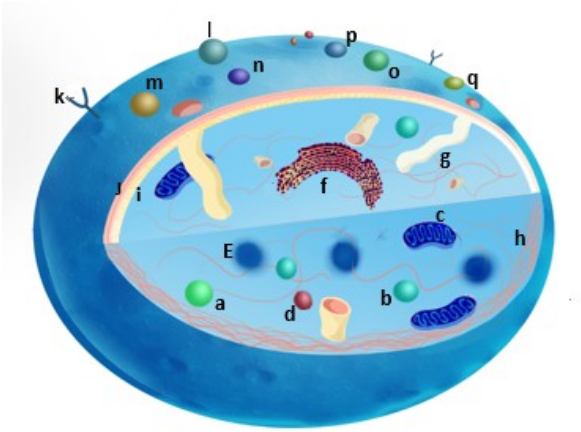

Sol-Gel Zone

Microtubules and microfilaments
Glycogen
coated vesicles
secretory organelles

Membrane Systems

Golgi complexes
Open canalicular system
Dense tubular system
Rough endoplasmic reticulum

Organelle Zone

α-granules (membrane-associated and soluble proteins)

dense granules (ADP/ATP, GPIb, integrins αIIbβ3, CD63 (granulophysin) , LAMP-2)

lysosomes

Figure 1. The structure of platelet is closely associated with its function. The platelet plasma membrane has a thicker glycocalyx with a wrinkled appearance that contains the surface glycoproteins(GPs) required for the interaction of platelets with subendothelial structures, platelet activation, platelet adhesion and aggregation, as well as clot retraction. The lipid bilayer and the submembrane region with a system of thin actin filaments—the membrane contractile cytoskeleton are below the glycocalyx. The former one contains tissue factor (TF), which is exposed to the platelet surface in an inactive form and plays an important role in enhance thrombin after the activation of platelets. The center of platelet is a granular zone with organelle aggregated and transparent zone surroundings, participating in various functions such as platelet synthesis and secretion.(a.lysosome b. glycosome c. mitochondria d. dense granule e. α-granule f. rough endoplasmic reticulum g. Open canalicular system h. microfilaments i. Actin filaments-the membrane contractile j. Lipid bilayer k. FcR l.GPIb-IX-X m. GPVI n.GPs o.αIIbβ3 p.CD3 q. Glut3)(*83*)

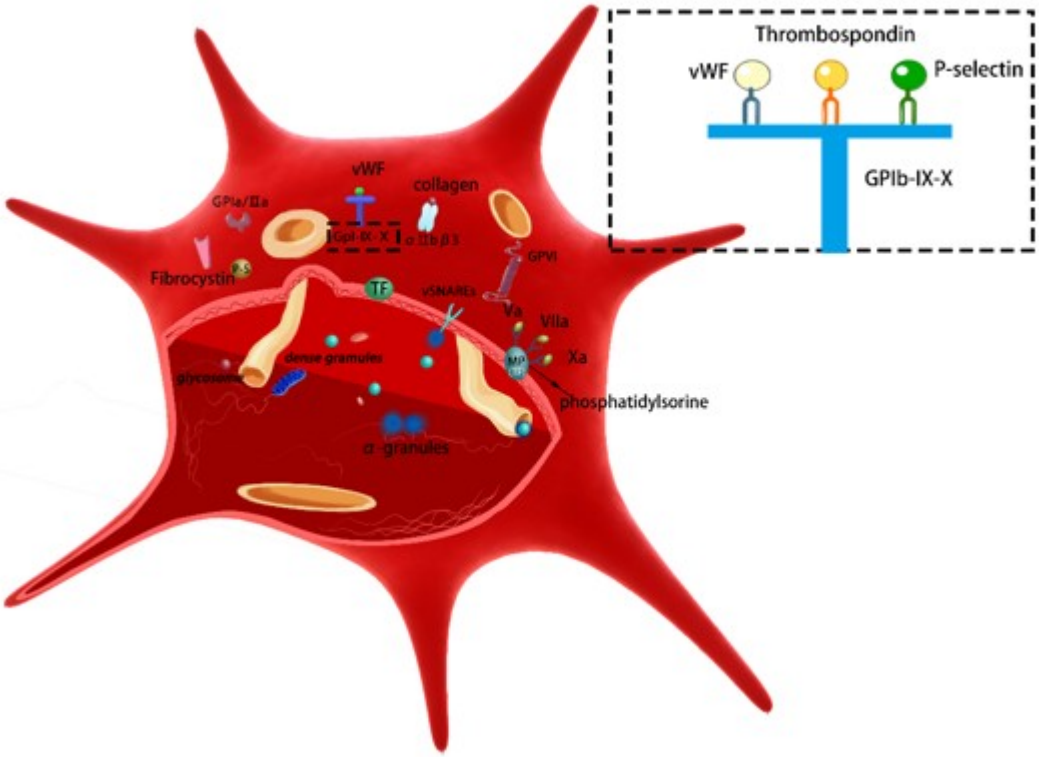

Figure 2. (A) When a platelet is activated, the appearance of it is changed from a shape of discoid to star. Channels of open canalicular system can be evaginated and enable to increase the surface area more than fourfold compared to resting platelets. Meanwhile, constricting microtubules which promote granules move to the center of platelet and release them to extracellular space through the channels. (B) GPIb-IX-V mainly achieves the adhesion of platelet-endothelial cells and platelet-platelet interactions through three different binding sites: vWF, thrombospondin and P-selectin.

