Potential clinical usefulness of biomarkers in current medical applications.

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Introduction.

Biomarkers are potentially useful in the contexts of primary, secondary and tertiary prevention. The main characteristics of an ideal biomarker include that they are safe and easy to measure with a scientific evidence to suggest that biomarker is any substance, structure or process that can be measured in the body or its products and influence or predict the incidence of outcome or disease [1,2]. Additionally, variation in biomarker levels with gender and ethnicity should be elucidated, and the biomarker should have good performance characteristics.

Risk prediction scores can combine information from several different biomarkers in order to estimate an individual's risk of developing an outcome, such as disease or death.

Material and methods.

As reported in several publications, biomarkers are potentially useful along several points of a disease continuum. They can be useful in the context of primary prevention, for preventing disease itself. Moreover, they can facilitate secondary prevention by the early detection of disease via screening, detection of subclinical disease, and by helping the monitoring of disease progression. Biomarkers are also useful for the purpose of tertiary prevention, allowing guide treatment to avoid morbidity owning to established disease [3].

Results.

The most important aim of identifying biomarkers that can accurately predict disease is to prevent disease in those at greatest risk and to personalize treatment according to maximal potential patient benefit. With the completion of the human genome project and the rapid expansion of the "omics field (i.e., genomics, proteomics, metabolomics, lipomics, ribomics and pharmacogenomics.

Predictive values of biomarkers with regards to specific outcomes are also important to consider. For instance, troponin is not only a highly sensitive biomarker of early acute myocardial infarction but is also highly predictive of post-myocardial infarction mortality [4,5]. Thus, both the diagnostic and predictive aspects of troponin make it an ideal biomarker for detecting acute myocardial infarction.

Even if a biomarker meets several criteria that make it "ideal", this does not imply that the biomarker will necessarily be useful in a clinical setting. Specifically, if a novel biomarker cannot add value to tests and biomarkers already being used in clinical setting then it may never pass the sizeable hurdle that separates clinical practice from clinical research [6].

Conclusion.

There is a growing interest in the field of biomarkers in most subspecialties of medicine.

Discrimination, calibration and risk reclassification are the usual classical methods which allow to assess the clinical utility of biomarkers, and each method has strengths and weaknesses that should be considered when employed to assess a biomarker.

References.

1- LASSERE MN.: The biomarker-surrogacy evaluation schema: a review of the biomarker-surrogate literature and a proposal for a criterion-based, quantitative, multidimensional hierarchical levels of evidence schema for evaluating the status of biomarkers as surrogate endpoints.
Stat Methods Med Res 2008 17: 303-340.

2- World Health Organization. Biomarkers in risk assessment: Validity and validation.
WHO 2001.

3- VASAN RS. Biomarkers of cardiovascular dises: molecular basis and practical considerations.
Circulation 2006 113(19) 2335-2362.

4- LINDAHL B0, et al.: Relation between troponin T and the risk of subsequent cardiac events in unstable coronary artery disease.
The FRISC study group. Circulation 1996; 993(9):1651-1657.

5- NEWBY I.K., et al.: Value of serial troponin T measures for early and late risk stratification in patients with acute coronary syndromes.
The GUSTO-IIa investigators. Circulation 1998; 98(18): 1853-1859.

6- NISHA I., et al., Assessing the clinical utility of biomarkers in medicine.
Biomarkers Med 2007; 1(3): 419-436.