Platelet

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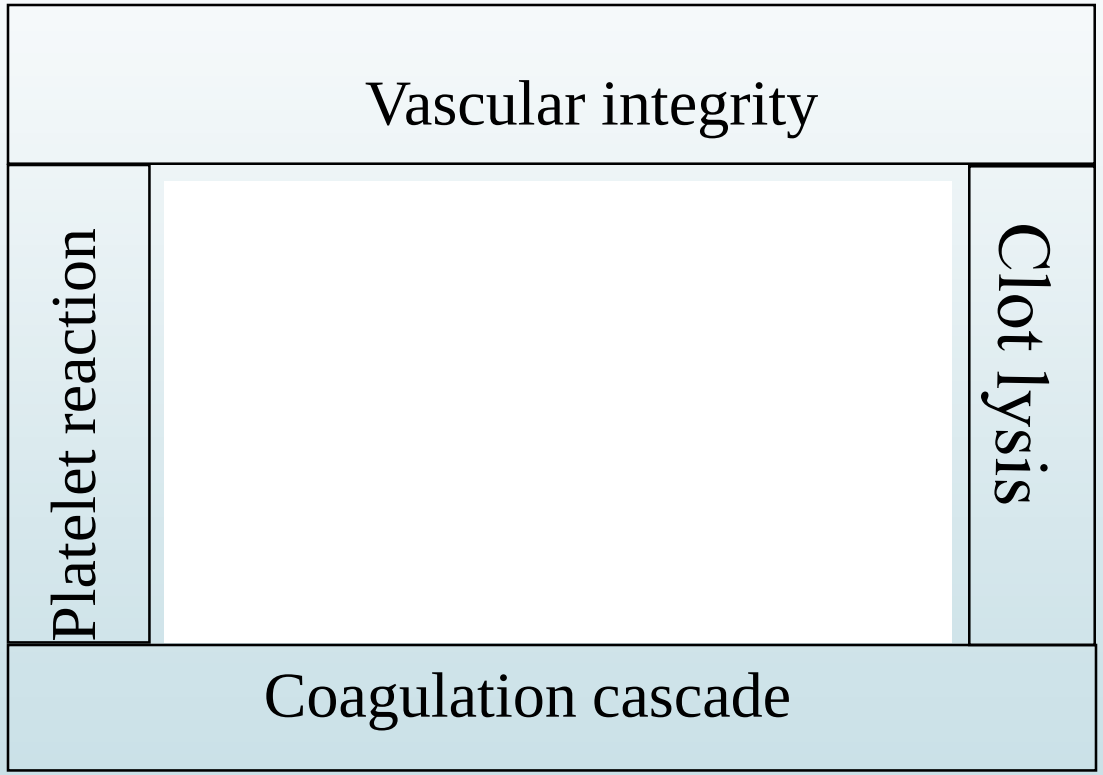
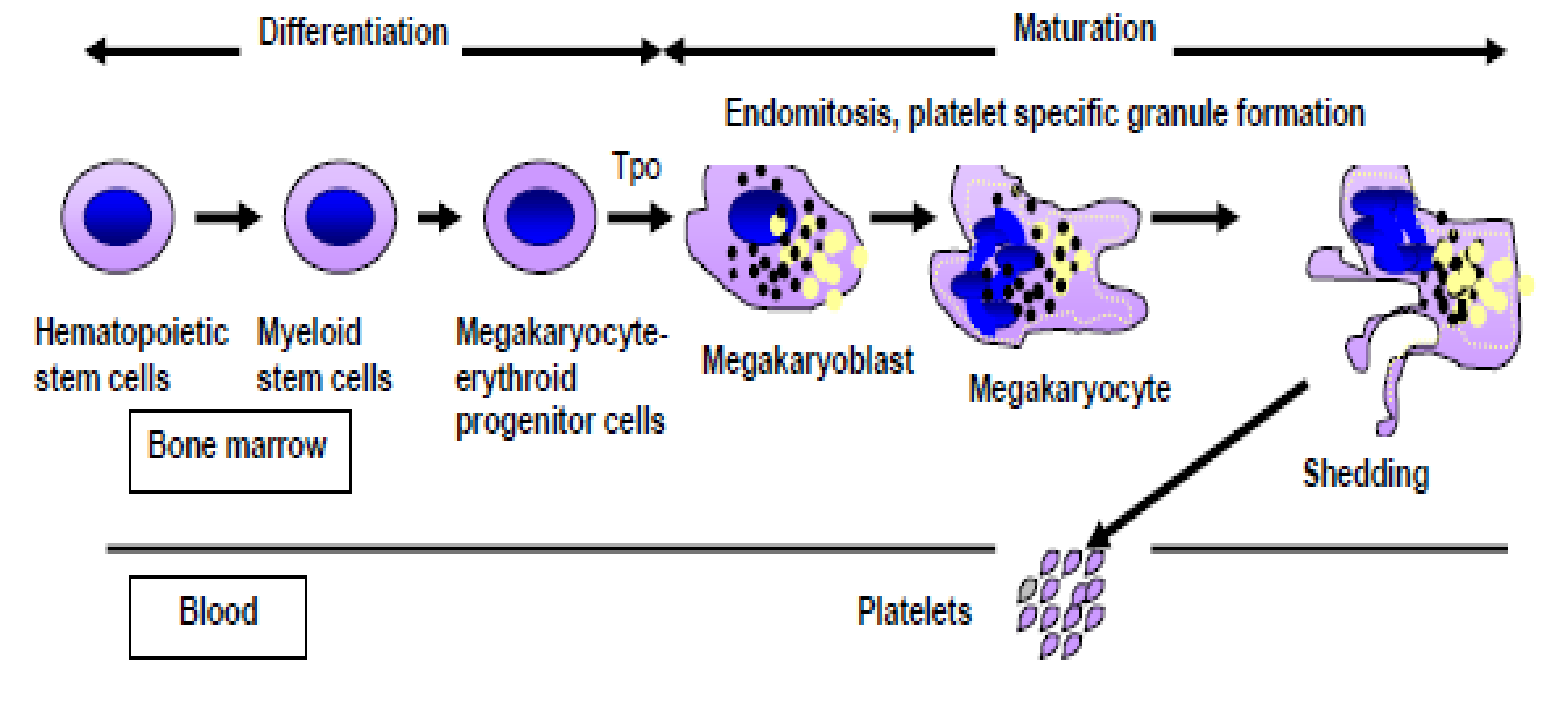
Hemostasis


