Anesthesiology Communications

Editorial OMICS International

Precision Anesthesia: Fiction or Reality?

Chunyuan Qiu[1,2]*, Vu T Nguyen[1] and Vimal Desai[1]

[1]Department of Anesthesiology, Kaiser Permanente Baldwin Park Medical Center, 1011 Baldwin Park Blvd, Baldwin Park, CA 92649, USA
[2]Department of Anesthesiology and Peri-operative Care, UC Irvine Medical Center, 101 The City Drive South, Orange, CA 92868, USA

Editorial

The history of anesthesiology can be characterized by plateaus of progressive evolution, punctuated by moments of sudden revolution. Ancient Greek lore recounts the use of deliriant herb brew of mandragora and Datura by the goddess Circe. From India, we receive descriptions of Sushruta's cannabis vapors. China brought acupuncture and Hua Tuo's Mafeisan-wine cocktail.Despite many centuries, the techniques of anesthesia did not see any more significant progress, until the momentous day of October 16, 1846. Within the operating theatre of the prestigious Massachusetts General Hospital, Mr. William T.G. Morton ushered the modern science and discipline of anesthesiology through the successful administration to a surgical patient of the newly developed inhalation agent called ether. That event not only captivated the public imagination, but also clearly christened the new era of modern anesthesiology that would revolutionize surgery and all of medicine [1]. The medical subspecialty of anesthesiology has since achieved remarkable success and proliferation with more than 120,0000 anesthesia professionals today in the United States alone. The expanding scope of anesthetic techniques has allowed for the development of continual development of surgical techniques that are not only of ever increasing invasiveness, but also increasing precision and delicacy. Most remarkably, the pioneering efforts of anesthesia safety science has resulted in a significant decrease in mortality in the last 20 years alone and remains to this day the only medical specialty that has achieved mortality improvements by multiple orders of magnitude [2]. These remarkable triumphs of anesthesiology are a cumulative result of synergy between scientific advancement, technological progress, human factors, and rigorous professional standards of practice. Despite these achievements, emerging evidence is presenting yet another call to even further improve the practice of anesthesiology. New studies are demonstrating the potential for profound long-term effects to patients, despite relatively fleeting exposure to anesthesia. Firstly, anesthesia can alter the brain and impact cognitive function in both negative and permanent ways, an effect that has significant implications in both the young and the old for different reasons [3]. Anesthesia is known to impact immune function in ways that are directly linked to the occurrence of surgical site infection and other post-operative infections [4,5]. Furthermore, the previously shocking suggestion that anesthesia can independently influence the rates of recurrence and metastasis in various cancers has continued to gather increasingly more robust evidence [2]. Finally, within the current epidemic of opioid misuse [6] special attention must be given for comprehensive anesthetic strategies of perioperative pain management in patients suffering with chronic pain syndrome [7], and it can be utilized to mitigate the development of chronic pain syndromes [8]. The convergence of these new findings challenges the field and practitioners of anesthesiology to continue to pursue that path of continuous evolution and revolution that has been a hallmark of our field. Conventional anesthesia practice features the universal checklist, protocols, and guidelines that are rigorously adopted by individual anesthesia professionals [9]. Often based on random controlled, prospective studies, this standardization of practice helps to ensure that the majority of patients receive high quality and consistent anesthesia care, but it may be ineffective and potentially inappropriate for a minority of patients. While not diminishing improvements in quality, reliability, and safety that result from standardization of practice, the pitfall is a potential for rigidity that does not take into consideration individual variation between even normal individuals. As a striking example, it is well established that opioid metabolism can vary as much as 100-fold between individual due to different genetic makeups, which can significantly affect the anesthesia and analgesia management of these patient [10]. Thus far, more than 535 pain genes have also been identified [11] which are further personalized at epigenetic, transcriptional, and protein level [12]. Unfortunately, this crucial information is largely unnoticed within the field of anesthesiology, and its potential for clinical use is yet to be scientifically explored and studied. There is currently an explosion in "omics" science, offering a more refined understanding of genes (genomics), mRNA (transcriptomics), proteins (proteomics) and metabolites (metabolomics). This offers anesthesiology, and indeed all of medicine, an unprecedented challenge as well as opportunity to begin imagining the future of precision medicine, where individual characteristics of "personomics" become an integral anesthetic consideration and practice [13]. Precision anesthesia begins with precision delivery, which is the most fundamental and the essential component of precision medicine [14], In anesthesiology, we presently have numerous opportunities, moving away from opioid-intensive general anesthetics to individualized opioid-sparing regimens; leveraging regional anesthetic techniques to deliver anesthetics in a precise manner. By utilizing this minimally invasive anesthesia [15], we can also minimize the amount of opioids and inhalation anesthesia agents, which are important to a large number of perioperative patients. For example, in the realm of geriatric medicine, emergent hip fracture surgeries continue to rise with a high rate of mortality, but through minimizing anesthetics and opioids, we can decrease postoperative complications such as delirium, pneumonia, and myocardial infarctions and improve functional recovery [16]. Additionally, the emerging convergence between the pathway based Perioperative Surgical Home (PSH) and individual based point-of-care (POC) genetic test allow us to reconcile the vital differences between the evidence-based standardization and individualized medicine that is indeed unique to each person in their "Omics", psycho-social-living environments as well as lifestyles [17,18]. Granted, the "Omics" fields are still in their infancy, with many puzzles that are yet to be solved, as well as many technologies yet to be developed and tested, but the paradigm shift in our thinking and practice can begin now.

