

**TITLE:** FALSE POSITIVE DIAGNOSIS OF MALIGNANT HYPERTHERMIA SUSCEPTIBILITY IN CONTROL SUBJECTS USING THE NORTH AMERICAN CAFFEINE HALOTHANE CONTRACTURE TEST

**AUTHORS:** M.G. Larach, M.D., J.R. Landis, Ph.D., The North American Malignant Hyperthermia Registry

**AFFILIATION:** The North American Malignant Hyperthermia Registry (NAMHR), Department of Anesthesia and Center for Biostatistics and Epidemiology, Penn State University, Hershey, PA 17033

The caffeine halothane contracture test (CHCT) is considered the most reliable laboratory method for the diagnosis of malignant hyperthermia susceptibility (MHS).<sup>1</sup> We estimated false positive rates of MHS diagnosis when the CHCT is performed according to the 1987 North American protocol.<sup>2</sup> Following approval of the IRB, data from 183 non-MHS control subjects were submitted by 12 biopsy centers for analysis. False positive rates were computed utilizing a set of conventional cutpoints for contracture tension responses to a) 3% halothane (HAL); b) 2mM caffeine (CAFF); c) percent response to incremental CAFF; and d) CAFF specific concentration (CSC).

Among centers with  $n \geq 10$ , the overall false positive rate using HAL=3% and cutpoint  $>0.2g$  was 42% (range 16–77%). Increasing the cutpoint to  $>0.7g$  lowered the overall false positive rate to 15% (0–35%). A cutpoint of  $\geq 0.2g$  at 2mM CAFF yielded an overall false positive rate of 21% (0–48%). A cutpoint of  $>7\%$  maximal tension at 2mM CAFF gave an overall false positive rate of 5% (0–10%). A CSC cutpoint at  $<4mM$  CAFF yielded an overall false positive rate of 42% (0–86%).

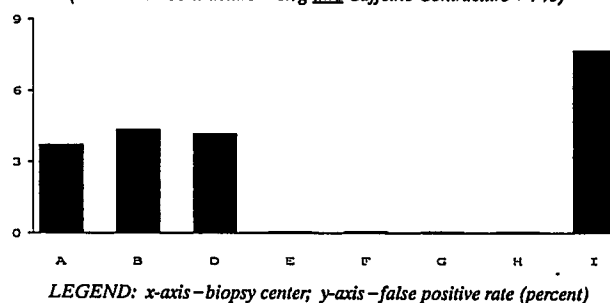
Variables examined for their contribution to false positive rates included: center, subject age, clinical anesthetic, muscle excision—test completion time, muscle type, replicate strips/subject, and pre-agent twitch height/cross sectional area. Differences among biopsy centers

contributed the major source of variation in false positive rates.

Using a new joint agent threshold (3% HAL cutpoint  $>0.7g$  and 2mM CAFF cutpoint  $\geq 0.2g$ ) substantially lowered the overall false positive rate to 8% (range 0–20%). Another new joint agent threshold ( $>0.7g$  at 3% HAL and  $>7\%$  maximal tension at 2mM CAFF) also lowered overall false positive rate to 3% (range 0–8%).

**Conclusion:** This is the first multicenter analysis of the North American protocol for the CHCT. We found a large false positive rate when using single agent thresholds; this rate was markedly reduced when joint agent thresholds were utilized to diagnose MHS.

**FALSE POSITIVE RATE FOR JOINT AGENTS**  
(Halothane Contracture  $>0.7g$  and Caffeine Contracture  $>7\%$ )



**References** 1. Ording H: Diagnosis of susceptibility to MH in man. *Br J Anaesth* 60:292,1988; 2. Larach, MG for the NAMH Group: Standardization of the caffeine halothane muscle contracture test. *Anesth Analg* 69:511-515,1989. **Support:** ASA, NAMHR, Penn State Dept of Anesthesia, and Center for Biostatistics & Epidemiology

## A1014

**TITLE:** HUMAN FACTORS AFFECTING ACCURACY OF HAND-WRITTEN ARTERIAL PRESSURE RECORD

**AUTHORS:** K. Shibutani, M.D., M. Bairamian, M.D., D. Subhedar, M.D., N. Kashiwagi, M.D., K. Kubal, M.D.

**AFFILIATION:** Dept. of Anes., New York Medical College, Valhalla, NY 10595

Today, the anesthesiologists are faced with multiple monitoring requirements and therapeutic activities. Arterial pressure is often continuously displayed on the monitoring screen. In this setting, multiple human factors are expected to affect accuracy of hand-written records. In this study, we examined how hypotensive episodes identified in the continuous records were reflected in hand-written arterial pressure records. In fifty-five patients undergoing surgery of abdominal aneurysm, systolic arterial pressure (SAP) and diastolic arterial pressure (DAP) were continuously displayed on the monitoring screen and also continuously recorded on paper. The lowest SAP in continuous records (SAP.C) were compared to the corresponding lowest hand-written SAP records (SAP.A).

(1) There were large discrepancies between continuous records and hand-written records both in SAP and DAP. SAP.A were almost always greater than SAP.C by 21–28 mmHg; whereas, discrepancies in DAP were less as compared to SAP. DAP.A were higher than DAP.C in 31 incidences and were lower in 11

instances. (2) In continuous recording, pulse pressure (PP) decreased proportionally when SAP decreased ( $r=0.7$ ,  $P<0.001$ ). This relationship was lost in the hand-written record. (3) During induction, discrepancies of SAP were not related to duration of hypotension, but during surgery discrepancies were related to the duration of hypotension ( $r=0.5$ , and  $P<0.05$ ) if hypotensive episodes due to accidental overshooting of sodium nitroprusside were excluded.

During induction, blood pressure records were entered almost always from memory. However, this does not explain large discrepancies of SAP observed during surgery. Transient episodes were often ignored. Psychological reluctance of recording low arterial pressure exists. Psychological bias appears less in DAP recording.

Table 1: Mean Values and Standard Deviations

		During Induction (n=16)	During Surgery (n=42)
SAP.C	mmHg	78.8±5.7	78.0±8.7
SAP.A	mmHg	104±19	96.5±10.9
DAP.C	mmHg	42.6±9.8	45.2±9.3
DAP.A	mmHg	58.3±10.5	57.1±12.1
ΔSAP	mmHg	28.8±19.1	21.7±15.1
ΔDAP	mmHg	16.5±11.6	13.5±12.9
PP.C	mmHg	30.8±8.4	24.6±7.9
PP.A	mmHg	45.3±10.6	40.1±9.7

|ΔSAP|=|SAP.A - SAP.C|, |ΔDAP|=|DAP.A - DAP.C|  
PP = pulse pressure