

# INFLUENCE OF REPEATED DAILY DIVING ON DECOMPRESSION STRESS



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# DISCLOSURE INFORMATION

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- ◆ I have no financial relationships to disclose
- ◆ I will not discuss off-label use or investigational use in my presentation

# 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

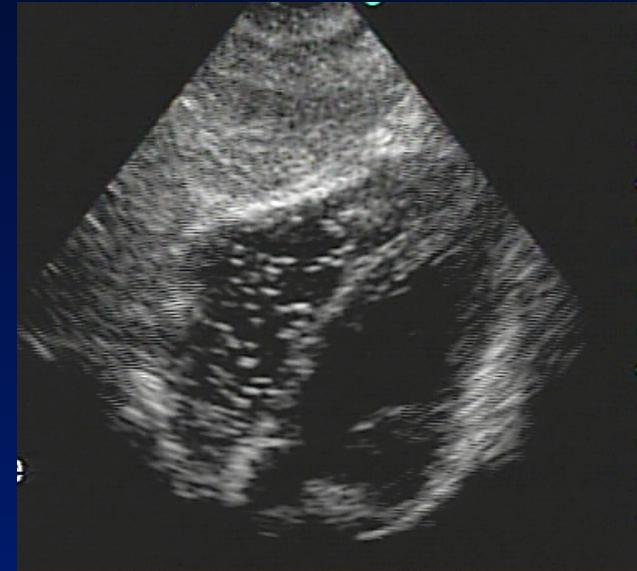
# METHODS

- ◆ 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.

