

93. Hirst JA, Howick J, Aronson JK, Roberts N, Perera R, Koshiaris C, Heneghan C: The need for randomization in animal trials: An overview of systematic reviews. *PLoS One* 2014; 9:e98856
94. Bebart V, Luyten D, Heard K: Emergency medicine animal research: Does use of randomization and blinding affect the results? *Acad Emerg Med* 2003; 10:684–7
95. van der Worp HB, Howells DW, Sena ES, Porritt MJ, Rewell S, O'Collins V, Macleod MR: Can animal models of disease reliably inform human studies? *PLoS Med* 2010; 7:e1000245
96. Hackam DG, Redelmeier DA: Translation of research evidence from animals to humans. *JAMA* 2006; 296:1731–2
97. Henderson VC, Kimmelman J, Fergusson D, Grimshaw JM, Hackam DG: Threats to validity in the design and conduct of preclinical efficacy studies: A systematic review of guidelines for *in vivo* animal experiments. *PLoS Med* 2013; 10:e1001489
98. Baker D, Lidster K, Sottomayor A, Amor S: Two years later: Journals are not yet enforcing the ARRIVE guidelines on reporting standards for pre-clinical animal studies. *PLoS Biol* 2014; 12:e1001756
99. Contopoulos-Ioannidis DG, Ntzani E, Ioannidis JP: Translation of highly promising basic science research into clinical applications. *Am J Med* 2003; 114:477–84
100. Kilkenney C, Browne WJ, Cuthill IC, Emerson M, Altman DG: Improving bioscience research reporting: The ARRIVE guidelines for reporting animal research. *PLoS Biol* 2010; 8:e1000412
101. Bolle I, Eder G, Takenaka S, Ganguly K, Karrasch S, Zeller C, Neuner M, Kreyling WG, Tsuda A, Schulz H: Postnatal lung function in the developing rat. *J Appl Physiol* 2008; 104:1167–76

## ANESTHESIOLOGY REFLECTIONS FROM THE WOOD LIBRARY-MUSEUM

### Balanced Anesthesia with Moonflowers and Monkshoods: Behind Hanaoka's *Mafutsusan* (Year 1804, Part 3)



After adding four minor sedating herbs to his gradually ranging ratio from a 2:1 up to a 4:1 mixture by weight of moonflowers to monkshoods, Japan's Seishū Hanaoka (1760–1835) produced an herbal potion now considered the world's first successful *recorded* surgical anesthetic. Not a "slash and dash" surgeon, Hanaoka spent two decades formulating his anesthetic *mafutsusan* ("powder to make go away") in order to minimize his patients' side effects by balancing moonflowers' tachycardia against monkshoods' bradycardia and by allowing monkshoods' aconitine to potentiate moonflowers' anticholinergic delirium. Hanaoka's use of *mafutsusan* for surgical anesthesia preceded William Morton's ether demonstration by 42 years, but ironically both anesthetic firsts occurred in the same month of the year—October. (Copyright © the American Society of Anesthesiologists, Inc.)

George S. Bause, M.D., M.P.H., Honorary Curator, ASA's Wood Library-Museum of Anesthesiology, Schaumburg, Illinois, and Clinical Associate Professor, Case Western Reserve University, Cleveland, Ohio. UJYC@aol.com.