Vascular integrity
Platelet reaction
Clot lysis
Coagulation cascade

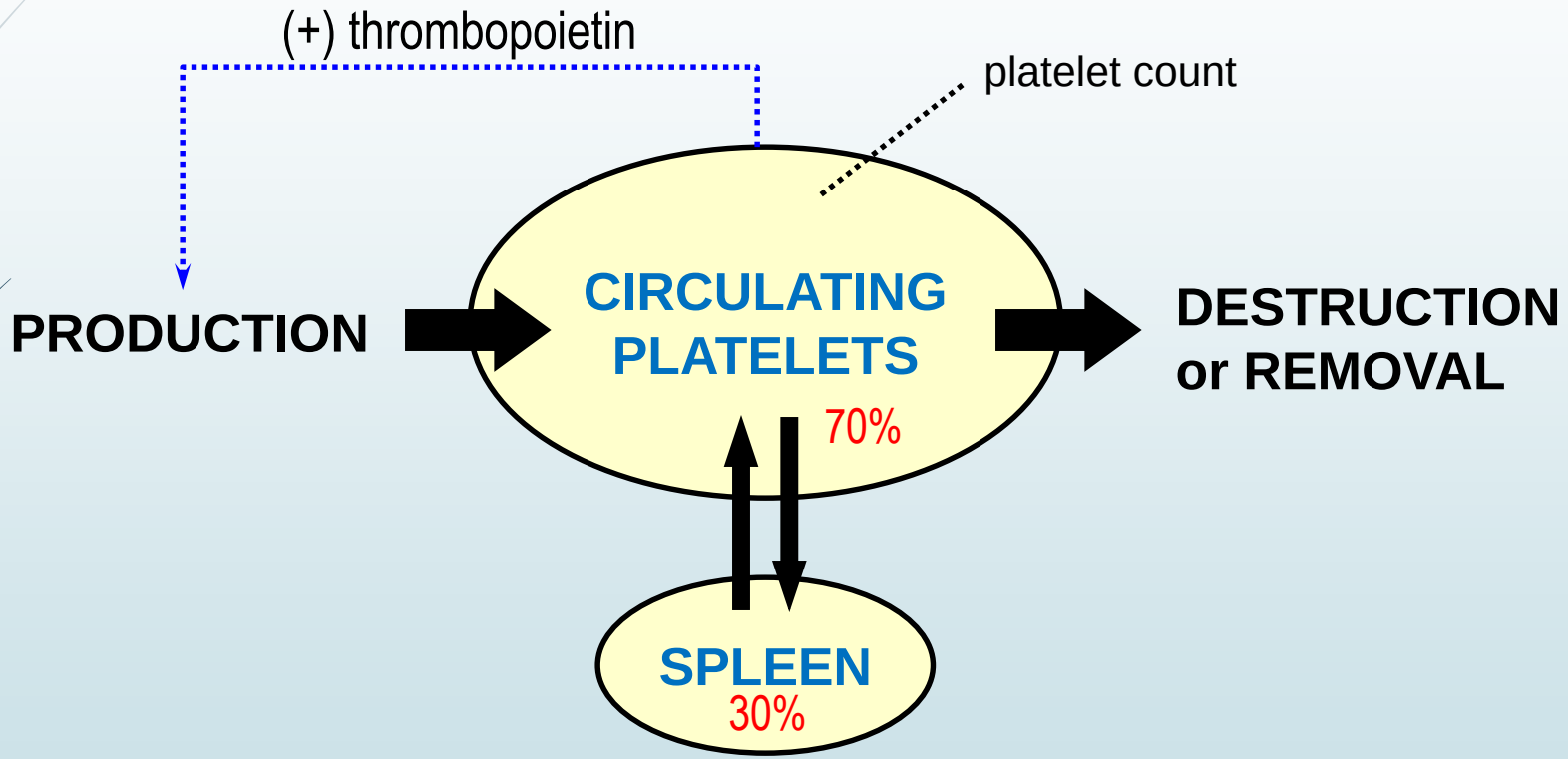
Thrombocytopoiesis



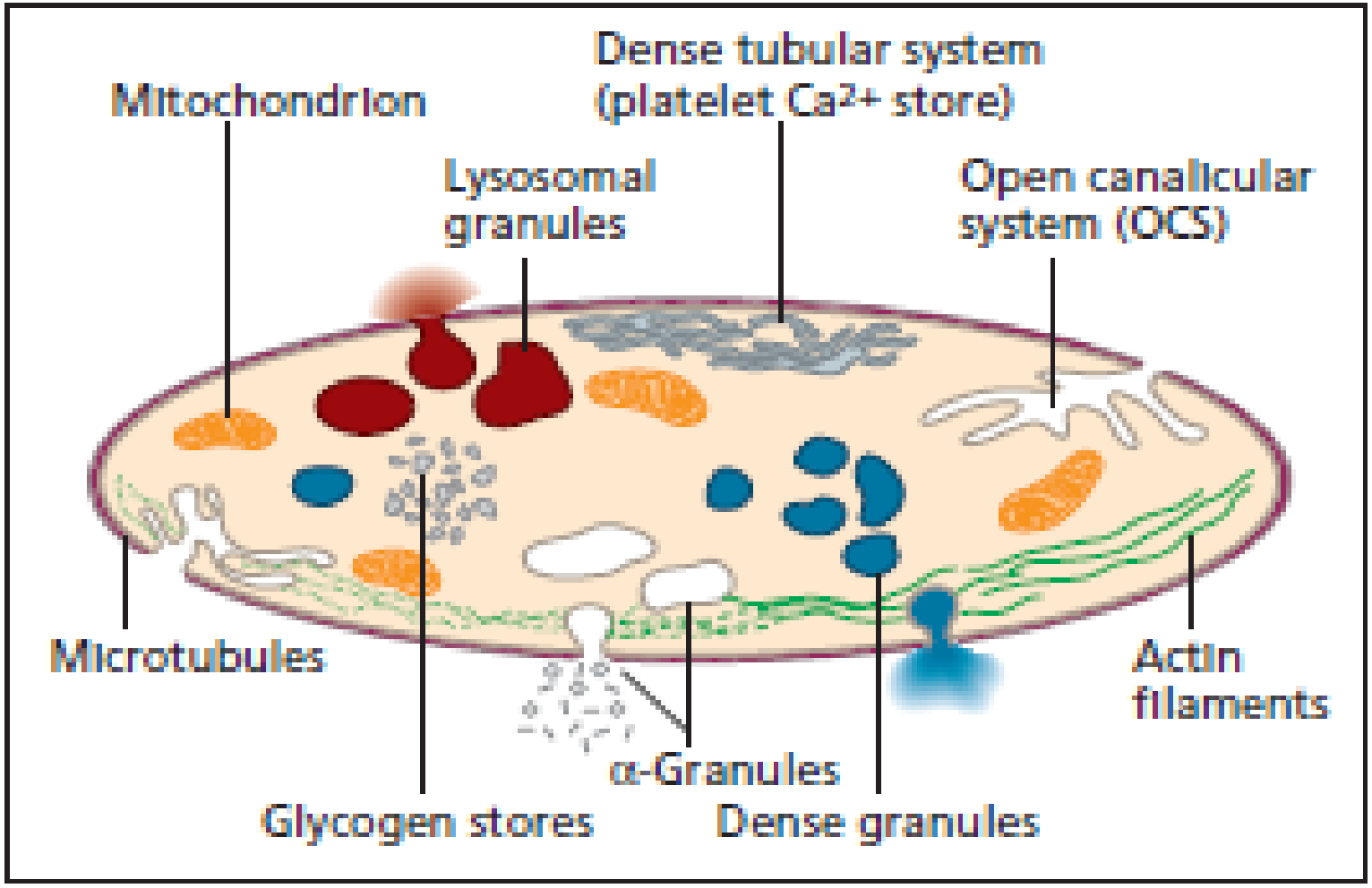
Platelet

- also called **thrombocytes**
- Platelets have no cell nucleus
- Circulating unactivated platelets are biconvex discoid
- Low platelet concentration is called thrombocytopenia
