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Title: New approaches in systems diagnosis : combining metabolomics and ultra-weak photon emission

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PROPOSITIONS

1. Combining metabolomics and ultra-weak photon emission yields a novel diagnostic approach to understand health and disease of complex dynamic biological systems. (Chapters 1, 2)
2. Metabolomics enables the identification of molecular pathways that are correlated with ultra-weak photon emission. (Chapter 3)
3. Ultra-weak photon emission can be used as a dynamic monitoring tool of oxidative metabolism. (Chapter 4)
4. The pharmacological potential of UPE as a label free method to monitor ROS production and suppression has been evaluated and it reveals that UPE can trace ROS production as well as suppression by pharmacological inhibitors. (Chapter 6)
5. Understanding biology at the systems level is essential to examine the dynamics of cellular and organismal functions, in contrast to monitoring the characteristics of isolated parts of a cell or organism only. (Kitano, Science, 2002)
6. Metabolomics is an essential methodology in systems biology research and studies of metabolism range from agriculture to human disease. (Doerr, Nature Methods, 2017)
7. Metabolomics is a powerful biochemical approach to represent the metabolic state of an individual's overall health status enabling precision medicine. (Beger *et al.*, Metabolomics, 2016)
8. Ultra-weak photon emission is now known to be related to reactive oxygen species (ROS) and consequently it can be used as a non-invasive diagnostic tool to monitor oxidative stress response. (Pospíšil *et al.*, J. Photochem. Photobiol. B, 2014)
9. "Life is like riding a bicycle. To keep your balance, you must keep moving". (Albert Einstein)
10. "There is nothing either good or bad, but thinking makes it so". (William Shakespeare, Hamlet Act 2, scene 2)