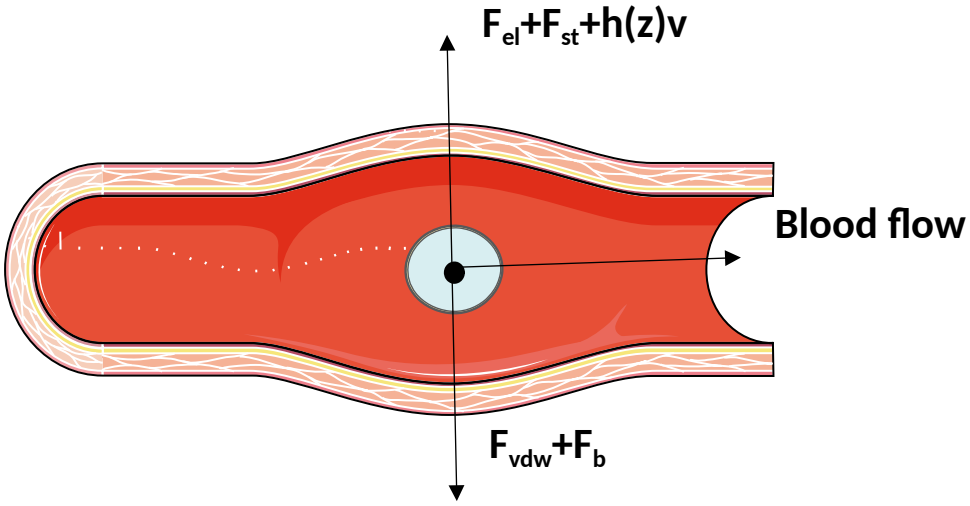

Figure 3. Applied forces of a particle in blood flow, (Fel force due to the electrostatic double layer interaction, Fsr force due to steric repulsion, FvdW force due to the van der Waals interaction, h due to hemodynamic resistant function, v due to steady velocity, z due to z-axis coordinate for the center of the particle)(*39*)

