

Anesthesia is a cornerstone of modern medical practice, yet its effects on brain function, respiratory system, and patient safety remain subjects of ongoing research and scrutiny. This review aims to provide a comprehensive analysis of anesthesia's impact on these critical aspects of patient care. The need for a thorough understanding of anesthesia's effects on brain function, respiratory parameters, and overall patient safety, particularly in vulnerable populations such as pediatric patients need to be addressed. Utilizing a systematic review methodology, this study synthesizes evidence from a range of studies and experiments, focusing on anesthesia's effects on brain activity, respiratory parameters, and the role of anesthesia in enhancing patient safety during surgical procedures. The analysis reveals significant insights into anesthesia's impact on brain function, including short-term memory consolidation impairments and potential neurotoxicity concerns, especially in pediatric populations. In pediatric populations, exposure to anesthesia can potentially disrupt brain development, long-term cognitive deficits, learning disabilities, and behavioral problems. Furthermore, the review highlights the effects of anesthesia on respiratory parameters and the crucial role of anesthesia in maintaining patient safety during surgical interventions. For further studies, scientists need to study the neurotoxicity mechanisms, optimal dosing

alternative agents they could be using. The findings underscore the importance of ongoing research and vigilance in anesthesia practices to optimize patient outcomes, minimize risks, and enhance overall patient safety. Through collaborative efforts and innovative advancements, the medical community can continue to improve anesthesia techniques and protocols, ultimately benefiting patient care and medical outcomes.