

Master of Science in Pathology: Investigating the Viability of Cold-Stored Platelet Concentrates and the Effects of Prolonged Incubation

Rebecca Spiteri

My name is Rebecca Spiteri, and I am a medical laboratory scientist working at Mater Dei Hospital. I have carried out my Master degree (M.Sc.) in Pathology at the University of Malta and as part of my course requirements, I conducted a research study entitled, “Investigating the Viability of Cold-Stored Platelet Concentrates and the Effects of Prolonged Incubation”. The aim of this study was to determine whether platelets remain stable *in-vitro* if stored at a different temperature and for a longer period of time from the current guidelines that the Maltese Blood Bank follows.

Thrombocytes, more commonly referred to as platelets, are cellular fragments produced within the bone marrow that play a pivotal role in hemostasis. Cancer patients, trauma patients and individuals who suffer from platelet disorders can benefit from platelet transfusions to ameliorate their condition and state of health.

Upon donation, platelet concentrates (PC) are stored at a temperature of $22^{\circ}\text{C} \pm 2^{\circ}\text{C}$ in gas permeant bags under constant agitation for five days. Currently there are no guidelines available for cold storage and clinical trials are already underway. This study addressed issues related to logistics and blood product wastage by determining whether the quality and viability of platelets are affected if a lower temperature and a longer incubation period is put into practice.

In this study, PC were divided into two cohorts, each of which were stored at different temperatures, one in refrigerated conditions (2°C to 6°C) and the other one at room temperature

(22°C ± 2°C). Each aliquot was analysed at different time intervals for parameters which literature has identified as markers of safety and quality.

Results were statistically compared to determine whether there was any significant difference between the two cohorts. The investigation yielded predominantly positive results across three main aspects of platelet analysis. Parameters such as the Platelet count (PLT) remained stable, whereas the Mean Platelet Volume (MPV) and the Plateletcrit (PCT) showed significant variations. Platelet metabolism was evident in both room temperature and cold storage, with a notable decreased rate in the latter. pH levels remained within acceptable transfusion thresholds under both storage conditions. No statistically significant differences in cytokine levels were observed between room temperature and cold storage or across different incubation days, although mean cytokine levels were higher at room temperature.

In conclusion, cold-stored platelets can be exploited however, further studies are still required to fully establish their efficacy in real-life *in-vivo* scenarios.

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