



KEMENTERIAN
KESEHATAN
REPUBLIK
INDONESIA



WEBINAR

RSUP Dr. SARDJITO





WEBINAR

Advantages of Apheresis Blood Component

Hans Vrielink, MD, PhD
Sanquin Blood Supply, The Netherlands

Swirling Test

Dr. dr. Teguh Triyono, M.Kes, Sp.PK(K)
KSM Patologi Klinik/Unit Pelayanan
Transfusi Darah, RSUP Dr Sardjito/FK UGM

<http://rebrand.ly/webinardarah>

Sabtu, 29 Februari 2020
09⁰⁰ – 10³⁰





KEMENTERIAN
KESEHATAN
REPUBLIK
INDONESIA



SWIRLING TEST

Teguh Triyono
Dept of Clinical Pathology
Faculty of Medicine Gadjah Mada University/ Sardjito Hospital
Yogyakarta Indonesia

Platelet Storage Lesions (PSL)

- The PC undergo **biochemical, structural and functional changes**
- Have a **negative impact** on the post-transfusion functional capacity of platelets.

SWIRL: Meaning Of

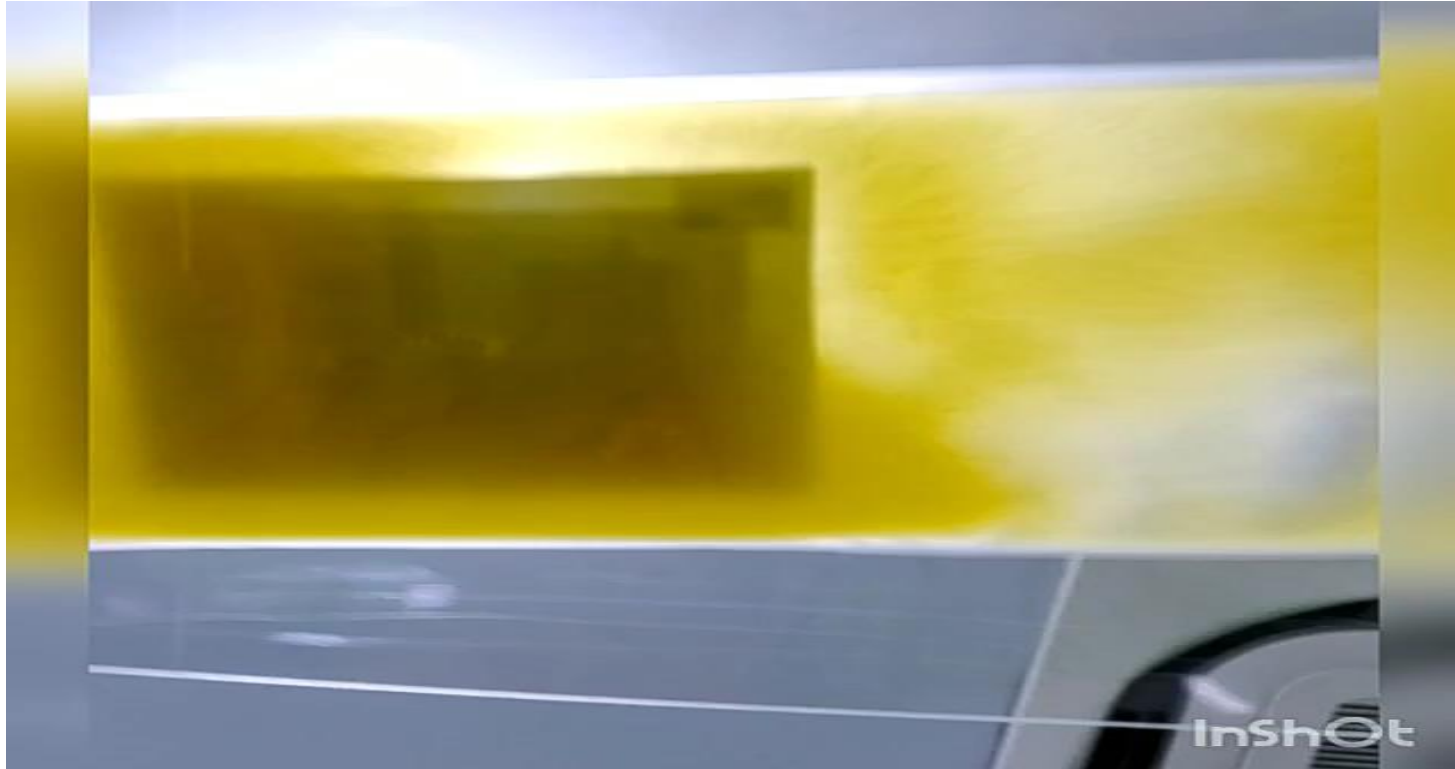
- the act of moving quickly with a twisting, circular movement

“The truck went by in a swirl of dust”

