

Bacterial Screening of Platelet Concentrates

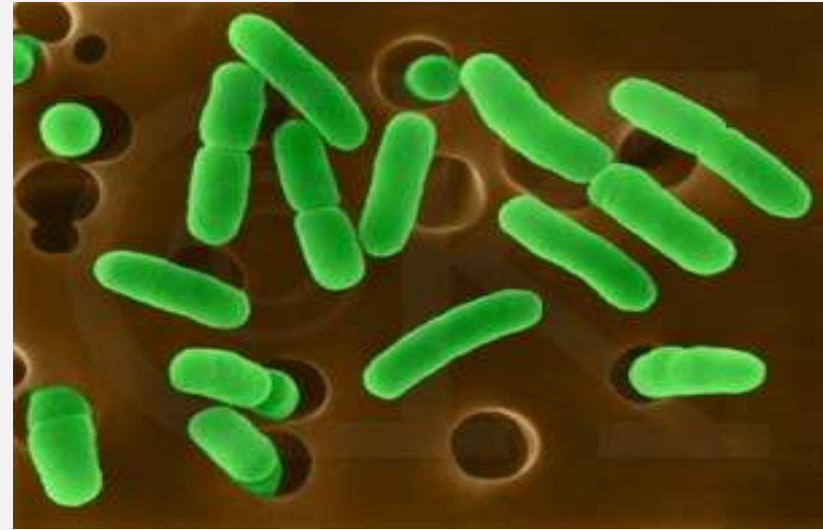
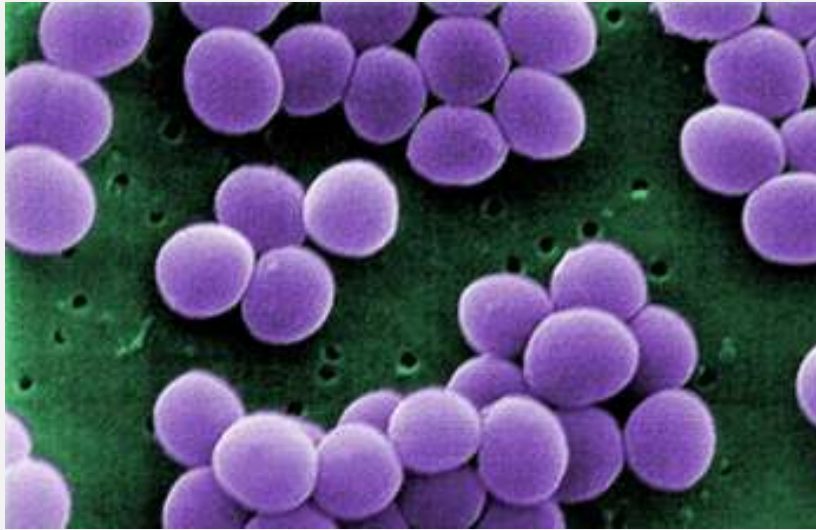
Enda Cadden

Platelet Donations

- Very Short shelf-life < 5 days
- Stored at 22°C under agitation
- ~ 25,000 Platelet units/year
- Studies by IBTS have shown that between 1 in 1000 & 1 in 3000 units are bacterially contaminated. *Murphy et al., 2008; Doherty et al 2006*