- Elevated platelet concentration is called thrombocytosis
- inappropriate platelet adhesion/activation and thrombosis
- normal range : 150,000 to 450,000 /µl or 150–450 × 10^9 per liter
- Each megakaryocyte produces between 1,000 and 3,000 platelets

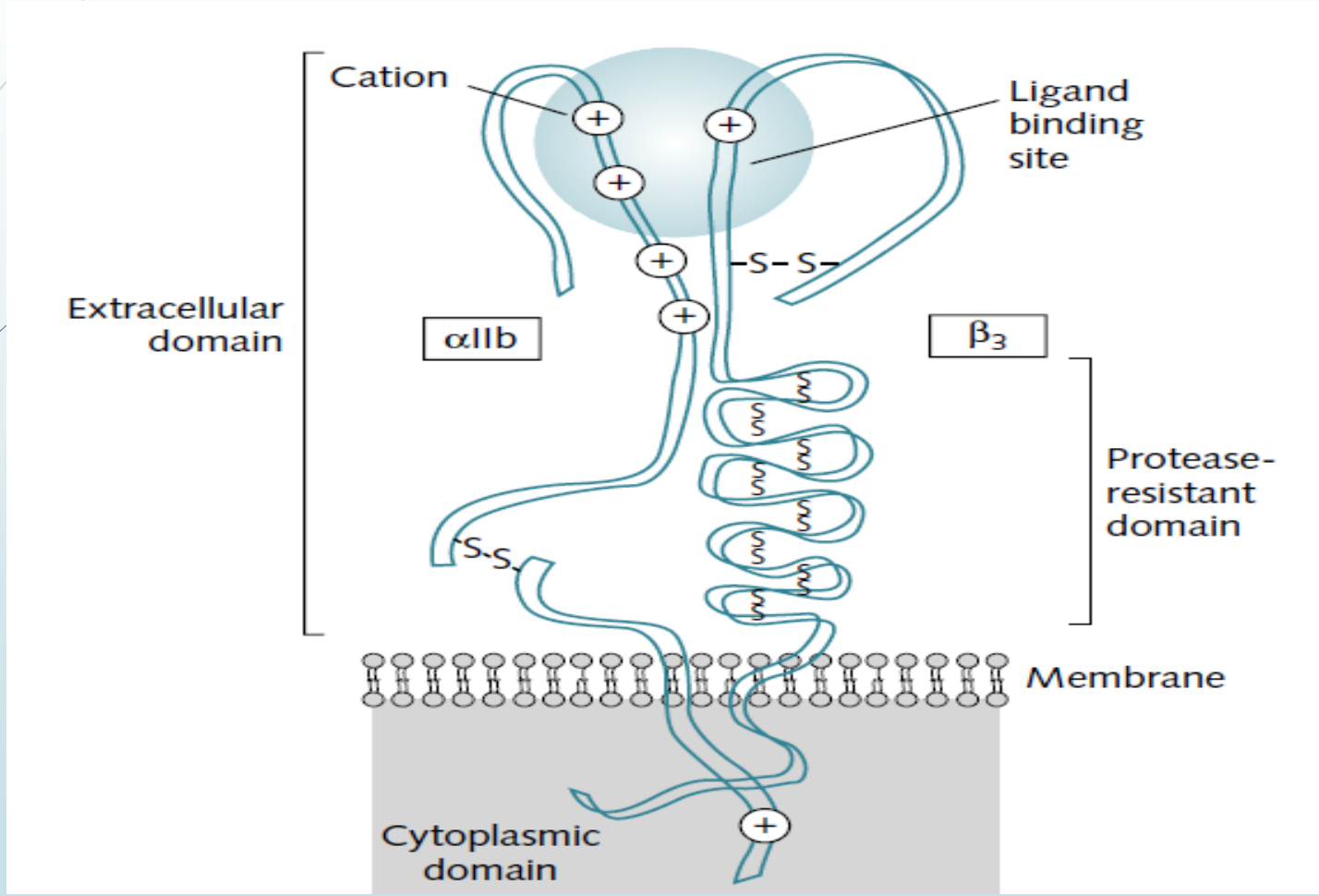
Platelets in the circulation:



