



# Hyperbaric Oxygen Therapy Effects on Blood Pressure

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# Background

- Important to quantify risks and benefits of HBOT for our patients
  - Barotrauma
  - O<sub>2</sub> Toxicity
  - Hypoglycemia
  - Confinement anxiety

# Background

- HBO known to have effects on blood pressure and heart rate
- Previous studies suggest an increase in BP with HBOT
  - Primarily quantified in dive medicine
  - Multiple animal studies
  - Effects are not as well quantified in the clinical setting
- We sought to better quantify HBOT effects on BP in the clinical setting and identify any risk factors

# Background

- Decreased HR
  - Evidence suggests increased vagal tone/parasympathetic effect
- Increased SVR
  - Evidence suggests a decrease in endothelium-derived vasodilators (ie nitric oxide)
  - Evidence suggests increased sympathetic activity

Abel FL et al. UHM 2000.  
Shibata S et al. Aviat Space  
Environ Med 2005. Hink J  
et al. J Phys Heart Circ  
Phys 2006.

# Materials & Methods

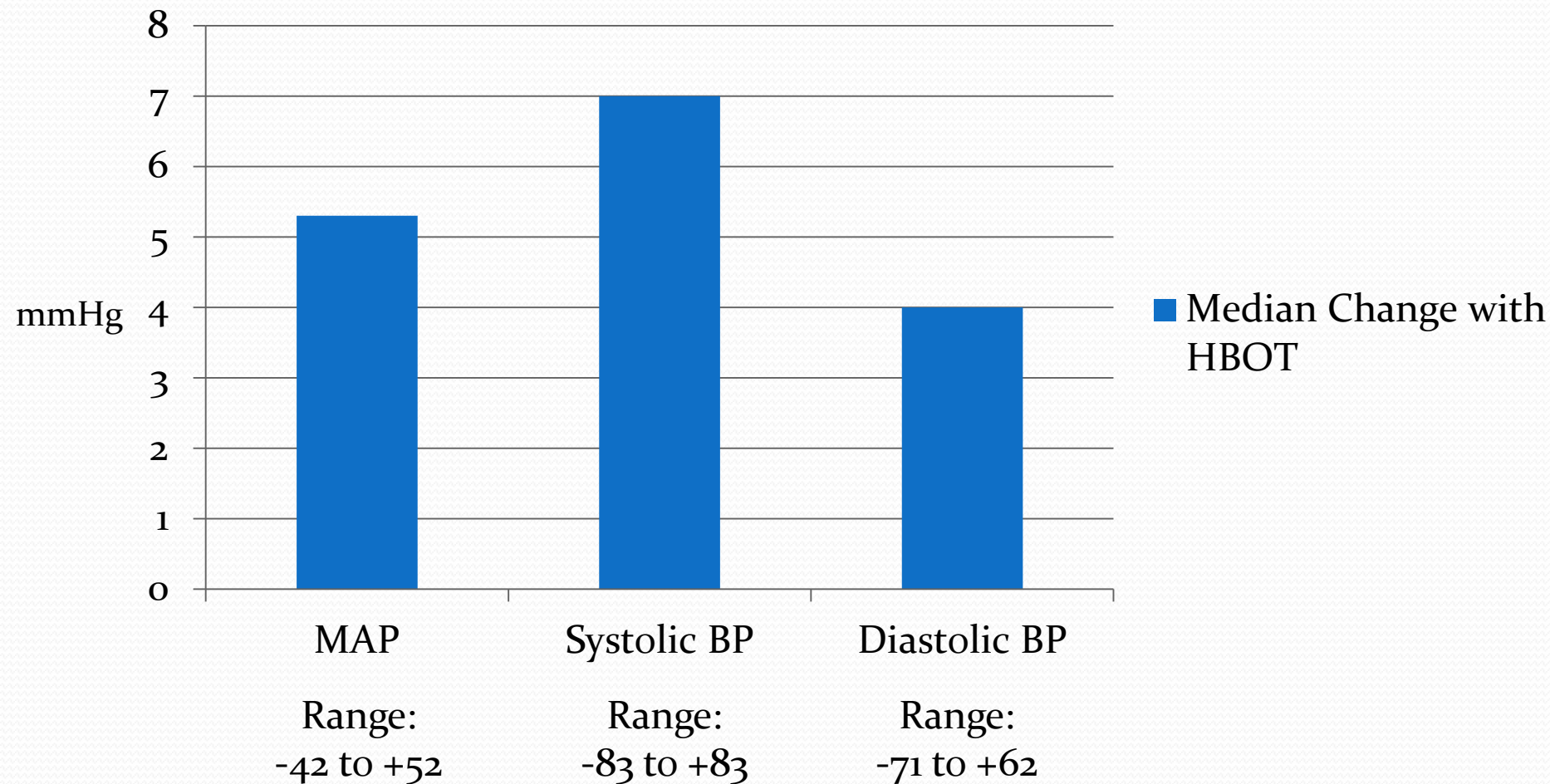
- Blood pressure data was prospectively collected as part of a quality initiative
  - Pre and Post HBOT
  - March 2012 – December 2014
- 145 patients representing 2952 treatments

