INFLUENCE OF REPEATED DAILY DIVING ON DECOMPRESSION STRESS

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INTRODUCTION

♦ Acclimatization is adaptive change to repetitive natural exposure

♦ Repetitive diving could influence decompression stress
  - positive - protective effect
  - negative - sensitizing effect

♦ Published data are ambiguous
  - confounder may be typical human behavior
    ♦ e.g., shift in profile pattern over a dive series

♦ Our Purpose
  - to evaluate identical dives conducted over consecutive days
METHODS

- Sixteen experienced male divers
- Identical no-decompression air dives on 4 consecutive days
  - 18 msw (60 fsw) / 47 min bottom time
    - moderate exercise throughout
  - controlled ocean environment (16 °C/61 °F)
    - pressure profiles captured electronically
METHODS

- Post-dive bubble monitoring
  - transthoracic echocardiography (TTE)
    - GE Vivid q
    - every 20 min for 2 h
    - rest, post-arm move, post-leg move
  - technician pair consensus scoring
METHODS

- Bubble grade differences evaluated with cumulative logistic proportional odds model for multinomial data
  - diver-to-diver and time-to-time basis using generalized estimating equations (GEE) for repeated measures
  - All days of diving for all bubbles
  - Day 1 vs. 4 for all bubble grades
  - Day 1 vs. 4 for grades >III
RESULTS

- There were no signs or symptoms of DCS.
Figure 1. Assessment of a linear dose-response relationship for the odds (logit-risk) of having a higher-grade bubble over four consecutive days of diving referent to Day 1 (Zanchi et al., in press).
Figure 2. Distribution of bubble grades on Day 1 and Day 4 of air repetitive diving series, pooled for six sample points (Zanchi et al., in press).
RESULTS

- Odds of having a relatively higher bubble grade on Day 4 were half the odds of having a higher bubble grade on Day 1
  - OR 0.50 (95% CI: 0.34, 0.73)

- Odds of having a >III bubble grade on Day 4 were almost one-third the odds of having a >III bubble grade on Day 1
  - OR 0.37 (95% CI: 0.20, 0.70)
CONCLUSION

- Repetitive, identical daily diving can reduce bubble formation, representing positive acclimatization

- Further work needed to determine
  - if the acclimatization pattern holds true with
    - additional days of diving
    - multiple dives per day
    - variable profiles
  - if the magnitude of the effect is sufficient to alter the absolute risk of DCS
  - the absolute risk associated with left vs. right heart bubbles