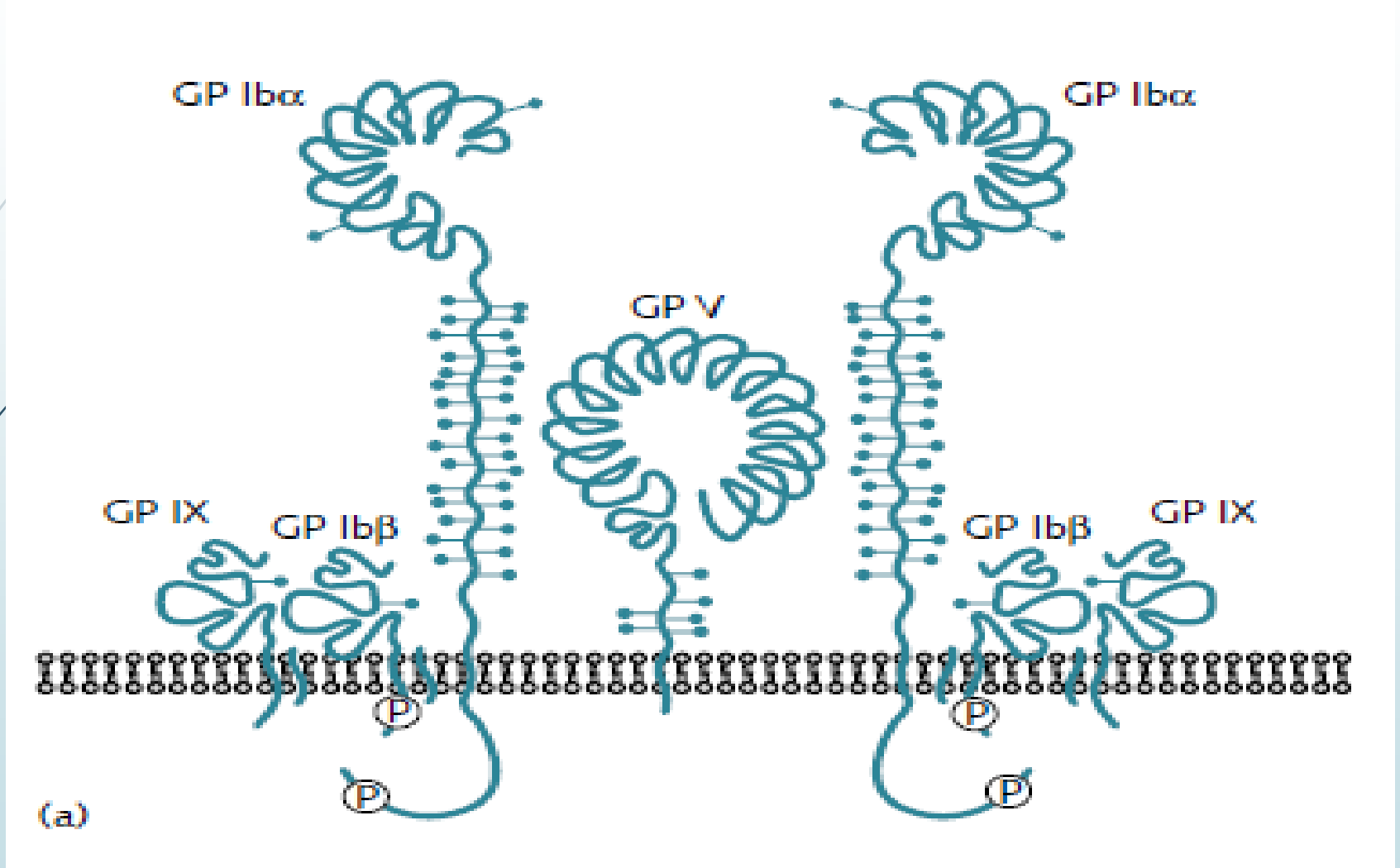
Platelet structure



GP IIb/ IIIa


Cation
Ligand binding site
Extracellular domain
αIIb
β3
Protease-resistant domain
Membrane
Cytoplasmic domain

GP Ib/IX/V



Contents of platelet granules

Dens body	a- granule	Lysosom
ATP ADP Calcium Serotonin TGFβ Adernalin/Noradernalin GDP/GTP	Factor I, V, XI,XIII, vWF, HMWK PDGF, P-selectin, Vitronectin, Fibronectin PF4, TSP	Galactosidase Fucosidase Glucoronidase Catepsin

Platelet Function

Adhesion

- When the endothelial layer is disrupted, collagen and VWF anchor platelets to the subendothelium. Platelet GP1b-IX-V receptor binds with VWF; and GPVI receptor and integrin a2β1 bind with collagen
- But in normal condition prevented by nitric oxide, prostacyclin and CD39.

Activation

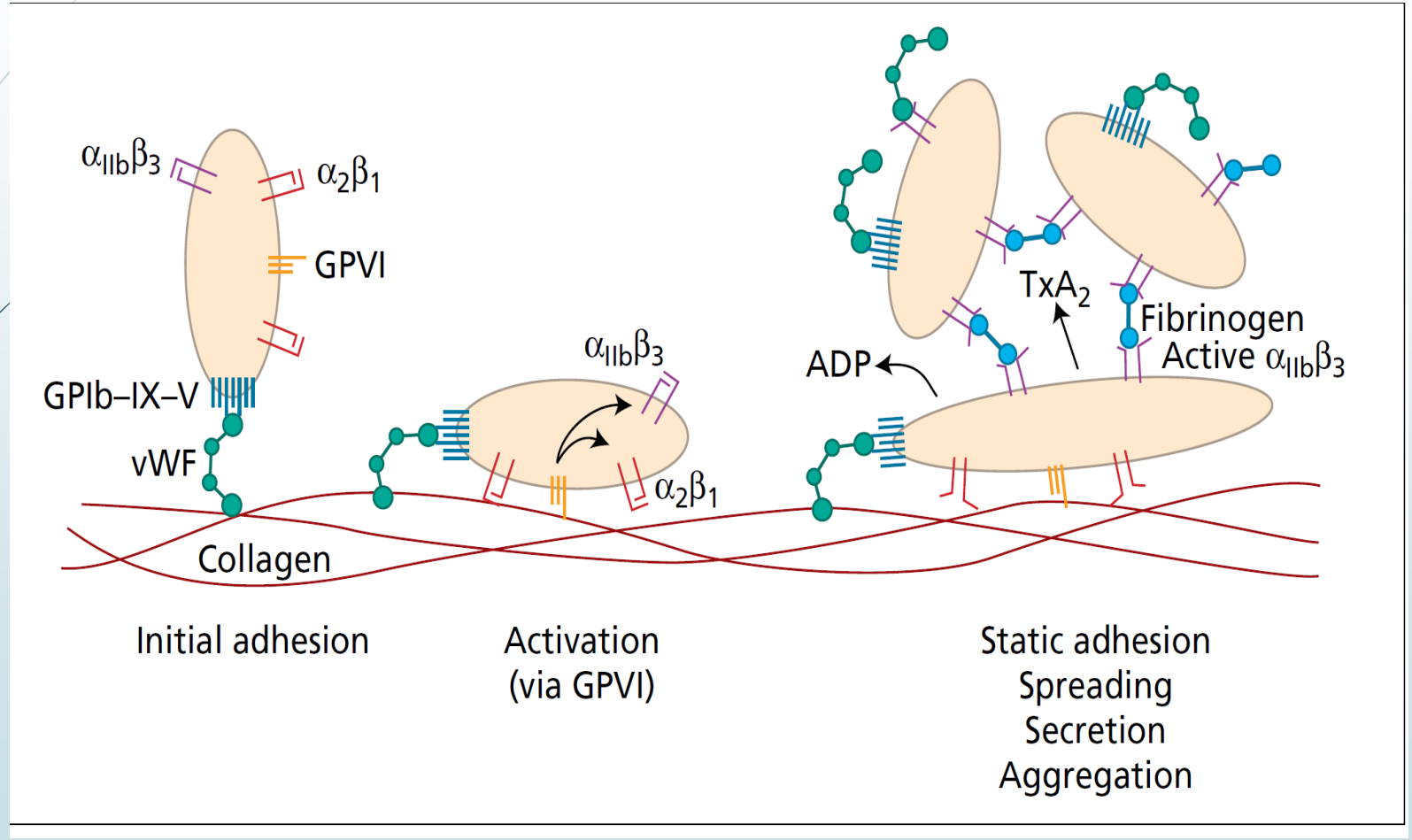
- **Trigger (induction):**
- **GPIIb/IIIa activation:** GPVI signalling increases the production of thromboxane A2 (TXA2) and decreases prostacyclin
- **Granule secretion:** Activated platelets secrete the contents of these granules through their canalicular systems to the exterior
- **Morphology change:**

