus Med 1995; 5:297-302
Acta Med Scand 1969; 186:433-7
Transfusion 2005; 45:591-5

Blood 1996; 87:812-7
Ann Intern Med 1972; 77:751-3

HHV-8

- A statistically significant excess risk of **HHV-8** seroconversion (2.8%) among recipients of HHV-8–seropositive blood, compared with recipients of HHV-8–seronegative blood.
- **LR seems to be a prudent preventive measure**.

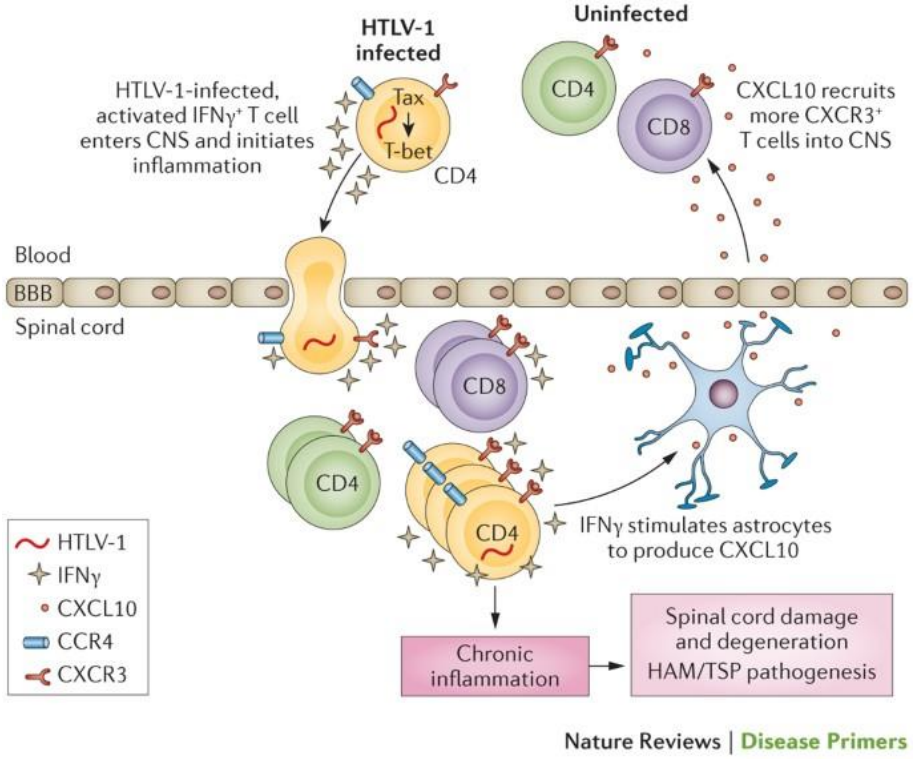


N Engl J Med 2006; 355:1331-8 and 1303-5
Lancet 1997; 350:217. N Engl J Med 2001; 344:637-43

HTLV-1

LR reduces the risk of transmission of HTLV-1 via transfusion, although this reduction does not equate to zero risk.

A marked **reduction (4.9– 5.8 log) in proviral HTLV-1 copies** in the mononuclear cells of cell components that had undergone LR.