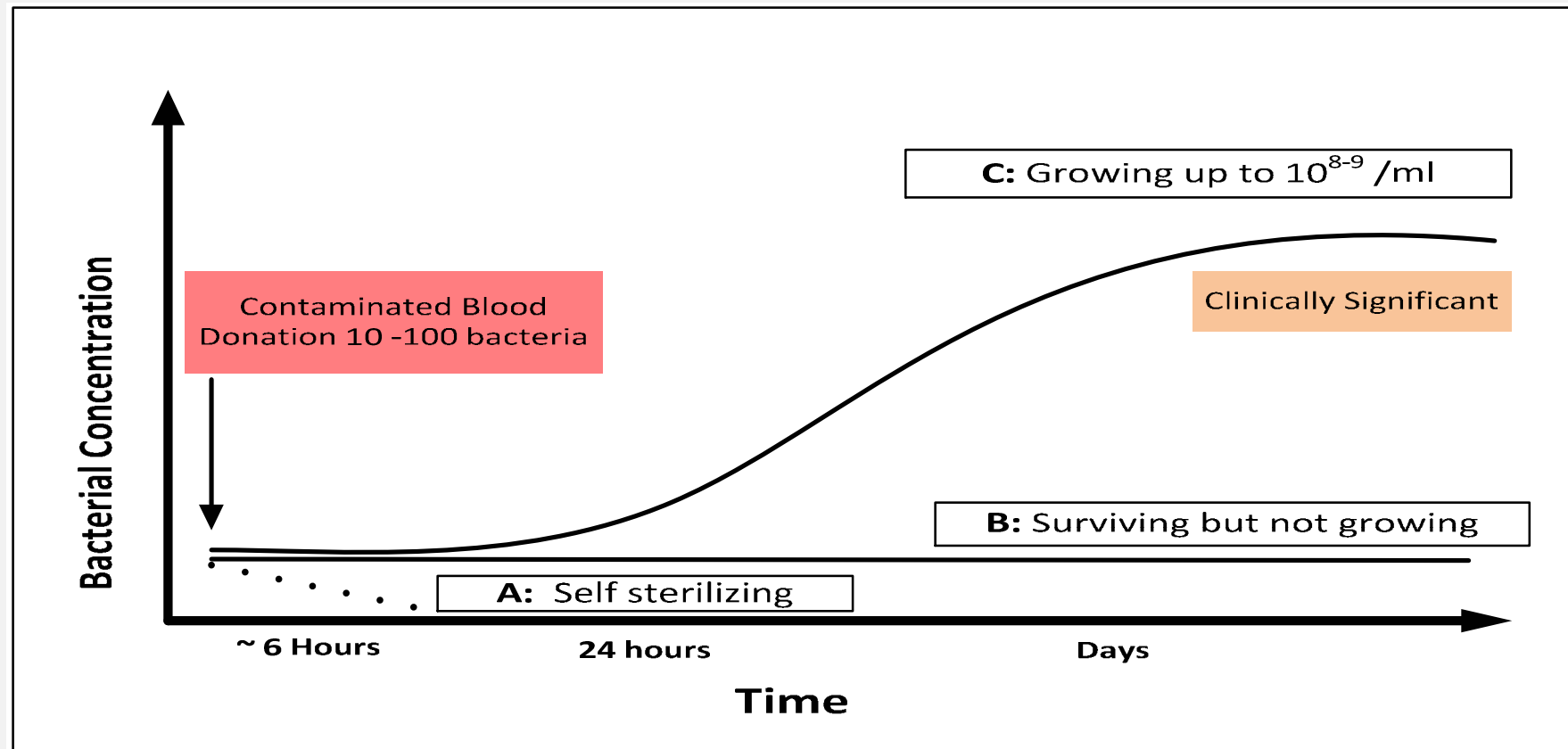


Platelet Contamination



- Main sources of bacteria are:
 - a. Contamination with bacteria present on the skin at the time of donation
 - b. Donor bacteraemia
 - c. Contamination present in blood packs

Bacterial Growth Curves in Blood



- A. Bacteria that are killed by plasma – Phagocytosis & complement activation
- B. Bacteria that can not grow in plasma – Not fully understood ? Metabolic restrictions
- C. Bacteria that multiply after an initial lag phase

Estimated Transmission Risks giveblood.ie (Ireland)

You get more than you give

- HCV 1: 15 million units
- HIV 1: 6.5 million units
- HBV 1: 1.1 million units

- Bacteria 1: 2150 Platelet units
1: 5250 Red cell units

Bacterial Sepsis Fatalities

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You get more than you give

Country	No.	Rate / PC infused	Reporting Period
Australia	1	1: 670,000	2003 - 2009
France	7	1: 209,000	2000 – 2006
Germany	8	1: 570,000	1997 – 2010
US	35	1: 430,000	2005 - 2010
UK	11	1: 340,000	1996 – 2010
Ireland	0	~200,000	2000 - 2009

