International Journal of Chemical and Molecular Engineering
Vol:8, No:8, 2014

An AFM Approach of RBC Micro and Nanoscale Topographic Features During Storage

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Abstract : Blood gamma irradiation is the only available method to prevent transfusion-associated graft versus host disease (TA-GVHD). However, when blood is irradiated, determine blood shelf time is crucial. Non-irradiated blood has a self-time from 21 to 35 days when is preserved with an anticoagulated solution and stored at 4°C. During their storage, red blood cells (RBC) undergo a series of biochemical, biomechanical and molecular changes involving what is known as storage lesion (SL). SL include loss of structural integrity of RBC, a decrease of 2,3-diphosphatidylglyceric acid levels, and an increase of both ion potassium concentration and hemoglobin (Hb). On the other hand, Atomic force Microscopy (AFM) represents a versatile tool for a nano-scale high-resolution topographic analysis in biological systems. In order to evaluate SL in irradiated and non-irradiated blood, RBC topography and morphometric parameters were obtained from an AFM XE-BIO system. Cell viability was followed using flow cytometry. Our results showed that early markers as nanoscale roughness, allow us to evaluate blood quality since another perspective.

Keywords : AFM, blood γ-irradiation, roughness, storage lesion
Conference Title : ICNN 2014 : International Conference on Nanotechnology and Nanomedicine
Conference Location : Venice, Italy
Conference Dates : August 14-15, 2014