# Materials & Methods

- Additional data was collected retrospectively
  - HBOT protocol
  - Demographic information
  - Anti-hypertensive medications
  - Co-morbid Illness
    - Diabetes, CAD, PVD, CVD, Peripheral Neuropathy, Tobacco

# RESULTS

## Median Change with HBOT



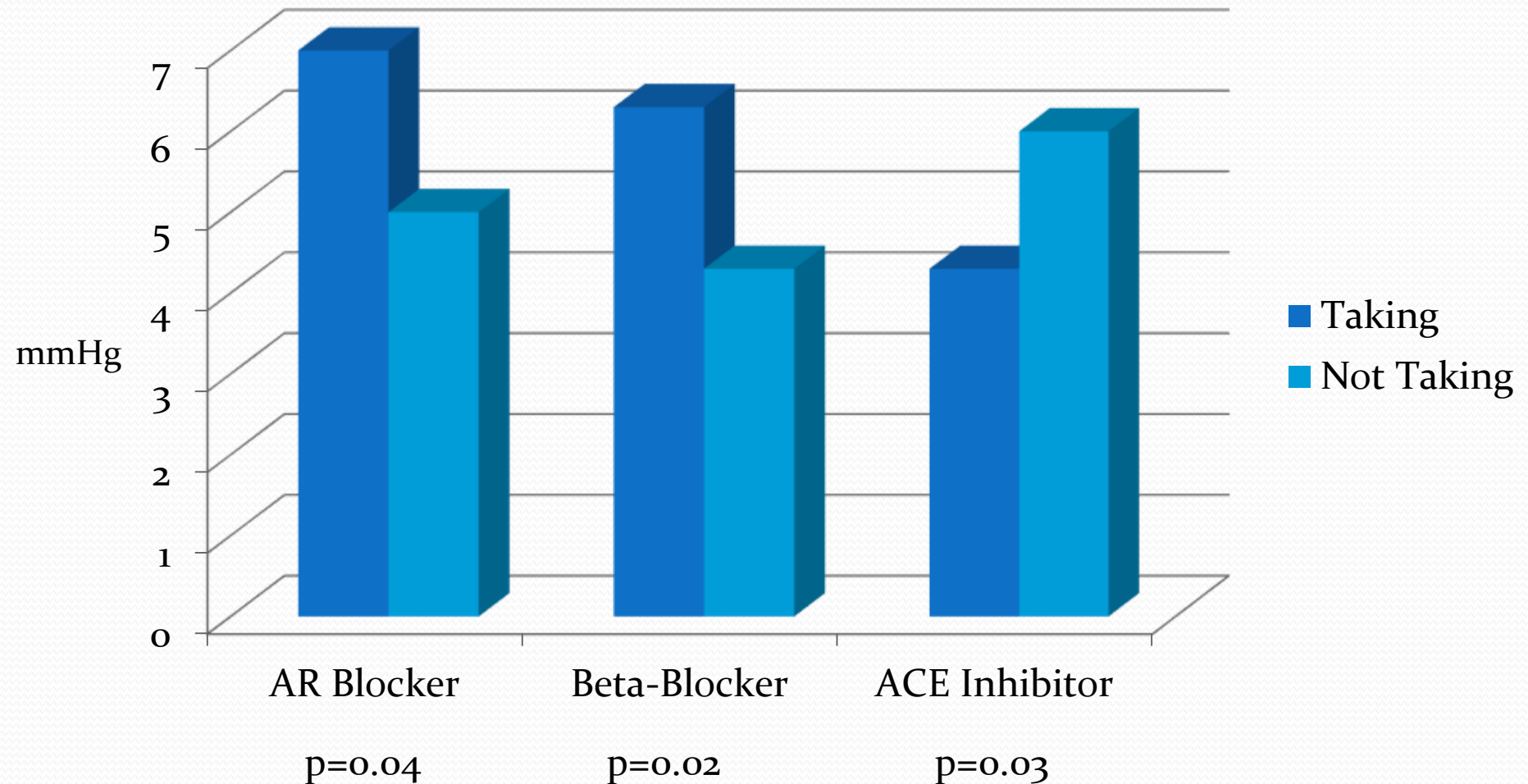
# Among those with HTN

- Anti-hypertensive effect on change in BP:
  - Exacerbated Effect:
    - Angiotensin Receptor Blocker ( $p=0.04$ )
    - Beta-Blocker ( $p=0.02$ )
  - Lessened Effect:
    - ACE (Angiotensin-Converting Enzyme) Inhibitor ( $p=0.03$ )
  - No change:
    - Alpha-agonist
    - Calcium Channel Blockers