UK Fatalities

Report Year	No. of Deaths	Organism involved
2009	1	<i>Pseudomonas koreensis</i>
2008	3	2x <i>Klebsiella Pneumoniae</i> ; 1x <i>Escherichia coli</i>
2006	1	<i>Klebsiella pneumoniae</i>
2001	1	<i>Bacillus cereus</i>
2000	2	1x <i>Enterobacter aerogenes</i> ; 1x <i>Staphylococcus epidermidis</i>
1999	1	<i>Yersinia enterocolitica</i>
1998	2	1x <i>Staphylococcus aureus</i> ; 1x <i>Escherichia coli</i>

Platelet Safety Measures

- Arm cleansing
 - Diversion pouch
 - Leucodepletion
 - Overnight hold (Pooled)
 - Bacterial testing
-
- Donor Notification
 - Platelet Concentrates (PC)s are usually not issued until at least 48 hours after collection

BacT/Alert® 3D Blood Culture System

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You get more than you give

Main unit (5 incubators):

- live product testing
- Continuous Alarm

Second unit (2 incubators):

- non live product samples
- Expired products,
- Recall follow up testing
- Batch acceptance etc.

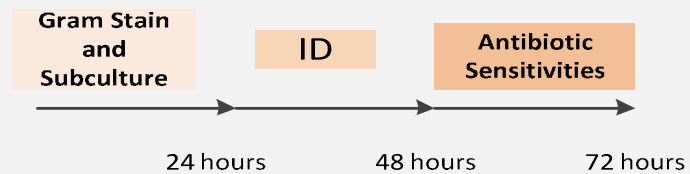


Platelet Screening Programme

- Bacteriological screen on all platelets since Dec 2004 (NBC) and April 2005 (MRTC)
- Apheresis Platelets - tested Day 1, minimum 12 hours after donation.
- Pooled Platelets - tested Day 2, minimum 12 hours after pooling.
- Platelets for extension to 7 days - also sampled on Day 4.
- 1% of platelets that have not been issued are tested at expiry.