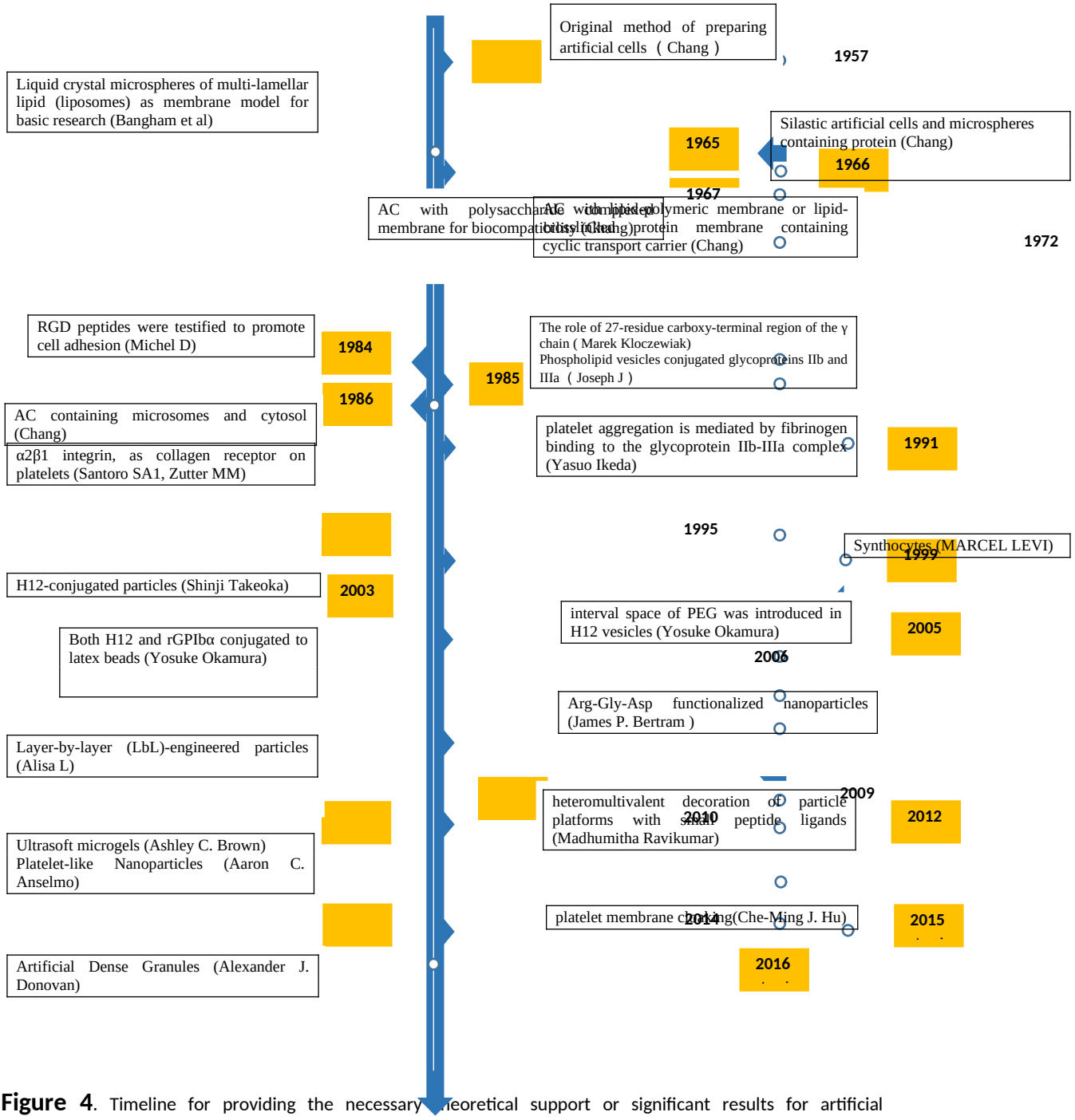

Figure 4. Timeline for providing the necessary theoretical support or significant results for artificial platelets(*26*, *42*, *43*, *45*, *47*, *48*, *52-54*, *62*, *63*, *69*, *70*, *73*, *77*, *88-91*)

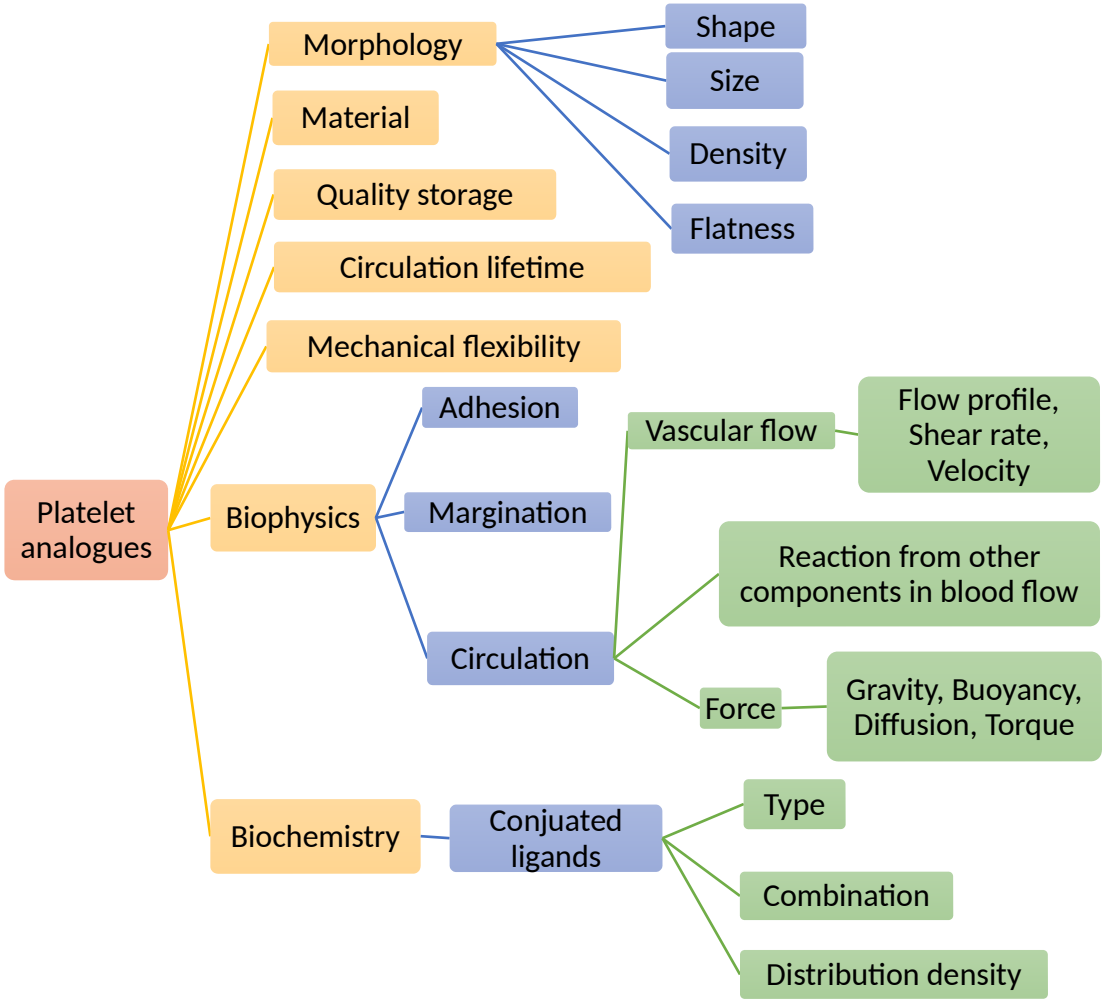

Figure 5. Suggested design factors of platelet analogues