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Morphology changes of erythrocytes of end stage renal disease patients on hemodialysis-3D image reconstruction - Preliminary report

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Introduction: Etiopathogenesis of end stage renal disease (ESRD) anemia is multifactorial. One of the reasons is shortened life of red blood cells (RBCs) bound directly and indirectly to the shape, which is a consequence of cell's reological possibility, metabolic processes and environment influence. Physiological RBC is biconcave, regular shaped discs-*discocythes*. The electron microscopy analysis of RBCs revealed the loss of their typical biconcave shapes in chronic kidney disease (CKD). Confocal microscope allows obtaining high quality images and image reconstruction in three dimensions (3D).

Aim: The aim of this preliminary report was to analyse changes of morphology of RBC in patients with ESRD using confocal microscopy – 3D image reconstruction.

Material & Methods: Blood Samples were collected from 3 randomly selected ESRD patients (2 female, 1 male; mean age: 57±20.66y; duration of hemodialysis 7y) and healthy donor. Erythrocytes were isolated by centrifugation in ficoll gradient. Next cells were deposited onto glass slide using cytospin, fixed and stained with antibody against LDH and examined using Zeiss LSM 780 confocal microscope. Collected images were next analyzed using Imaris software. In each patient were measured surface, volume, diameter, thickness of the ring of 3 randomly selected erytrocythes. Serum biochemical and hematological characteristics for ESRD patients and healthy donors were analysed.

Results: The results of average measurements of uremic erytrocythes (surface, volume, diameter, thickness of the ring) showed a significant decrease comparing to same parameters for a healthy patient. The 3D-reconstruction image using confocal microscopy showed significant differences in morphology of RBC between ESRD patients and healthy subject.

Conclusions: The 3D-reconstruction image using a confocal miscroscope allows obtaining the actual image of RBC in patients with ESRD. The morphology of these RBCs is irregular bubble, but the shape of cell still remains the biconcave disc. The above information containing parameters of uremic RBCs require confirmation in patients with statistical significance.

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