Platelet Function

Aggregation

- Aggregation begins minutes after activation, and occurs as a result of turning on the GPIIb/IIIa receptor, allowing these receptors to bind with vWF or fibrinogen.
- There are around 60,000 of these receptors per platelet.
- When any one or more of at least nine different platelet surface receptors are turned on during activation, intraplatelet signaling pathways cause existing GpIIb/IIIa receptors to *change shape* – curled to straight – and thus become capable of binding.

Plt Adhesion



PLATELETS

- Type of platelets:

  -Recovered platelets (Random donor platelet)

  - Apheresis platelets (single donor platelets)

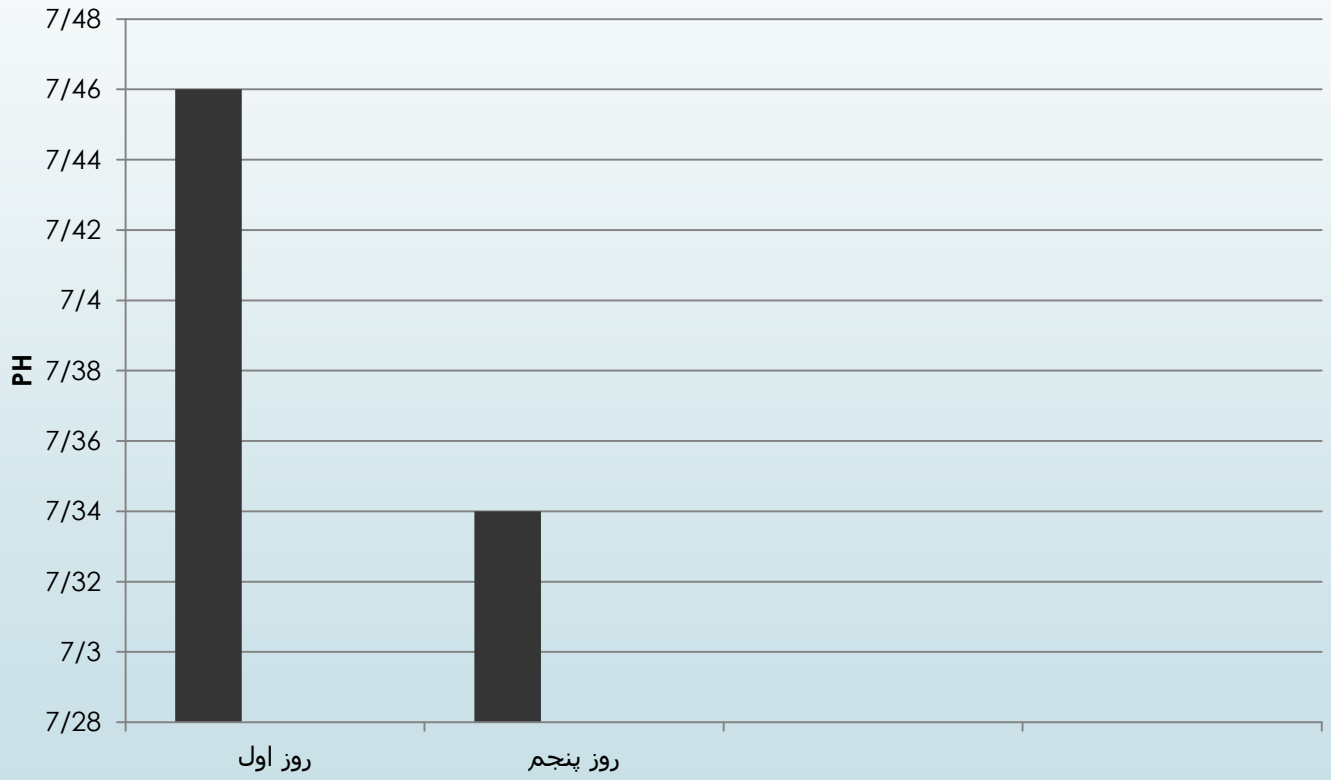
Recovered platelets

- volume of plasma : 40 and 70 mL
- Stored at room temperature with continual agitation for up to 5 days
- at least 5.5 X 10^{10} platelets per bag