Testing / ID Matrix

Identification Matrix



Testing Matrix

Pooled Platelet



Apheresis Platelet



Day 0

Day 1

Day 2

Day 3

Day 4

Day 5

Day 6

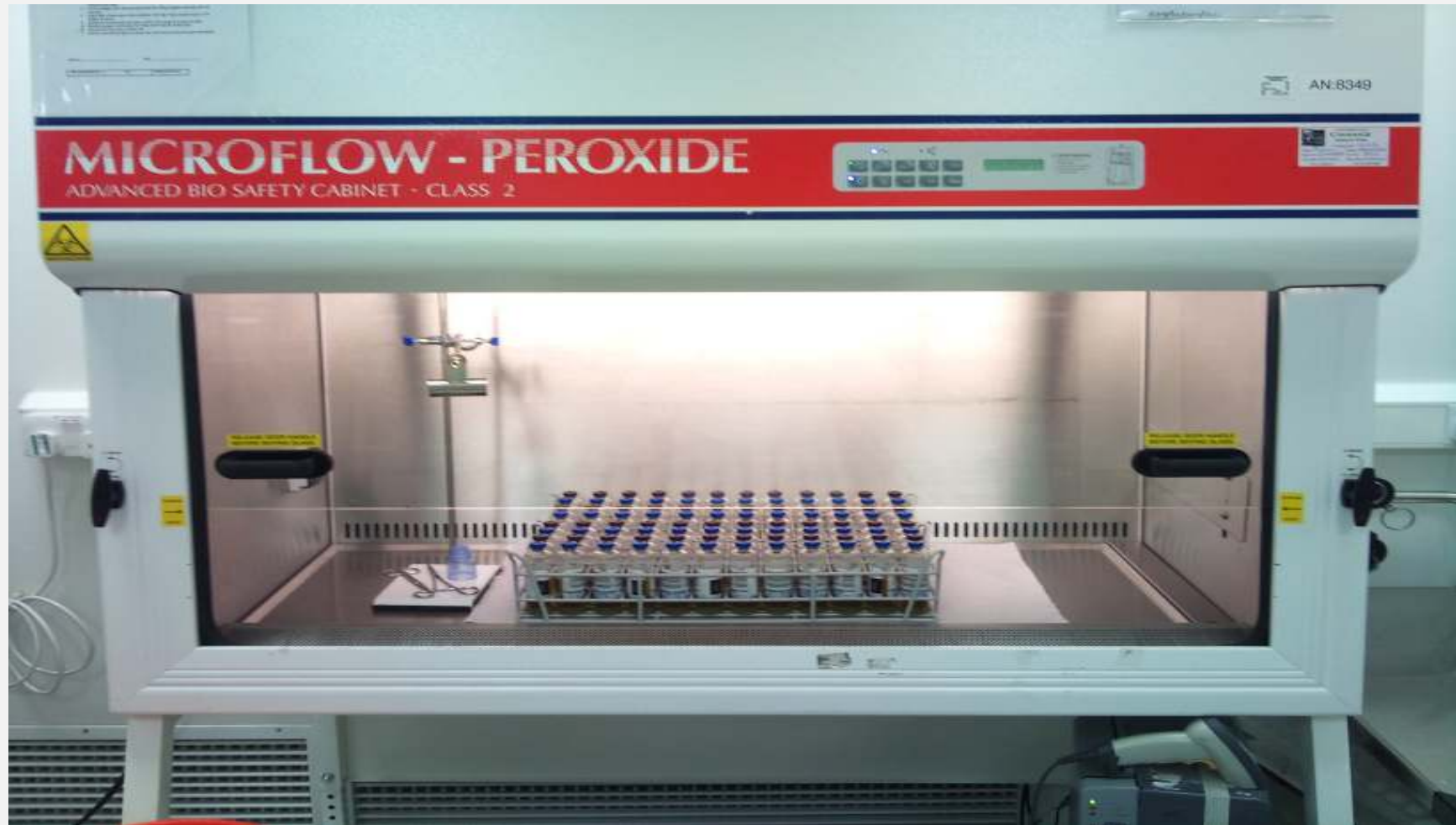
Day 7

Day 8

Time

Platelet Sampling

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You get more than you give



7.5ml of PC into BPA and BPN BacT Alert bottles

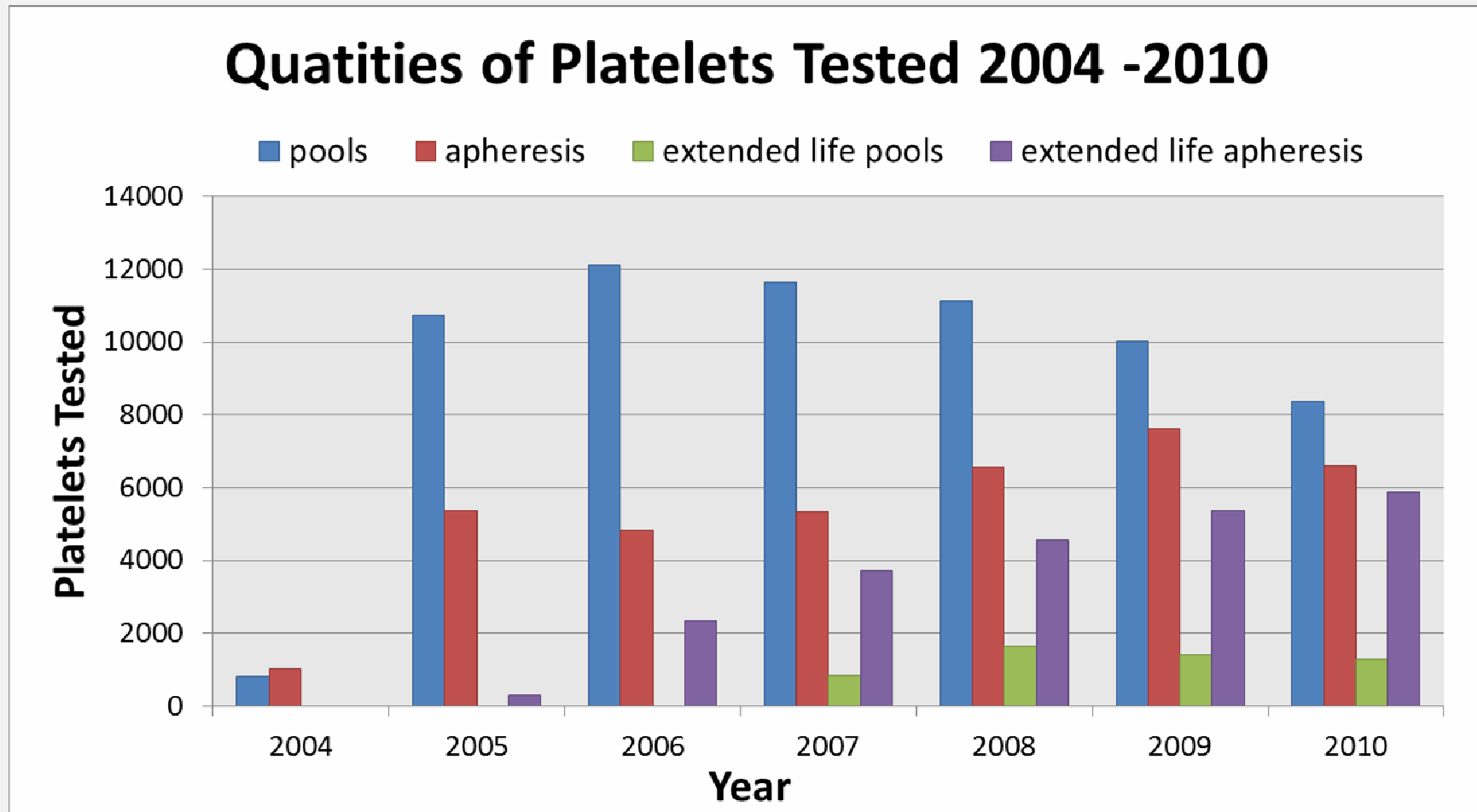
Incubation:



