Platelet activation

Platelet activation is a key process in both protective hemostasis and pathological thrombosis through the activation of multiple pathways by the binding of several agonists (e.g., thromboxane A2 (TxA2), adenosine diphosphate (ADP), and thrombin) to their receptors.

Platelet activation has been postulated to be involved in the pathogenesis of delayed cerebral ischemia (DCI) and cerebral vasospasm (CVS) after aneurysmal subarachnoid hemorrhage (aSAH).

A study explains the activation of mechanoreceptor Piezo1 under hypertension is the key to abnormal platelet activation and thrombosis while providing novel platelet intervention strategies to prevent thrombosis ¹.

Prothrombotic states of early brain injury (EBI) and delayed cerebral ischemia (DCI) after aSAH determine morbidity and mortality. To understand how platelet activation might contribute to such prothrombotic states, Ray et al. studied trends in coated platelets during EBI and DCI periods. Serial blood samples from a prospective cohort of aSAH patients were collected and assayed for coatedplatelet levels. Patient's coated-platelet level during post-hospital discharge follow-up served as an estimate of baseline. Occurrence of DCI, Montreal cognitive assessment (MOCA) score of < 26, and modified Rankin scale (mRS) of 3-6 were considered poor clinical outcomes. Non-linear regression analysis detected a transition between periods of rising and declining coated-platelet levels at day 4. Additional regression analyses of coated-platelet trends before day 4 showed differences among patients with modified Fisher 3-4 [4.2% per day (95% CI 2.4, 6.1) vs. - 0.8% per day (95% CI - 3.4, 1.8); p = 0.0023] and those developing DCI [4.6% per day (95% CI 2.8, 6.5) vs. - 1.9% per day (95% CI - 4.5, 0.5); p < 0.001]. Differences between peak coated-platelet levels and baseline levels were larger, on average for those with DCI [18.1 ± 9.6 vs. 10.6 ± 8.0 ; p = 0.03], MOCA < 26 [17.0 ± 7.8 vs. 10.7 ± 7.4 ; p = 0.05] and mRS 3-6 [24.8 ± 10.5 vs. 11.9 ± 7.6; p = 0.01]. Coated-platelet trends after aSAH predict DCI and short-term clinical outcomes. The degree of rise in coated-platelets is also associated with adverse clinical outcomes $^{2)}$.

1)

Zhao W, Wei Z, Xin G, Li Y, Yuan J, Ming Y, Ji C, Sun Q, Li S, Chen X, Fu W, Zhu Y, Niu H, Huang W. Piezo1 initiates platelet hyperreactivity and accelerates thrombosis in hypertension. J Thromb Haemost. 2021 Aug 19. doi: 10.1111/jth.15504. Epub ahead of print. PMID: 34411418.

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