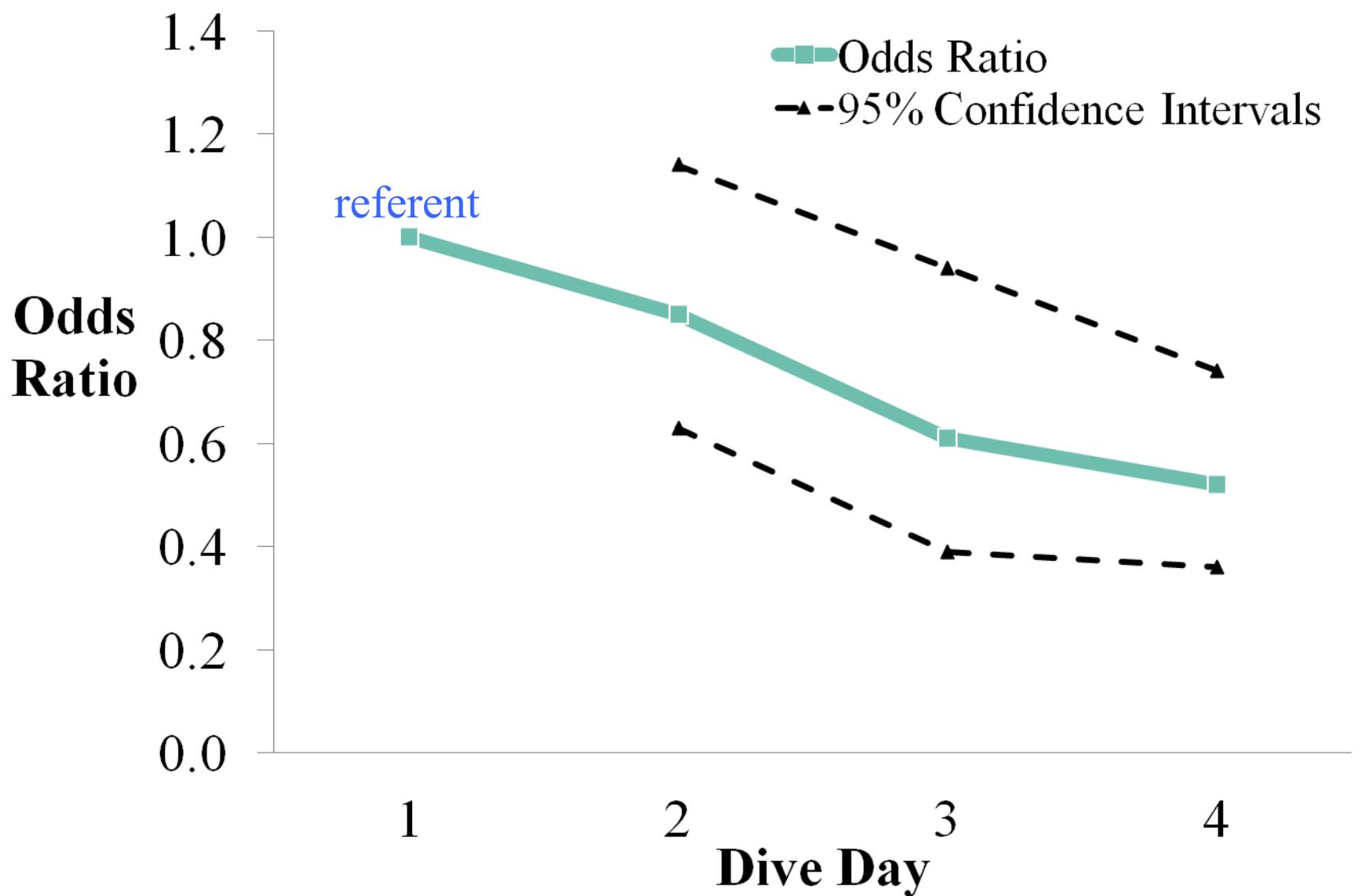


Figure 1. Assessment of a linear dose-response relationship for the odds (logit-risk) of having a higher-grade bubble over four consecutive days of diving referent to Day 1 (Zanchi et al., in press).

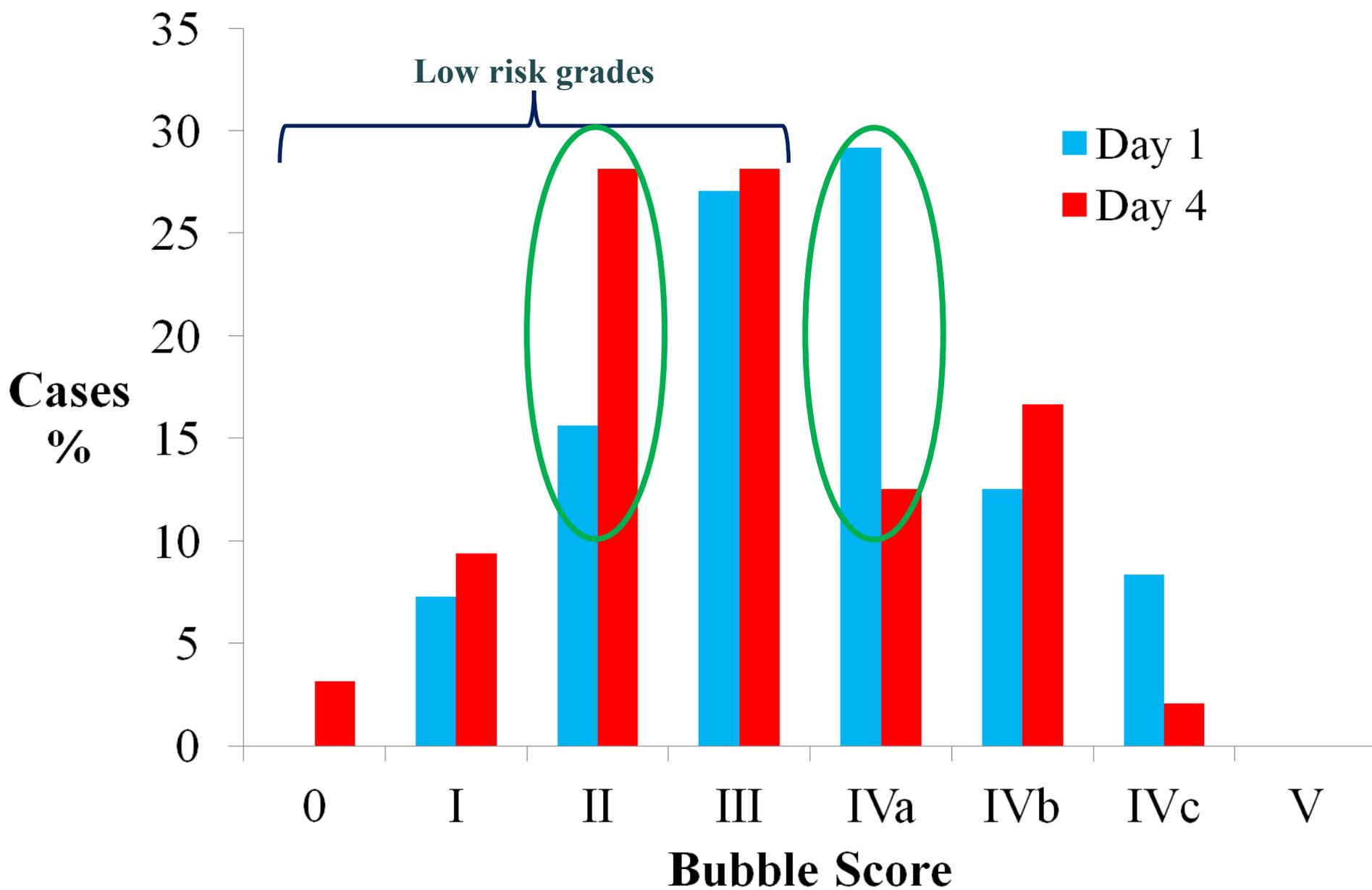


Figure 2. Distribution of bubble grades on Day 1 and Day 4 of air repetitive diving series, pooled for six sample points (Zanchi et al., in press).

# 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