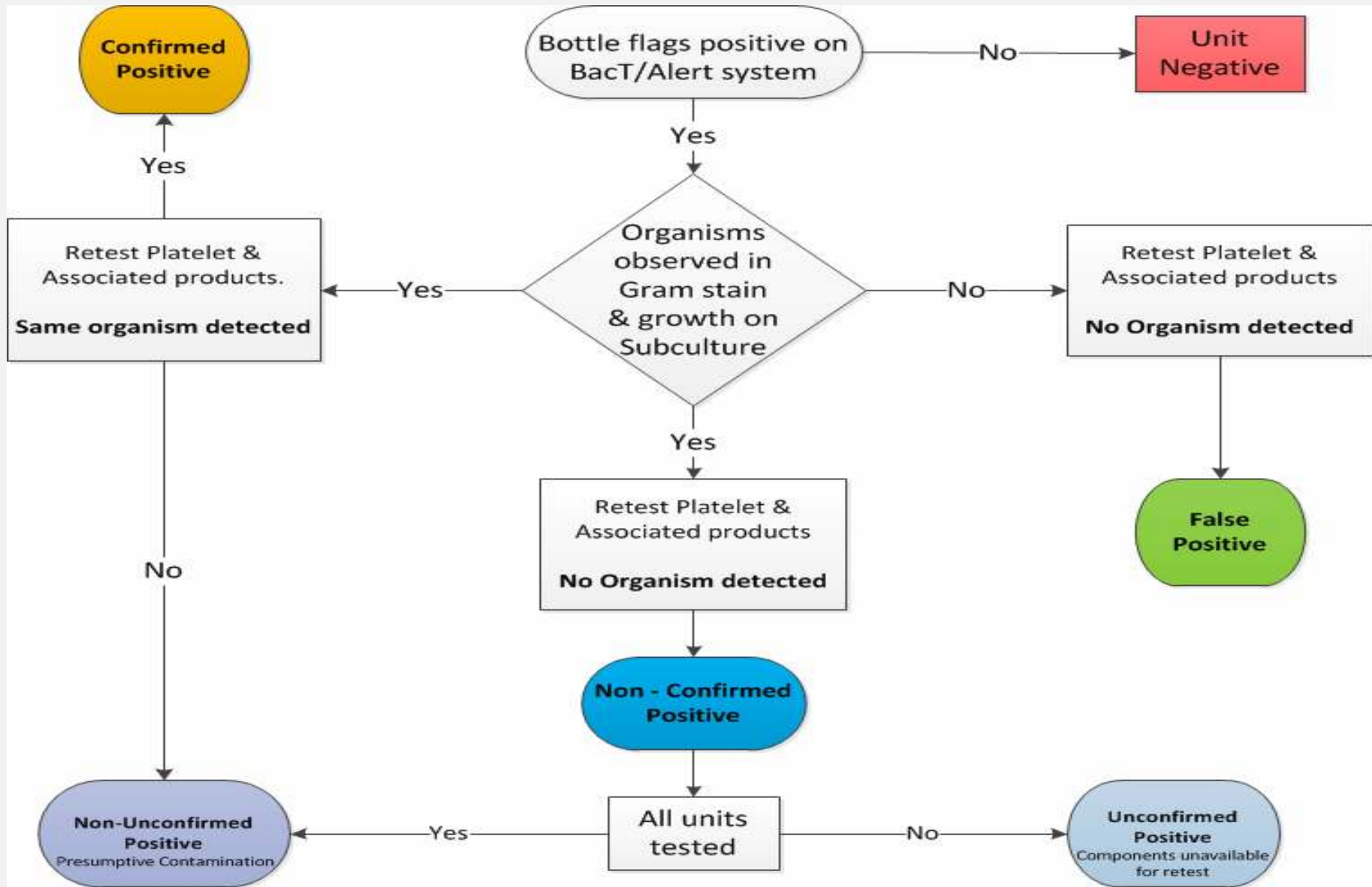
- **4 days:** Pooled and extended life
- **5 days:** Apheresis

