Effects of Anesthesia on the Developing Brain
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The possibility of long-term changes in the developing brain after exposure to anesthesia was first described in rodents and gained wider exposure in the anesthesia community a little more than a decade ago. Since that time pre-clinical studies using nearly all common general anesthetic drugs have shown changes including brain cell death, loss of synapses, and alteration of neural stem cell function. Some of these changes are immediate and some persist well into development. In addition, many studies find changes in cognitive function such as spatial or recognition memory.

The first human studies in 2009 were retrospective and reported that early exposure to anesthesia was associated with diagnosis of a learning deficit prior to completion of high school(1). Studies in non-human primates have shown many of the same structural changes in the brain that have been reported in rodents and a recent trial in rhesus monkeys found emotional behavior was altered after repeated early exposure to anesthesia (2). The first prospective trial in a small group of human children was published in 2014 and reports a specific deficit in recognition memory similar to that reported in rodents(3). A number of larger ongoing trials are currently in progress and some results may be available in the next few years.

A consensus statement from a variety of groups with interest in pediatric anesthesia can be found on the website for the Smart Tots organization, a public private-private partnership focused on increasing our understanding of this concern. The statement is currently being revised and may be updated in the near future (4).
References


