

DRAFT FINAL REPORT

Examination of Real-time Heart Rate Variability During the Anesthetized State

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Report No. XX-XX, supported by the Office Of Naval Research, Department of the Navy, under Contract No. K0999BH3180, Order No. 9T9T022A/AA03. The views expressed in this article are those of the authors and do not reflect the official policy or position of the Department of the Navy, Department of Defense, or the U.S. Government. Approved for public release, distribution unlimited.

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EXECUTIVE SUMMARY

Autonomic Nervous System (ANS) Monitoring based on Real-time Heart Rate Variability (rt-HRV) techniques is a unique and novel means of non-invasively monitoring the physiologic status of patients undergoing surgical procedures requiring general anesthesia. ANS monitoring can quantify physiologic state through a measure of the tone of the sympathetic and parasympathetic branches of the ANS. Fifty-seven patients were studied before, during, and after anesthetic induction, surgery, and the immediate post-operative recovery period. ANS monitoring parameters (Low Frequency area, High Frequency area, and Low to High Ratio) along with Mean Arterial Pressure, Heart Rate, arterial hemoglobin oxygen saturation by pulse oxymetry, and inspired fraction of oxygen concentration information was collected and analyzed. The ANS monitoring parameter data were found to be more sensitive than the hemodynamic parameter data to changes in physiologic state, including anesthesia and sedation, intubation and extubation, incisions and surgical stimulation, bleeding, and post-operative recovery. This preliminary study provides evidence that ANS monitoring, using rt-HRV, offers physicians additional information regarding the physiologic state of their general surgery patients and the relative effects of anesthesia.

This document only addresses the immediate intra-operative period from immediately following the patients' entry into the operating room, to immediately prior to the patients' departure from the operating room. Pre-operative and Post-operative monitoring data from outside of the operating room were not included in this preliminary study.

The fundamental research questions that were expected to be answered from this project are:

- 1) "Is ANS monitoring sensitive to changes in physiologic conditions during the anesthetized state?"; and
- 2) "How does the relatively novel ANS monitoring data compare and contrast with some of the established hemodynamic data?".

These questions provided the basis for the data collection and analysis portions of the project documented herein.