Product available for issue once loaded & released

Platelets Tested 2004 – 2010



Classifications



Detection Capability:

Day 1 v Day 4 results

Confirmed Results (2004 – Aug 2011 NBC)

	Pools			Apheresis		
	Quantity tested	Quantity Positive	Rate %	Quantity tested	Quantity Positive	Rate %
Day 1	59509	41	0.069	40157	16	0.035
Day 4	6170	5	0.081	26242	1	0.004
Overall Rate			0.150	Overall Rate		0.039
% Effectiveness			46 %	% Effectiveness		90 %

Detection Capability: Day 1 v Expired results

Confirmed Results (2004 – Aug 2011 NBC)

	Pools			Apheresis		
	Quantity Tested	Quantity Positive	Rate %	Quantity Tested	Quantity Positive	Rate %
Day 1	59509	41	0.069	40157	16	0.035
Expiry (Day 6 or 8)	5293	4	0.076	3479	2*	0.057
Overall Rate			0.145	Overall Rate		0.092
% Effectiveness			48 %	% Effectiveness		38%

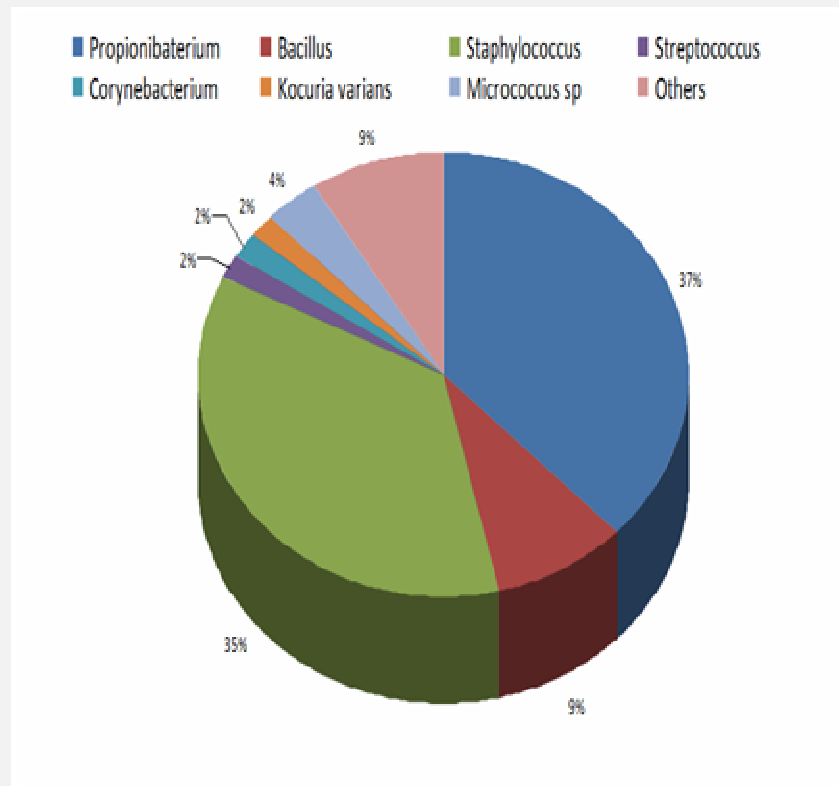
***Note:** Both occurred in 2005 prior to introduction of 7-day extension.
Since then effectiveness = 100%