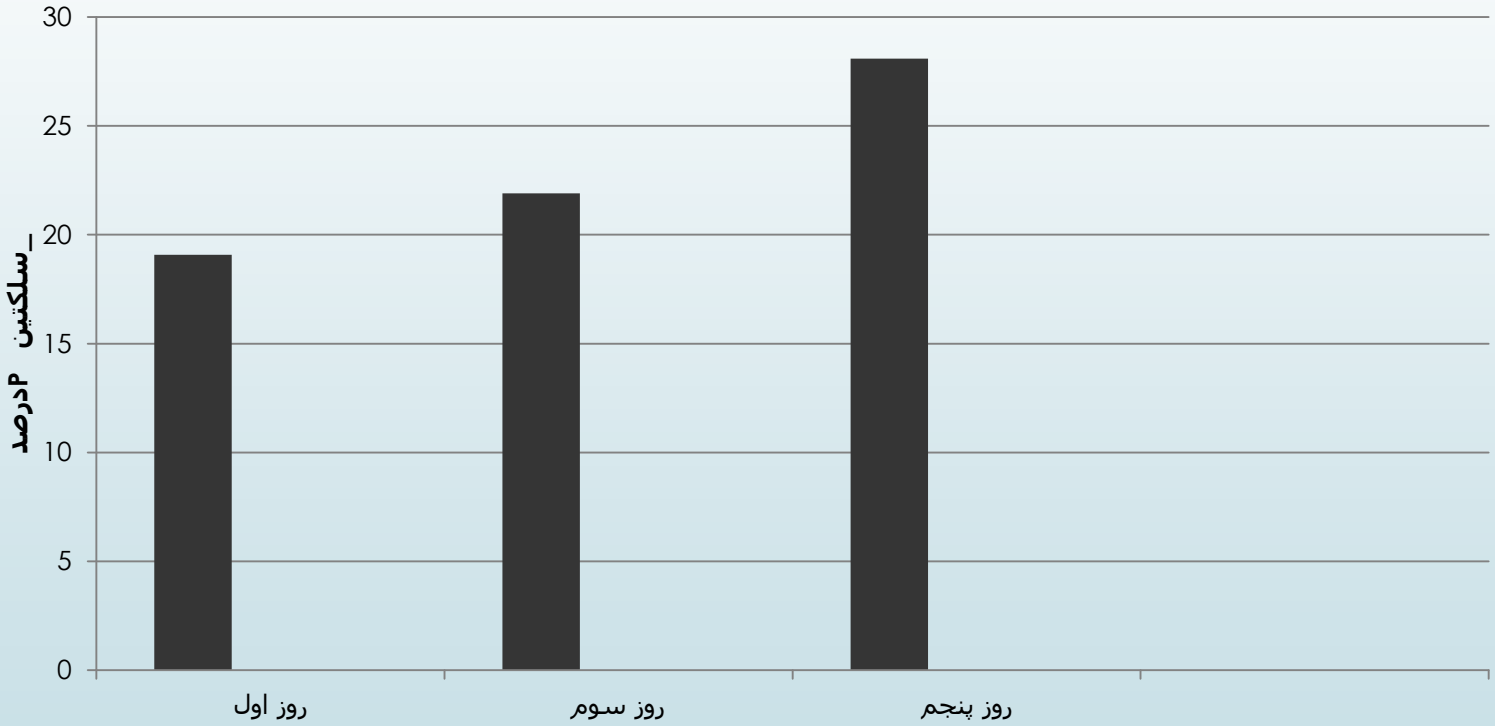
In Vitro Assessment of Platelet Lesions during 5- day Storage in Iranian Blood Transfusion Organization (IBTO) Centers

- How to determine the volume of dense platelet product
- Examination of bacterial contamination
- How to check Swirling in platelet product
- Platelet product pH measurement
- White blood cell count in platelet product
- Red blood cell count in platelet product
- Platelet count in platelet product
- **Flow cytometry**
- **Platelet Aggregometry**

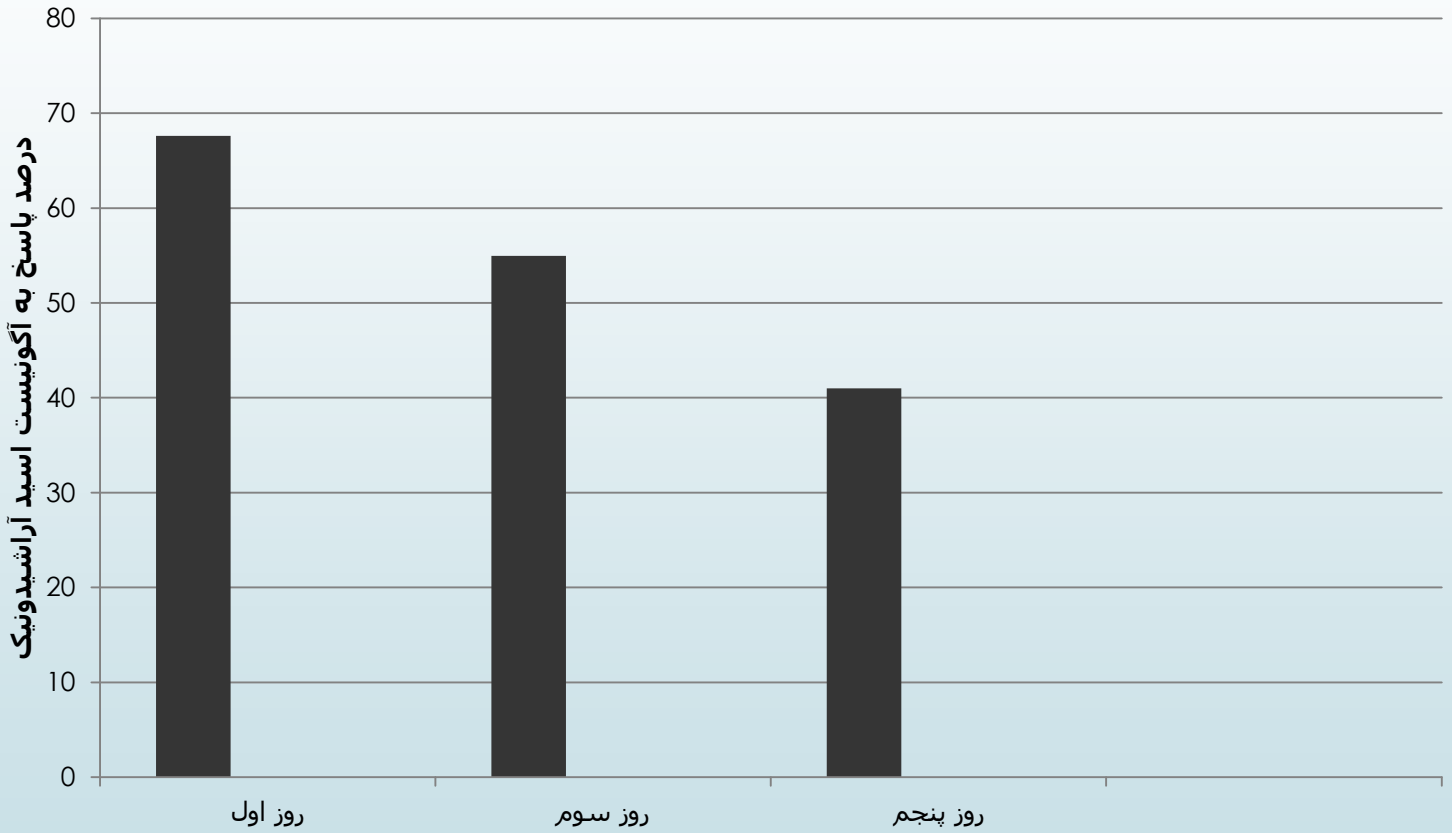
Results of pH on the first and fifth days of the study



