Aquaphotomics – new approach for studying food quality

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Summary: Food technology is an area with high applicability of aquaphotomics, including qualitative and quantitative analysis for diverse objectives, such as classification, monitoring quality, safety, and freshness of food. As a new “omics”, aquaphotomics can afford an opportunity to substitute highly expensive “Genomics”, “Proteomics” and, especially, “Metabolomics” for better understanding of biological systems. Examples of the application of Aquaphotomics approach in food will be shown. In particular regarding fruits, fish, and cheese quality evaluation.

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Introduction: The Aquaphotomics concept opens a new area in biological sciences and engineering. It describes a new way for exploring biological systems through a non-destructive monitoring of their interaction with VIS-NIR light. Multivariate spectral analysis reveals that changes with the water matrix under perturbation reflect, like a mirror, the rest of the molecules surrounded by water [1]. Its application for the assessment of nutraceutical potential, quality and authenticity of food products through non-destructive approach and minimal sample preparation by a rapid and economical determination could be a great opportunity. Results concerning fruits maturity, fish (salmon) freshness, and water distribution in Taleggio cheese can support the applicability of Aquaphotomics approach in food area.

Materials and Methods:

Fruits during ripening: Bananito at different times of storage

Fresh and frozen/thawed salmon

Taleggio cheese – water distribution
**Conclusions:** For the three food chains considered, the Aquaphotomics approach demonstrated to be a useful tool in:

- Evaluating the different maturity, and the optimal ripening stage for fruits;
- Identifying at the market samples of packed “fresh salmon” from “frozen/thawed salmon”
- Studying the water distribution pattern inside Taleggio cheese slices, PDO Italian cheese, characterized by a centripetal ripeness.

The application of adequate algorithms for data processing is a fundamental need in obtaining satisfactory results, independently from the spectroscopic technique (NIR, HSI, etc..) used to collect spectral data.

**References:**