

Aquaphotomics: Water Spectral Pattern as Biological Marker

Roumiana Tsenkova

rtsen@kobe-u.ac.jp

Water hydrogen and covalent bonds overtones vibrations are observed in the visible and near infrared (VIS – NIR) range of electromagnetic spectrum. The intensity of absorbance is hundreds times lower than in the infrared range allowing the use of longer pathlength and in-vivo monitoring of biosystems, i.e. in-vivo spectral data acquisition.

Data base (Aquaphotome)¹ of water absorbance bands in the VIS - NIR range called water matrix coordinates, WAMACs, have been developed. Specific spectral patterns based on these water bands and related to various conditions of numerous biosystems have been registered as biomarkers. As the spatial hydrogen bond network “reflects” the presence of other molecules, the water spectral pattern (WASP)¹ in the VIS – NIR range plays role of a water mirror on molecular level (Extended Water Mirror, EWAM)¹ giving multidimensional informational “snap shot” on a system level.

Examples of multivariate analysis of spectral patterns that revealed similarities or differences in bio and aqueous systems and that have been used for diagnosis will be presented.

1. Tsenkova, R., (2009) Introduction Aquaphotomics: dynamic spectroscopy of aqueous and biological systems describes peculiarities of water, *J. Near Infrared Spectroscopy* 17 pp303-313.