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Cellular and Molecular Anesthesia: from Bench to Bedside

In the current practice of anesthesia, each day, anesthesiologists deal with a great work: they use the cellular mechanisms of drug molecules to induce their desired effects for induction and maintenance of anesthesia for appropriate tolerance of surgery and its pain, modulation of the stress response, sedation needed for performing a variety of procedures, emergency anesthesia care, acute and chronic pain management or other everyday jobs of anesthesiologists in the perioperative period.

Molecular anesthesia has been cited for more than 6 decades on a very limited scale. In 1956, the molecular mechanisms of morphine and pethidine are described (1). Pauling in 1961 published an article in Science describing a molecular theory for general anesthesia (2).

In its report "the World in 2025", Thomson Reuters has predicted clinical medicine would be the most active research front; while molecular biology has the 9th rank (3). But are we still practicing in the clinic the same as today?

The future trend of anesthesia is highly dependent on finding the novel cellular and molecular mechanisms and the possible interactions of the newly discovered molecules and interaction mechanisms with organ systems. Today, we emphasize the role of pharmacologists, physiologists, immunologists, anatomists, embryologists, geneticists, cellular medicine specialists, physicists, and other basic science specialists; some very interesting examples are published in this volume of the Journal (4-7).

However, changes that have been well started now would "revolutionize" our daily practice during the next decade in such a way that it will change the basis of medicine: presumably, we will have a new model of medicine known as "personalized medicine" or "precision medicine". In this approach, the content of each patient's genes accompanied with his/her cellular and molecular analysis is used as the basis for further diagnosis and treatment, tailoring the most appropriate treatment for each individual; some aspects of this novel approach like genetic makeup or genetic profile of an individual's tumor is nowadays approved by FDA (8-10).

In the approach of personalized medicine, not only clinical and psychological modalities are used for clinical management of patients, genetic, proteomic, and pharmacogenomic methods are used as well. Techniques are known as "bench techniques" are much more used in the clinic, at times even more than the conventional assessment tools and diagnostic methods (11, 12). Personalized medicine has started a few years ago and we will be incorporated in everyday practice; clinical anesthesia practice is not only excluded but seems to be among the front line fields due to the nature of anesthesia; especially when looking at the nearly 7 decades history of interactions between cellular and molecular medicine and anesthesia.

Cellular and molecular anesthesia is going to pave its way from bench to bedside. Possibly, in the next years, the remnants of the arbitrary line between clinical and basic medicine are completely removed; this would not take too many years.

The Thomson Reuters report "the World in 2025" has very well quoted François Voltaire just the line after its title: "It is said that the present is pregnant with the future".

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