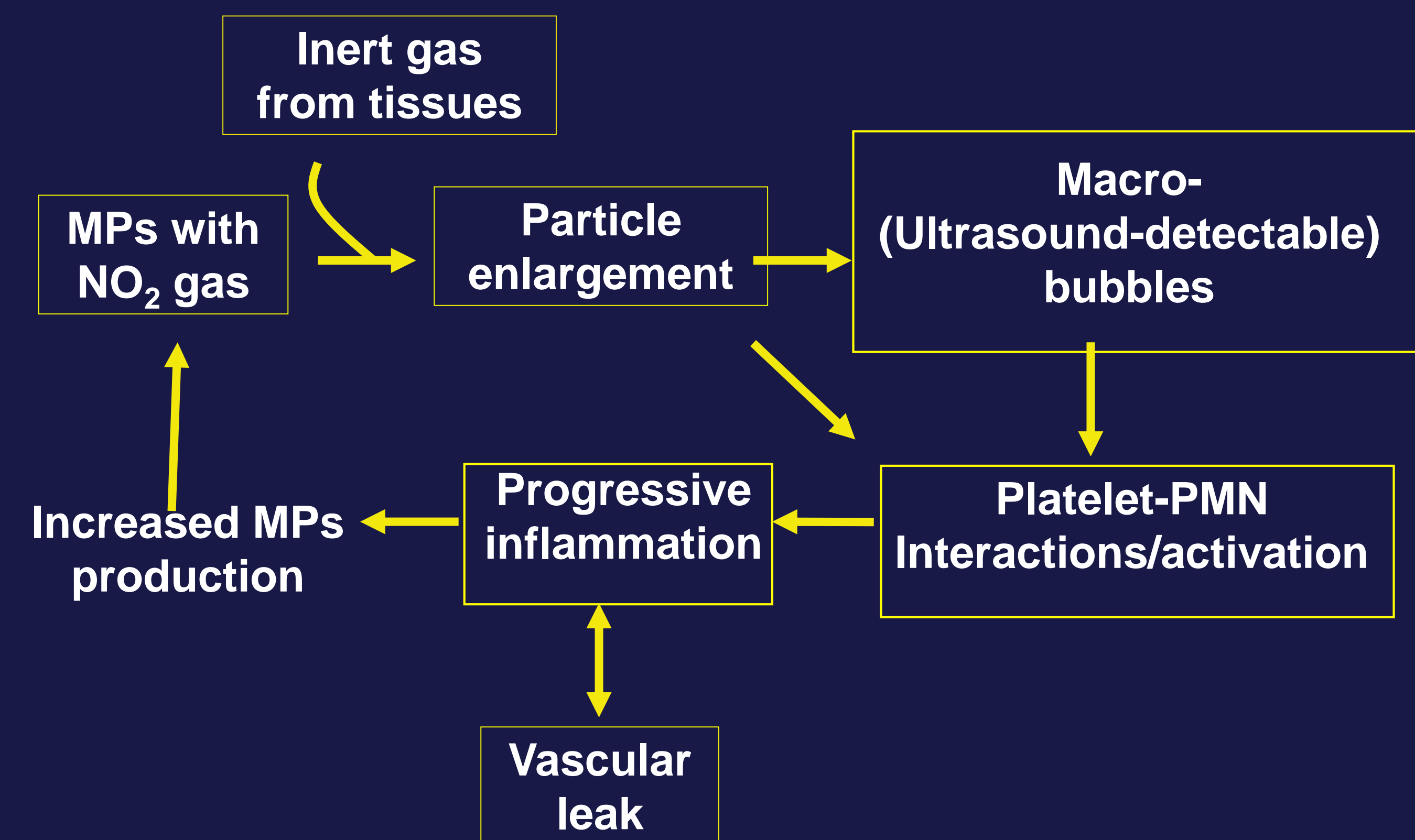


## BACKGROUND:

Circulating microparticles (MPs) appear to cause some of the insults following decompression stress. MPs are elevated in animals and humans after simulated or *bona fide* underwater diving. Ascorbic acid (AA) inhibits *ex vivo* high gas pressure-induced MPs generation by neutrophils. This study evaluated whether AA supplementation inhibits MPs elevations and inflammatory changes in human divers and mice.