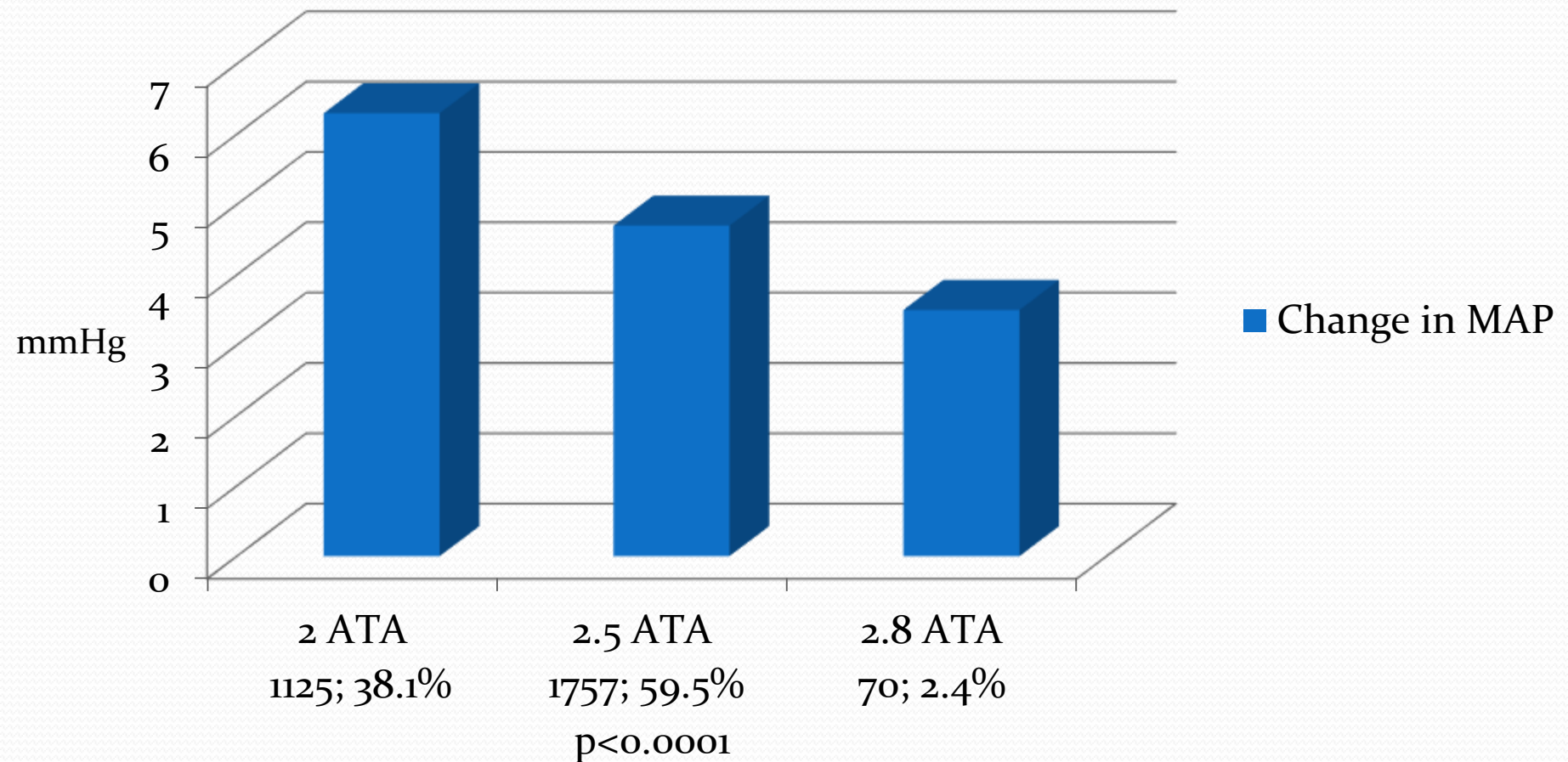
# Patients with HTN

## Different Anti-hypertensive Medications



# Change by treatment pressure

## Change in MAP



# HBOT & BP Change

- Change with treatment time – NS
  - 90 minutes: 5 mmHg increase
  - 120 minutes: 6.3 mmHg increase
- HTN vs. No HTN – NS
  - 57.5% HTN
  - 42.5% No HTN

# Summary

- Overall increase in blood pressure with HBOT
  - Both with HTN and without HTN
- Significant range
  - Both increase and decrease
  - Would benefit from further analysis to determine if variability is between patients (ie individuals consistently increased or decreased)

# Summary

- Among those with HTN:
  - Exacerbated Effect:
    - Angiotensin Receptor Blocker
    - Beta-Blocker
  - Lessened Effect:
    - Angiotensin-Converting Enzyme Inhibitor
  - No change:
    - Alpha-agonist
    - Calcium Channel Blockers

# Summary

- Demonstrated diminished effect on BP with increasing treatment pressure
  - Counter intuitive
  - Warrants further investigation
- Demonstrated no statistically significant change in BP with longer treatment time



Questions?