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Fluorescent Study of Albumin Alterations in Patients with Type 2 Diabetes Mellitus

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Editorial

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Editorial

The structural/functional properties of albumin play an important role in the pathogenesis of various diseases (e.g. diabetes mellitus). In different pathologies membrane damage in immune cells and blood plasma albumin involves as a consequence of alterations in a immune state of patients. It is now widely accepted that the dynamics of these changes, along with the types of alterations in structures of the immune system cells and plasma proteins play a critical role in the maintenance of the immune status of any given organism. As a result of the importance of changes in the structural integrity of cells of the immune system, it is important for clinicians to receive information on the immunological status of organism via quick, reliable, reproducible methods. In this regard, fluorescent probes have shown to be excellent tools for use in such protocols. Such an analysis has a great potential for not only for helping to comprehend mechanisms of immune modulation associated with the induction/progression of pathologies, but might serve as a very important prognostic indicator of long- term survival among patients with pathologies. The probe ABM developed at Daugavpils University (Latvia) has been shown as a potential biomarker for the immune state of patients in patients with diabetes mellitus and healthy donors [1-5].

The following parameters were examined and compared:
1. The spectral characteristics of ABM in blood plazma
2. "Effective" and total albumin concentration in blood plazma
3. Quantitative parameters of albumin auto fluorescence, characterizing tryptophanyl region of molecule and advanced glycation end products (AGEs). The emission maximum of ABM for healthy donors is 650 nm. The fluorescence zone in diabetics is shifted by 32-48 nm (603-618 nm) to a short wave region of spectra and fluorescence intensity decreases by 14%-42% as compared to mean control value. Qualitatively different albumin binding sites characteristics were obtained in diabetics, Chernobyl clean-up workers with diabetes mellitus and healthy donors differing in affinity, quantum yield, and degrees of polarization (dehydration of tryptophanyl region), effective albumin concentrations etc. The levels of pathological and pharmacological metabolites balance differs in patients comparable to controls and hence their correlation to seizures patophysiology and their degree. In human plasma albumin auto fluorescence is dominating by tryptophanyl (ex/em 286/330 nm). In diabetics the fluorescence spectra have two maxima: 1. 332-333 nm observed in healthy persons (intrinsic fluorescence) and 2. Shifted to a long wave region by 10-20 nm (340-350 nm), that corresponds to advanced glycation end products (lysine and argentine). AGEs specific fluorescence was found to constantly increasing glucose concentrations and correlated with changes in albumin structure detected using ABM.

Specifically, it was found that spectral characteristics of this probe correlate with a number of important parameters of artificial and cellular membranes such as physicochemical state, microviscosity, proliferating and lipid metabolic activities of cells, distribution of lymphoid subset, etc. 2. The choice to examined albumin, among the

myriad of constituents in plasma, is that this protein is practically the single source of ABM binding and subsequent fluorescence in plasma. Very important is that ABM can be used as a probe sensitive to conformation changes in protein: the most prominent changes in fluorescence characteristics occurred at pH values 3-12 known to cause conformation transitions of proteins. Only fluorescent probes allow to detect the effective concentration of albumin in blood plasma (effective concentration- equivalent in blood plasma of healthy albumin and reflects its binding and carrier functions). The total albumin concentration is more conservative. The detection of effective concentration of albumin using ABM is technically simple and not so time consuming as in the cases of other probes (don't require additional steps of plasma and probe preparation). ABM spectral parameters in blood plasma are coupled with alterations in cellular mechanisms of immune regulation in the patients with different pathologies. Measures of ABM fluorescence intensity values for plasma albumin and/or for lymphocytes (total and among different subtypes) could potentially be a useful tool in clinical immunological screenings to estimate the immune state of patients.

References

1. KalninaI, Kirilova E, Bruvere R (2013) Fluorescent Biomarker ABM. Lambert Academic Publishing.

2. Kirilova E, Kalnina I, Zvagule T, Gabruseva N, Kurjane N, et al. (2011) Fluorescent Study of Human Blood Plasma Albumin Alterations Induced by Ionizing Radiation. J Fluoresc 21(3): 923-927.

3. Kalnina I, Kirilova E, Zvagule T, Kurjane N, Skesters A, et al. (2013) Radiation –modified albumin in type 2 diabetic patients. J Exp Integr Med 3(1): 3-7.

4. Kalnina I, Kirilova E, Zvagule T, Kurjane N, Skesters A, et al. (2013) Characteristics of albumin binding sites in patients and Chernobyl clean-up workers with type 2 diabetes mellitus. J Exp Integr Med 3(3): 185-190.

5. Zvagule T, Kalnina I, Skesters A, Kurjane N, Bruvere R, et al. (2010) Long term effects of low doses of ionizing radiation on Chernobyl clean-up workers from Latvia. Int J Low Radiation 7(1): 20-31.