## HYPOTHESIZED PROCESS:



### HUMAN STUDIES

*Eur J Appl Physiol* 105, 507 (2009)  
*Aviat Space Environ Med* 81, 41 (2010)  
*Appl Physiol Nutr Metab* 37, 1 (2012)  
*J Appl Physiol* 112, 1268 (2012)  
*J Appl Physiol* 115, 1481 (2013)  
*Eur J Appl Physiol* 114: 1955 (2014)  
*Med. Sci. Sports Exerc.* 46: 1928 (2014)

### MOUSE MODEL

*J Appl Physiol* 110, 340 (2011)  
*J Appl Physiol* 112, 204 (2012)  
*J Appl Physiol* 114, 550 (2013)

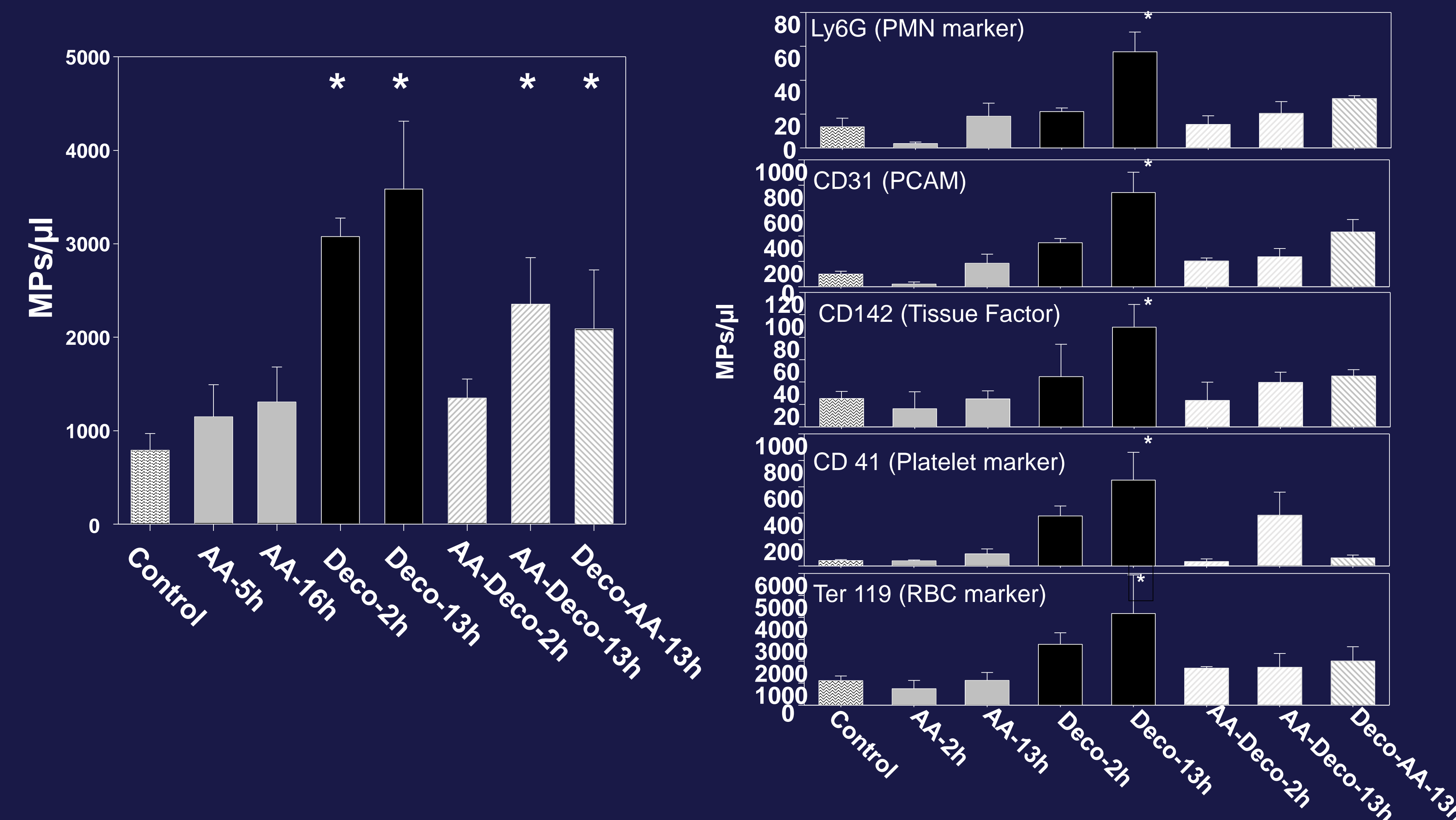
### COMBINED HUMAN + MOUSE

*J Biol Chem* 289: 18831 (2014)

## METHODS:

Mice received 500 mg/kg AA IP 1 hour before or just after a 2 h exposure to 690 kPa air pressure. Blood was obtained and analyzed for MPs and neutrophil activation, and vascular injury assessed following published techniques.