Mean Times to Detection

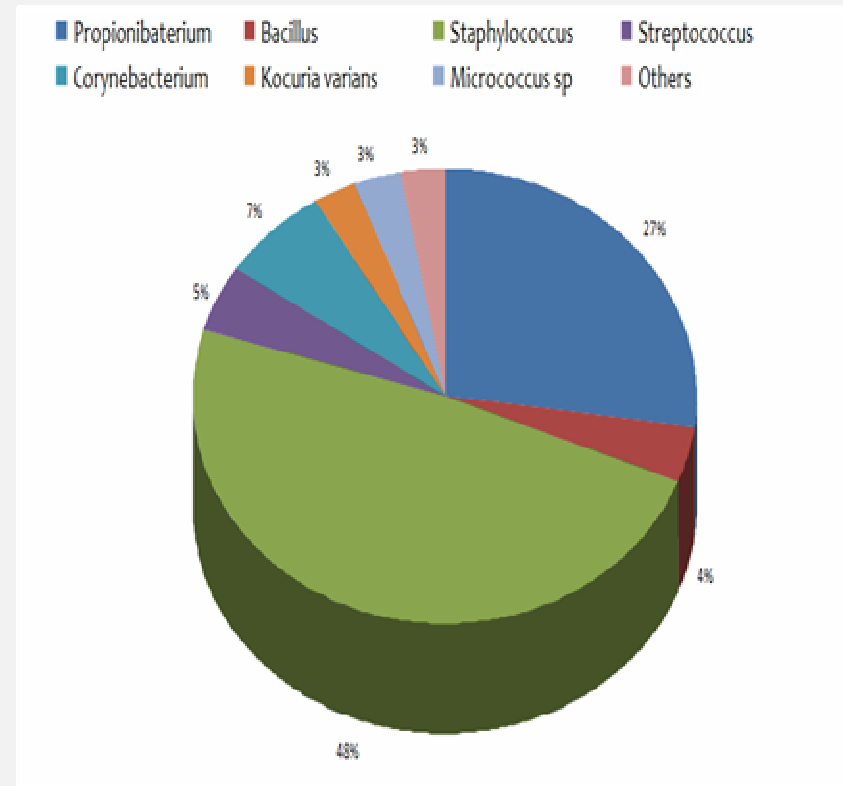
- *Bacillus sp.* 24 hours
 - *Staphylococcal sp.* 27 hours
 - *Streptococcal sp.* 34 hours
 - *Micrococcus luteus* 47 hours
 - *Kocuria varians* 56 hours
 - *Corynebacterium sp.* 87 hours
 - *Propionibacterium sp.* 97 hours
 - Others 24 hours
- *E. coli, Listeria, Proteus, Bacteroides, Klebsiella*

Bacteria Isolated from 2005 - 2011

Apheresis Platelets



Pooled Platelets



Positive Blood Cultures

- Precautionary recalls
- Perform Gram stain and subculture on to
 - Columbia Blood, Columbia Chocolate & SDA
- Isolate ID & sensitivities
- Isolate frozen and stored
- Retest platelet &/or any associated products

Recall Procedure

- Quality Department (7 am – 7 pm)
 - Rees Alarm
- Initial Hospital Contact
 - Telephone lab followed by fax
- Positives with an infused platelet or associated product sent to referral lab
 - St. James (NBC); Bon Secours (MRTC)

Recall Procedure II

- Inform IBTS medical staff and they liaise with the Hospital
 - Gram stain, Subculture, IDs, Antibiotic Sensitivities
- Retest platelet &/or associated products
- Notification Letter
 - Consultant Haematologist / Patients Consultant

Thank You