**Supplemental methods for Groups 3 and 4:** Female Sprague Dawley rats (300-340g) were used for the studies. The rats were induced with 3% isoflurane and allowed to breathe spontaneously. An arterial catheter was inserted into the femoral artery; and cerebrospinal fluid catheter sham operation was performed. The skin wounds were closed. The rats were randomly assigned to receive either isoflurane or dexmedetomidine + low dose isoflurane (DEXM-I); and the anesthetic regimens and physiological monitoring was carried out as for Groups 1 and 2. The rats were placed in the 9.4T instrument and MRI scanning was commenced. Arterial blood gases were collected 1-2 times over 1 hr. The spinal catheter was not perfused with contrast for these experiments.

**Supplemental results:** The average respiratory rates for group 3 and 4 rats were within similar ranges: (isoflurane: 59 ± 7 bpm vs DEXM-I 51 ± 10 bpm, p=0.39). The average heart rate in rats anesthetized with DEXM-I was lower than rats anesthetized with isoflurane (DEXM-I: 271 ± 40 vs isoflurane: 341 ± 44, p<0.05). Table 1S shows that the arterial PaCO2, pH and PaO2 were also similar between the two groups.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Group | Anesthesia | PaCO2 mmHg | PaO2 mmHg | pH |
| 3 (N=4) | Isoflurane | 42.4 ± 3.7 | 288.2± 5.8 | 7.36 ± 0.03 |
| 4 (N=4) | DEXM-I | 49.2 ± 7.4 | 266.8± 40.9 | 7.34 ± 0.06 |

 **Table 1S: Arterial blood gas analysis**

Data are presented as mean ± SD.

.