Section C. Abstract

For laboratory animal anesthesia, inhalational agents are generally delivered in 100% oxygen. The current rodent surgical guidelines at this institution “strongly recommend” against the use of anything other than 100% oxygen for anesthesia. This is in spite of documented complications from long-term 100% oxygen use in human medicine and the known occupational safety risks associated with pure oxygen. However, some laboratories use room air to deliver isoflurane during rodent anesthesia. To our knowledge, no studies have been undertaken to directly evaluate oxygen concentration for rodent anesthesia via nose cone and whether it impacts physiologic parameters or recovery from anesthesia. Therefore, we conducted preliminary studies comparing 100% oxygen to 21% oxygen for one hour of anesthesia in mice. The results suggested no differences in physiological parameters, but did reveal evidence of a ventilation/perfusion mismatch suggestive of significant atelectasis in the 100% oxygen group. These compelling results warrant further investigation. Therefore, we hypothesize that delivery of isoflurane in 21% oxygen will not impact select physiological parameters in rodents but will reduce atelectasis compared to delivery in 100% oxygen. The first aim of this study is to verify our preliminary results in mice and determine if the same is true for rat anesthesia. The second aim of our study is to determine the extent of atelectasis through lung function tests, histology, and/or computed tomography in the two species. The results could have significant impact on recommendations for rodent anesthesia, ultimately impacting rodent welfare, lung research studies, and laboratory safety.