References

1. Adams AK (2002) Tarnished idol: William Thomas Green Morton and the introduction of surgical anesthesia. Jrsm 95: 266-267.

***Corresponding author:** Chunyuan Qiu, Department of Anesthesiology, Kaiser Permanente Baldwin Park Medical Center, 1011 Baldwin Park Blvd, Baldwin Park, CA 92649, USA, Tel: 626-851-7253: E- mail: Chunyuan.x.qiu@kp.org

Received: August 31, 2017; **Accepted:** September 01, 2017; **Published**: September 06, 2017

Citation: Qiu , Nguyen VT, Desai V (2017) Precision Anesthesia: Fiction or Reality? Anesth Commun 1: e001.

2. Staender SE, Mahajan RP (2011) Anesthesia and patient safety: Have we reached our limits? Curr Opin Anaesthesiol 24: 349-353.

3. Colon E, Bittner EA, Kussman B, Mccann ME, Soriano S, et al. (2017) Anesthesia, brain changes, and behavior: Insights from neural systems biology. Prog Neurobiol 153: 121-160.

4. Bardia A, Sood A, Mahmood F, Orhurhu V, Mueller A, et al. (2016) Combined epidural-general anesthesia vs. general anesthesia alone for elective abdominal aortic aneurysm repair. JAMA Surg 151: 1116.

5. Thomson DA (1987) Anesthesia and the immune system. J Burn Care Rehabil 8: 483-487.

6. https://www.drugabuse.gov/related-topics/trends-statistics/overdose-death-rates

7. Desai VN, Ahn JC, Ahn KS (2016) Perioperative management of the surgical patient on suboxone (Buprenorphine an Naloxone). Scientific American Pain Management 1-5.

8. Reuben SS (2004) Preventing the development of complex regional pain syndrome after surgery. Anesthesiology 101: 1215-1224.

9. Correll D, Bader A (2017) Precision medicine versus procrustean beds. Anesth Analg 124: 1032-1033.

10. Somogyi A, Coller J, Barratt D (2014) Pharmacogenetics of opioid response. Clin Pharmacol Ther 97: 125-127.

11. Ultsch A, Kringel D, Kalso E, Mogil JS, Lötsch J (2016) A data science approach to candidate gene selection of pain regarded as a process of learning and neural plasticity. Pain 157: 2747-2757.

12. He X, Fan L, Wu Z, He J, Cheng B (2017) Gene expression profiles reveal key pathways and genes associated with neuropathic pain in patients with spinal cord injury. Mol Med Rep 15: 2120-2028.

13. http://jamanetwork.com/journals/jamainternalmedicine/article-abstract/2247166

14. Parikh RB, Schwartz JS, Navathe AS (2017) Beyond genes and molecules-A precision delivery initiative for precision medicine. N Engl J Med 376: 1609-1612.

15. Pawlowski J, Haering JM, Comunale ME, Mashikian J, Reynolds D, et al. (1997) Minimally invasive anesthesia should accompany minimally invasive surgery. J Cardiothorac Vasc Anesth 11: 536-537.

16. Luger TJ, Kammerlander C, Gosch M, Luger MF, Kammerlander-Knauer U, et al. (2010) Neuroaxial versus general anaesthesia in geriatric patients for hip fracture surgery: Does it matter? Osteoporos Int 21: 555-572.

17. Iravani M, Lee LK, Cannesson M (2017) Standardized care versus precision medicine in the perioperative setting. Anesth Analg 124: 1347-1353.

18. Senagore AJ, Champagne BJ, Dosokey E, Brady J, Steele SR, et al. (2017) Pharmacogenetics-guided analgesics in major abdominal surgery: Further benefits within an enhanced recovery protocol. Am J Surg 213: 467-472.

Citation: Qiu , Nguyen VT, Desai V (2017) Precision Anesthesia: Fiction or Reality? Anesth Commun 1: e001.