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Transparent non-invasive panels of i-biomarkers in early cancer diagnostic and prognostic

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Early and non-invasive diagnosis and prognosis are important but challenging problems in cancer clinical management. Our results suggest that the most accurate solutions could be developed combining Artificial Intelligence with OMICS technologies. The new i-Biomarker concept and the methodology for developing panels of i-Biomarkers will be presented. While they are intelligent systems for diagnosis and prognosis purpose they function like usual biomarkers. The methodology for developing transparent i-Biomarkers, in the form of decision trees or mathematical formulas, follows the recent recommendations for OMICS tests. Using ensemble methods to develop panels of i-Biomarkers the accuracy can increase even to 100%. This will be illustrated with the non-invasive i-Biomarkers we developed for diagnosis and prognosis in bladder, prostate and breast cancer (all patent pending). The methodology can be used to develop both invasive, e.g., based on tumor mRNA or microRNA, and non-invasive, e.g., based on plasma microRNA or proteins, OMICS test. Our results showed that microRNAs are more informative than mRNAs, reaching the best accuracies with a smaller number of relevant inputs. Placing the relevant inputs of the non-invasive i-Biomarkers on pathways, especially for plasma microRNA, is recommended but could be misleading. Circulating microRNAs, possibly a form of inter-cellular communication, usually differ qualitatively and quantitatively from cellular microRNAs, but only cellular microRNAs can act on pathways. A meta-analysis was performed to establish relationships between plasma and cellular microRNA, before functional OMICS analysis. A highly accurate i-Biomarker could contain statistically relevant inputs, even if they are not related with the actually known pathways.

Biography

Alexandru G. Floares is a medical doctor (neurologist) and a computer scientist who received his Ph.D. in Biophysics from Iasi University of Medicine and Pharmacy, Romania. He is the President of SAIA and OncoPredict, premier organizations in developing OMICS tests in cancer, based on artificial intelligence. He has published many papers in this field, but also in the field of automatically modeling complex networks and systems. He is also the author of some European and USA inventions, relevant in these fields, which are patent pending. He is member of IEEE and New York Academy of Science.

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