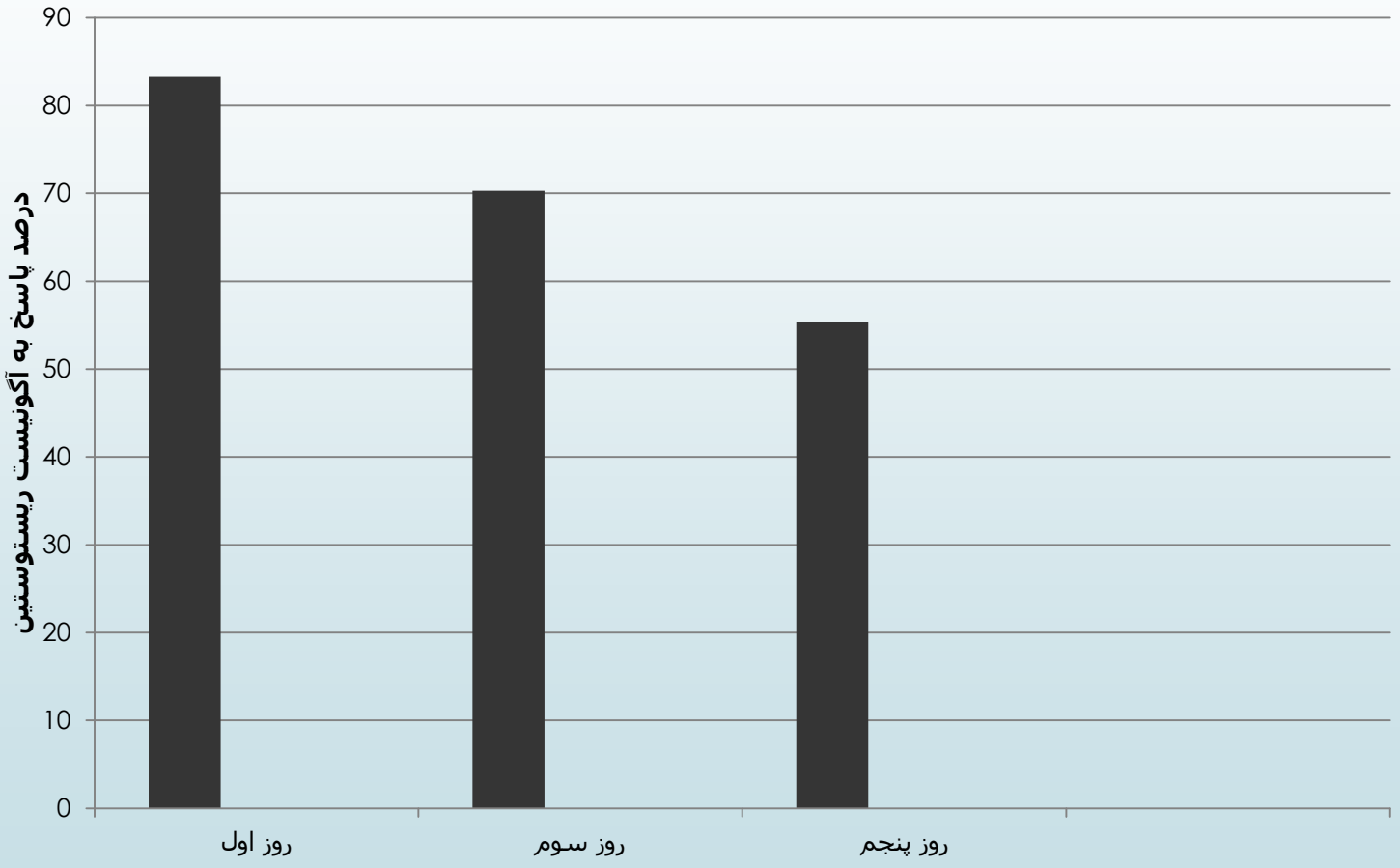
Results of CD62 (P-selectin) in platelet surface by flow cytometry



