EFFECT OF CENTRIFUGE TYPE & ROTATION DYNAMICS ON PRF GENERATION

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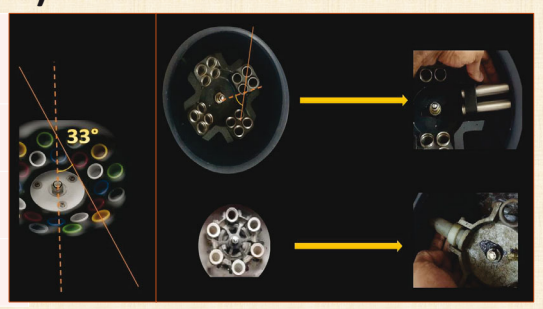
INTRODUCTION: STANDARD PROTOCOL FOR L-PRF IS 2700 RPM 12 MINUTES ~400g 33°[1], BUT THERE IS EXTREME VARIABILITY AMONG CENTRIFUGES WHEN IT COMES TO TUBE ANGULATION AND CENTRE-OF-CENTRIFUGE TO TUBE DISTANCE[2] (Table 1).

Table 1	Max G force	Max RPM	Angulation	Radius from axis
DUOS	2490	4500	33	11
Remi 8C	5070	6000	90	12.5
Remi C854	1600	3500	90	13



THE G-FORCE AT 2700 RPM IS CLEARLY IN EXCESS OF THE 400g RECOMMENDED IN THE LITERATURE[1] (Table 2). ONE SIZE CLEARLY DOESN'T FIT ALL, PLUS AN UNKNOWN FACT THAT THE RPM CAN BE ADJUSTED TO THE G-FORCE REQUIRED[2] AS PER THE FORMULA

G FORCE= 1.12 X CENTRE-OF-CENTRIFUGE TO TUBE DISTANCE X $(RPM/1000)^2$

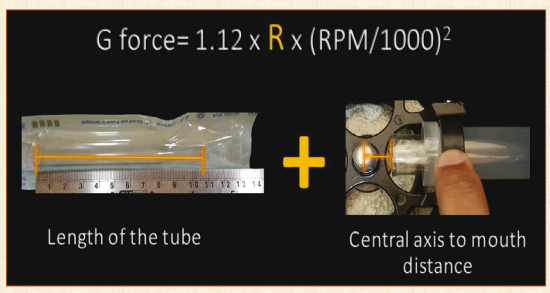


Table 2	G force at 2700 rpm	Adjusted RPM for 400g force
DUOS	898	NOT RECOMMENDED BY MANUFACTURER
Remi 8C	1020	1690
Remi C854	1061	1650

OBJECTIVES: COMPARE OPTICAL DENSITY (OD) AND FIBRINOGEN CONTENT OF PRF BY STANDARD PROTOCOL (2700 RPM/12MINS) VS ADJUSTED PROTOCOL (1650 RPM/12MINS)

METHODOLOGY[3,4]

15 CLOTS determination of fibrinogen (Cstd) by dry clot method
Standard fibrinogen (mg/ml) = (weight of clot (mg) X 10) / 250

DUOS (+ CONTROL) 30 PRF CLOTS

15 CLOTS Photometric evaluation by reading OD (Astd) value in a spectrophotometer (Systronics 1203®, Ahmedabad, India) at 570 nm

C854 15 PRF Standard
15 PRF Revised

OD Value= (Atest)

8C 15 PRF Standard
15 PRF Revised

Determination of fibrinogen (Ctest) = (Atest×Cstd)/Astd

RESULTS

STANDARD PROTOCOL		Mean	SD	F value	P value
OPTICAL DENSITY	C854	1.07	0.79	2.596	.086
	REMI8C	2.04	2.72		
	DUOS	0.73	0.23		
FIBRINOGEN	C854	34.54	25.57	1.384	.262
	REMI8C	29.85	23.91		
	DUOS	22.29	4.04		

	Mean	SD	t value	P value
OD C 854				
Standard	1.07113	0.795078	0.096	0.0924
Revised	1.12013	1.813317		
OD Remi8C				
Standard	2.04940	2.720886	1.321	0.197
Revised	1.09213	0.689743		
FIBRINOGEN C 854				
Standard	34.54198	25.577454	1.754	0.090
Revised	20.48585	17.577644		
REMI 8C				
Standard	29.8598	23.91254	0.657	0.516
Revised	35.4160	22.36728		

CONCLUSION: 1) No significant differences across all centrifuges. 2) Laboratory centrifuges resulted in a denser clot and higher fibrinogen content over fixed angle centrifuge (DUOS). 3) C854 resulted in higher fibrinogen content and less dense PRF over Remi 8C; however, revised protocol resulted in Remi 8C producing PRF with the highest fibrinogen content.

REFERENCES: 1. Pinto NR et al: The impact of the centrifuge characteristics and centrifugation protocols on the cells, growth factors and fibrin architecture of a Leukocyte- and Platelet-Rich Fibrin (L-PRF) clot and membrane. POSEIDO 2014, 2, pp. 141-154.
2. Dohan Ehrenfest DM et al: Classification of platelet concentrates (Platelet-Rich Plasma-PRP, Platelet-Rich Fibrin-PRF) for topical and infiltrative use in orthopaedic and sports medicine: current consensus, clinical implications and perspectives. Muscles Ligaments Tendons Journal 2014, 4, pp. 3-9.
3. Wolberg AS: Analyzing fibrin clot structure using a microplate reader. Blood Coagulation & Fibrinolysis 2002, 13, pp. 533-9.
4. Behera S et al: UV-Visible Spectrophotometric Method Development and Validation of Assay of Paracetamol Tablet Formulation. Journal of Analytical Bioanalytical Techniques 2012, 3:151. doi:10.4172/21559872.1000151.