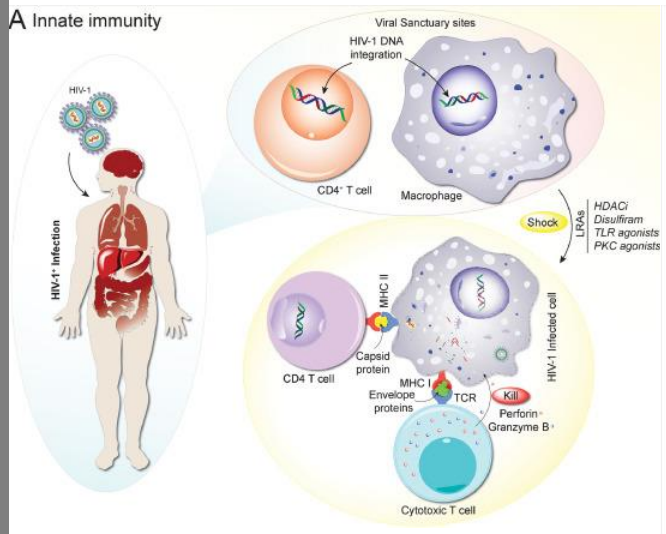


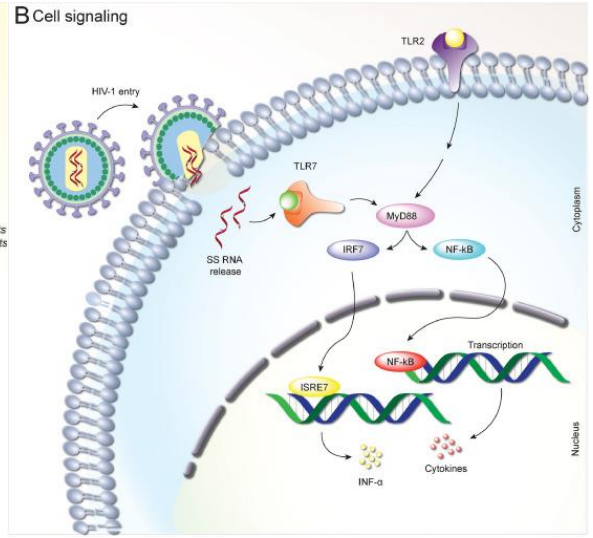
Ann Hematol 1993; 67:295-300
Blood 2003; 101:370-1

Transfusion 1998; 38:317-8
Transfusion 2004; 44:42-8

HIV

- Two studies have addressed the reduction in **HIV**-infected cells from donor blood by LR filtration (**2.5 - 5.9 log mean reduction**).
- Although **these studies do not suggest that LR eliminates or reduces the potential for HIV transmission by transfusion**, they do demonstrate the ability of the process to reduce the viral burden in blood products.





Transfusion 1989; 29:460-2
Transfusion 1990; 30:833-7

- Multiple studies demonstrated the **ability of LR filters to eliminate or markedly reduce the growth of the bacterium in processed blood**.

- Aubuchon et al. confirmed the ability of LR to remove low concentrations of **Yersínia enterocolítica**, **Escherichia coli**, **Pseudomonas putida**, and **Klebsiella pneumoniae** in both platelet concentrate and RBCs.

- Current studies indicate that a significant percentage of healthy blood donors carry **Chlamydia pneumoniae** in their blood. The clinical significance of these results is unknown; however, the eradication of these bacteria was verified in leukoreduced units through real-time PCR and immunostaining tests that identified bacteria trapped in the filter mesh.

- Waters et al., using a combination of LR filters and cell washing, were able to reduce the biological burden of surgically shed blood by 97.6%–100% when spiked with **Staphylococcus aureus**, **E. coli**, and **Pseudomonas aeruginosa** at concentrations ranging from 2000 to 4000 colony-forming units/mL. It must be emphasized that, although encouraging, no clinical evidence of this benefit currently exists.

- Dzik proposed a number of mechanisms that could explain the salutary effect of filters, including the **removal of phagocytozed bacteria**, **bacterial adherence to filter media**, and the **activation of bactericidal substances**, such as complement.

Transfusion 1993; 33:533-5
Vox Sang 1994; 66:166-70
Immunol Invest 1995; 24:95-115
J Clin Microbiol. 2005;43(9):4580-4

LEISHMANIA

- The prevalence of positive serology for visceral leishmaniasis in asymptomatic individuals has been observed in endemic areas. There are few cases in the literature pointing out to transfusion as a likely cause of transmission of this disease.
- Performance of LR immediately after blood collection or after storage for 2 weeks has been proven to **reduce the Leishmania concentration by 3–4 log**. This results in a substantial reduction in the number of both free and intracellular organisms.
- Because there is currently no donor screening for Leishmania infection, the use of **LR filters could improve the safety of transfused blood in this regard.**

TRYPANOSOMA

- Using electron microscopy, Cardo et al. observed that T. cruzi trypomastigotes are effectively removed from blood by filtration.
- The predominant mechanism appears to be the **adherence of trypomastigotes to filter fibers**.
- The **serology for Chagas' disease** research is part of blood banks routine, which is the reason why the use of filters is not necessary for this purpose.