Bashier et al. 2014



KEMENTERIAN
KESEHATAN
REPUBLIK
INDONESIA



Mitra Terpercaya Menuju Sehat

www.sardjito.co.id

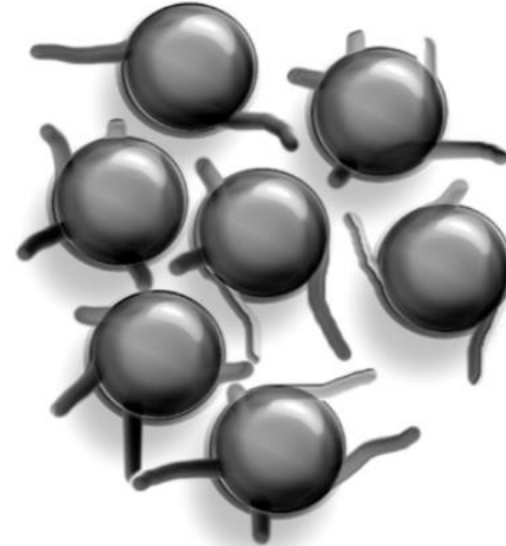


A



SWIRL

B



NO SWIRL

Maurer-spurej And Chipperfield, 2007

SWIRL: Grade

- **Score 0:** Homogen turbid and is not changed with pressure.
- **Score 1:** Homogen swirling only in some part of the bag and is not clear.
- **Score 2:** Clear homogenic swirling in all part of the bag.
- **Score 3:** Very clear homogen swirling in all part of the bag.

Swirling

- The presence of the swirling phenomenon is useful to define platelet concentrates that are **suitable for transfusion**.
- If it is possible to identify donor-related factors which are related to persisting swirling during storage, it is possible to **select platelet donors**.
- The platelets that retain the **discoid shape in vitro** at the time of transfusion are expected to be **functional in vivo**.

Hervig et al., 1999; Mathai et al., 2006

Swirling

- The extent of platelets with discoid shape can be qualitatively estimated by using the **non-invasive** technique of platelet swirling

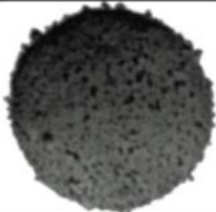
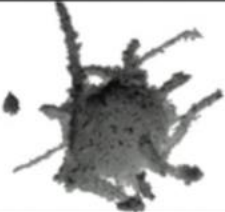
Wagner & Robinette, 1996

Swirling

- Can also be considered as a good test for determination of **shape change**
- Its absence is highly **predictive** of poor post-transfusion increments

Bertolini et al., 2014

- Visual inspection of swirling constitutes a simple and reliable evaluation of platelet concentrates during storage.
- Swirling is highly significantly correlated with the **pH** of the medium (Wagner *et al.*, 1996), and swirling correlates with an ***in vitro* analogue, proportion of spherical (shape-changed) platelets** (Holme & Murphy, 1978; Holme *et al.*, 1997)

<i>In vitro</i> Measure					Correlation with Transfusion Outcome
	Fresh	Old			
Morphology			Morphology Score	↓ (21,30,36,37)	+++ (16,38)
			Swirl	↓ (28,36)	++ (39)

Maurer-spurej And Chipperfield, 2007

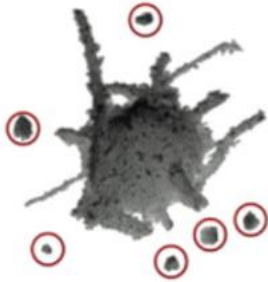
SWIRLING: PAS vs w/o PAS

Platelet storage days	Without PAS (%)				With PAS (%)			
	Score 0	Score 1	Score 2	Score 3	Score 0	Score 1	Score 2	Score 3
Day 0	0 (0)	0 (0)	3 (19)	13 (81)	0 (0)	0 (0)	2 (13)	14 (87)
Day 3	0 (0)	0 (0)	16 (100)	0 (0)	0 (0)	0 (0)	16 (100)	0 (0)
Day 5	0 (0)	1 (6)	15 (94)	0 (0)	0 (0)	0 (0)	16 (100)	0 (0)
Day 7	0 (0)	3 (19)	13 (81)	0 (0)	0 (0)	0 (0)	16 (100)	0 (0)
Day 8	0 (0)	16 (100)	0 (0)	0 (0)	0 (0)	0 (0)	16 (100)	0 (0)
Day 9	16 (100)	0 (0)	0 (0)	0 (0)	0 (0)	2 (13)	14 (87)	0 (0)
Day 10	16 (100)	0 (0)	0 (0)	0 (0)	0 (0)	4 (25)	12 (75)	0 (0)

PAS=Platelet additive solutions

Bashier et al. 2014

- **BC-PC and PRP-PC units were comparable in terms of swirling, volume, platelet count per unit, WBC contamination and pH.**
- **Apheresis-PC units showed better swirling and platelet count.**



PMPs: Platelet Derived Microparticles

- indicators of **platelet activation**
- carry platelet-specific antigens such as **glycoprotein IIb-glycoprotein IIIa and glycoprotein Ib**
- may have clinical importance because they **express procoagulant** phospholipids and could enhance coagulation and/or thrombosis

Maurer-spurej And Chipperfield, 2007

SWIRL: Limitations

- Hardly has **any dynamic range**,
- is prone to **subjectivity**,
- and does not entirely or necessarily correlate with **other platelet (quality) markers**.

Raturi, *et al.* 2017

TERIMA KASIH