

Biomarker Uprising: The Dazzling Paradigm Shift

The Future Depends on What We Do in the Present.

Mahatma Gandhi, 1869-1948

All fields of science have experienced scientific revolutions throughout human history; Medical knowledge is no exception. Undoubtedly, in recent years, personalized medicine has created new horizons in medical knowledge; both scientifically and in terms of providing services to the patients. That is why in medical science, the biomarker revolution has been proposed as one of the key steps in personalized medicine by creating new approaches in the clinical practice of medicine (1).

A biomarker is a feature that is measured and analyzed; this measurement is often quantitative but sometimes qualitative. Therefore, biomarkers are used as indicators to monitor natural biological processes, pathological processes, and response to treatment (2).

Clinical biomarkers are usually easier and less costly to apply than final clinical results. Biomarkers are used in many aspects of clinical practice: screening, disease diagnosis, monitoring, prognosis and development of personal therapeutic interventions, prediction and treatment of drug side effects, cell identification, and pharmacodynamic and dose-response studies.

Generally speaking, biomarkers are divided into four main categories: molecular, histologic, radiographic, and physiologic; a classification mainly based on the application terms; from a different perspective, the biomarkers classification is:

- Translation biomarker
- Efficacy biomarker
- Staging biomarker
- Surrogate biomarker
- Toxicity biomarker
- Mechanism biomarker
- Target biomarker
- Disease biomarker

This trend is a real “paradigm shift” (1)! In the 1990s, the term "evidence-based medicine" was introduced as a prospective strategy in clinical anesthesia orientation, embracing diagnostic and therapeutic decisions; nowadays, biomarkers are the cornerstone of evidence-based medicine (4).

One of the most widely used areas of biomarkers is oncology; i.e. single or multi-gene “signature”-based assays have been introduced to identify disorders of specific molecular pathways; improving the clinical decision-making plan. But we are still halfway to applying new biomarkers in this area (i.e. targeting precision oncology). In this issue of *JCMA*, Talischi et al. discuss predictive biomarkers in non-small cell lung cancer (5), which is in concordance with the recent trend in sequencing tumor genomes, and prescribing medication according to the genetic profile of the cancer cells, leading to more practical aspects and "clinical pharmacogenomics" (6).

Another new and important arena for the development of biomarkers in the clinical management of SARS-CoV-2 (COVID -19). The Covid 19 pandemic was a great worldwide challenge hitting many aspects of human life. The impressive effects of personalized medicine in areas like the latter examples was a potential promise to overcome the Covid-19 monster. Several related studies were successfully conducted, including the study by Emadi et al. and Mansouri et al. in this issue of the *JCMA* (7, 8).

The road to the future of medicine is at the turning point; personalized medicine is one of the key factors in this dilemma; the novel biomarkers are basic ingredients of this “future”.

References

1. Sezari P, Dabbagh A. Personalized medicine: the paradigm shift in medicine mandating lifelong learning. *J Cell Mol Anesth.* 2019;4(2):31-2.
2. Bonnefoy JY. The biomarker revolution: a step toward personalized medicine. *Per Med.* 2008;5(6):553-6.
3. Aronson JK, Ferner RE. Biomarkers-A General Review. *Curr Protoc Pharmacol.* 2017;76:9.23.1-9..17.
4. Holliday EG, Scott RJ, Attia J. Evidence-based medicine in the era of biomarkers: teaching a new dog old tricks? *Clin Pharmacol Ther.* 2010;88(6):740-2.
5. Talischi M, Mohamadnia A, Mahmoodi M, Bahrami N, Farhadi Nasab A. Predictive Blood Biomarkers in Non Small Cell Lung Cancer. *J Cell Mol Anesth.* 2022;7(2):116-21.
6. Vargas AJ, Harris CC. Biomarker development in the precision medicine era: lung cancer as a case study. *Nat Rev Cancer.* 2016;16(8):525-37.
7. Emadi M, Soltani S, Noori B, Zandi M, Shateri Z, Tabibzadeh A, et al. Highly Conserve Sequences in Envelope, Nucleoprotein and RNA-Dependent RNA Polymerase of SARS-CoV-2 in Nasopharyngeal Samples of the COVID-19 Patients; a Diagnostic Target for Further Studies. *J Cell Mol Anesth* 2022;7(2):78-83.
8. Mansouri V, Rezaiee Tavirani M, Okhovatian F, Abbaszadeh HA. Markers in Severe COVID-19 Versus Mild COVID-19. *J Cell Mol Anesth.* 2022;7(2):109-15.

Kamal Fani, MD 

Assistant Professor of Cardiac Anesthesia

Anesthesiology Research Center, Shahid Beheshti University of Medical Sciences,

Tehran, Iran; Email: kamalfani@yahoo.com

Please cite this article as: Fani, K. Biomarker Uprising: The Dazzling Paradigm Shift. *J Cell Mol Anesth.* 2022;7(2): 76-77. <https://doi.org/10.22037/jcma.v7i2.38434>

The "Journal of Cellular and Molecular Anesthesia" is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/).