Transfusion 2006; 46:896-902
Transfusion 2006; 46:1067-8

LR FOR PREVENTION OF TT-PRION DISEASE

- Published data suggest that LR may reduce the risk of transfusion-associated transmission of variant Creutzfeldt Jakob disease by preventing the passage of WBC-associated prions.

- Prions are infectious proteins related to a variety of progressive and fatal neurodegenerative diseases collectively referred to as transmissible spongiform encephalopathies.

- Contamination of leukocytes in the blood raises the risk of abnormal protein prion transmission, probable causative agent of the new variant Creutzfeldt–Jakob disease (CJD).

- Leukoreduction reduces up to 42% of infectivity associated with the infectious prion. Modifications of the specific affinity to prion surface have been developed to increase the filtering efficiency for this end.

- Some countries in Europe and the UK had the universal leukodepletion implemented under this risk. In Brazil, clinical screening eliminates people who were diagnosed with CJD, family history of CJD, significant stay in the UK or Republic of Ireland after 1980, who have received growth hormone or other pituitary origin not recombinant drugs, use of bovine insulin, corneal transplantation and dura mater, and those who have received transfusions of hemocomponents in the UK after 1980.

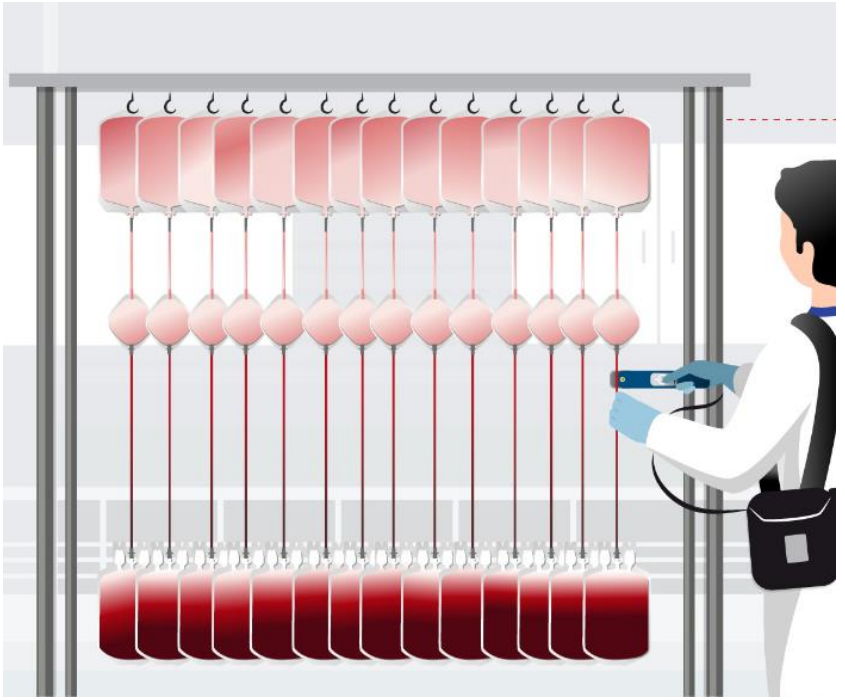
Lancet 2004; 364:529-31
Vox Sang. 2006;90(4):265-75
Transfus Med Rev. 2006;20(3):190-206.

The use of leukoreduction is a major step

to improve transfusion safety thanks to a significant

reduction of patient adverse reactions and pathogen

transmissions.



Gracias!

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