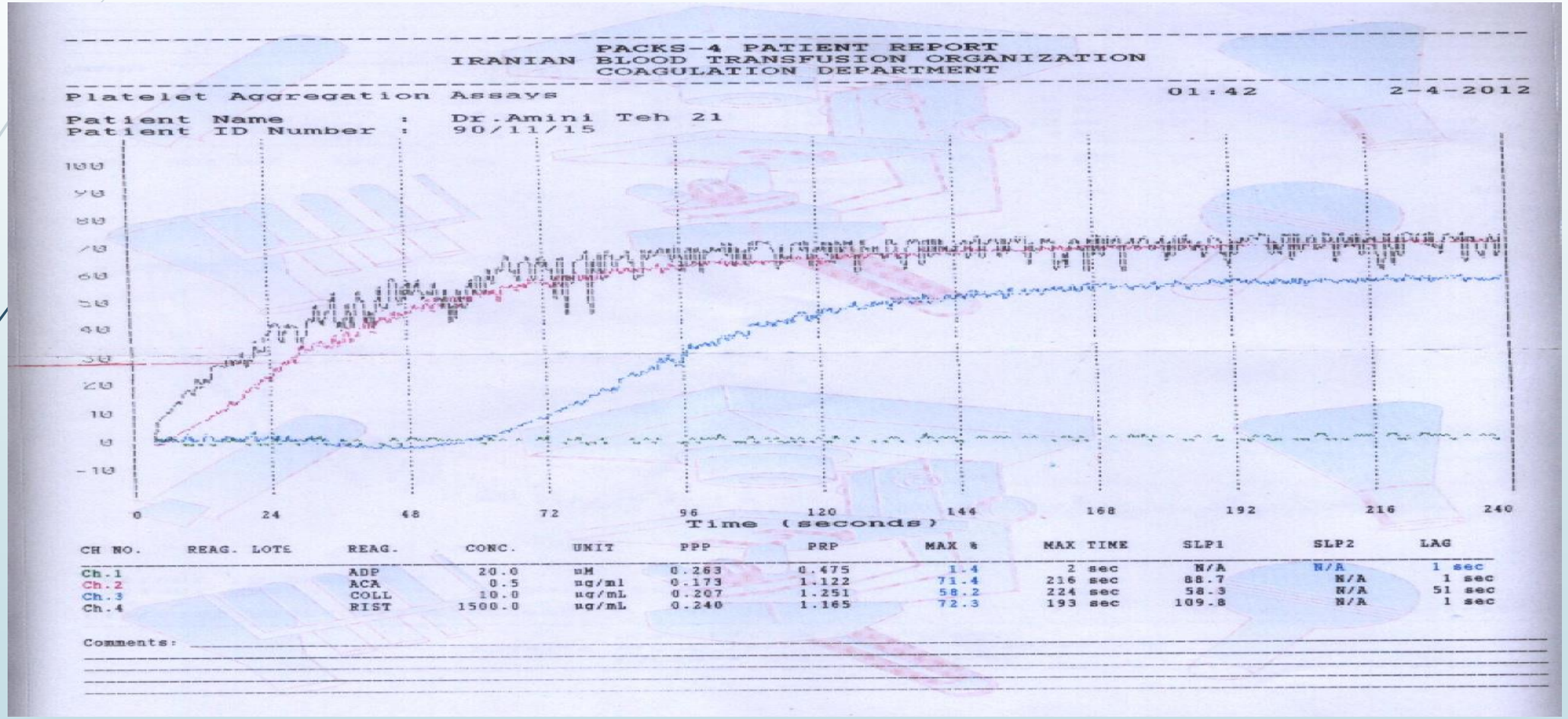
Results of arachidonic acid agonists



Results of Ristostin agonist



Results of platelet aggregation



PACKS-4 PATIENT REPORT
IRANIAN BLOOD TRANSFUSION ORGANIZATION
COAGULATION DEPARTMENT

Platelet Aggregation Assays 01:42 2-4-2012

Patient Name : Dr.Amini Teh 21
Patient ID Number : 90/11/15

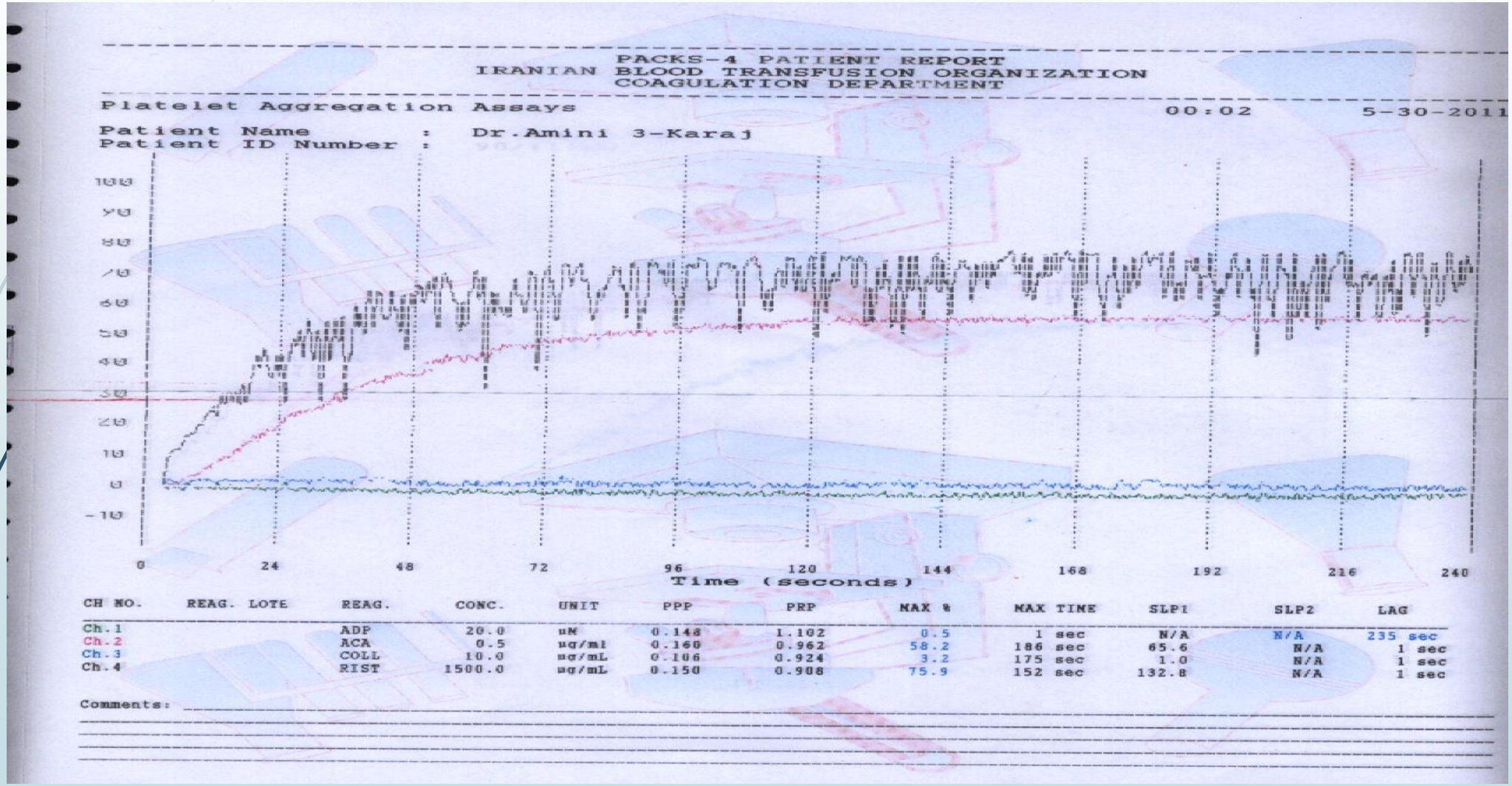
100
90
80
70
60
50
40
30
20
10
0
-10

0 24 48 72 96 120 144 168 192 216 240
Time (seconds)

CH NO.	REAG. LOTS	REAG.	CONC.	UNIT	PPP	PRP	MAX %	MAX TIME	SLP1	SLP2	LAG
Ch.1		ADP	20.0	uM	0.263	0.475	1.4	2 sec	N/A	N/A	1 sec
Ch.2		ACA	0.5	ug/ml	0.173	1.122	71.4	216 sec	88.7	N/A	1 sec
Ch.3		COLL	10.0	ug/mL	0.207	1.251	58.2	224 sec	58.3	N/A	51 sec
Ch.4		RIST	1500.0	ug/mL	0.240	1.165	72.3	193 sec	109.8	N/A	1 sec

Comments:

Results of platelet aggregation



PACKS-4 PATIENT REPORT
IRANIAN BLOOD TRANSFUSION ORGANIZATION
COAGULATION DEPARTMENT

Platelet Aggregation Assays 00:02 5-30-2011

Patient Name : Dr.Amini 3-Karaj
Patient ID Number :

100 90 80 70 60 50 40 30 20 10 0 -10

0 24 48 72 96 120 144 168 192 216 240

Time (seconds)

CH NO.	REAG. LOTE	REAG.	CONC.	UNIT	PPP	PRP	MAX %	MAX TIME	SLP1	SLP2	LAG
Ch.1		ADP	20.0	uM	0.148	1.102	0.5	1 sec	N/A	N/A	235 sec
Ch.2		ACA	0.5	ug/ml	0.160	0.962	58.2	186 sec	65.6	N/A	1 sec
Ch.3		COLL	10.0	ug/mL	0.106	0.924	3.2	175 sec	1.0	N/A	1 sec
Ch.4		RIST	1500.0	ug/mL	0.150	0.908	75.9	152 sec	132.8	N/A	1 sec

Comments:

Thank you for your attention