## AA prophylaxis & post-dive treatment inhibit MPs formation & sub-groups



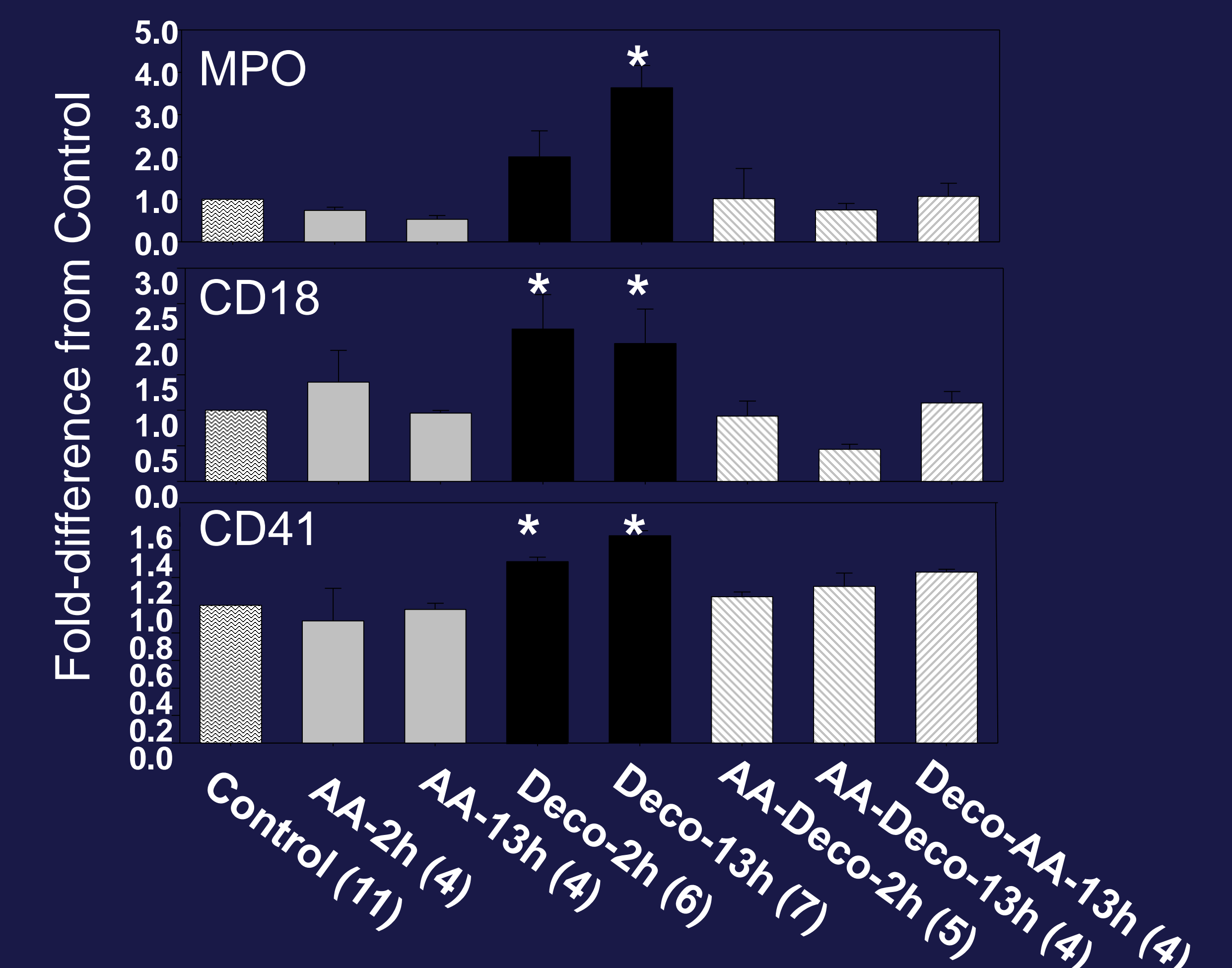
## RESULTS:

1. Pressure/decompression cause over 3-fold elevations in circulating MPs as well as sub-groups bearing a variety of vascular cell proteins. There was evidence of significant neutrophil activation, platelet-neutrophil interactions and vascular injury to brain, omentum, psoas and skeletal muscles assessed as leakage of high molecular weight dextran.
2. Prophylactic ascorbic acid (500 mg/kg IP) administration prevented all post-decompression neutrophil changes and vascular injuries.
3. Ascorbic acid administration immediately after decompression abrogated most changes, but evidence of vascular leakage in brain and skeletal muscle at 13 hours post-decompression persisted.
4. No significant elevations in these parameters occurred after injection of ascorbic acid alone.

## CONCLUSION:

The findings support the idea that MPs production occurring with exposures to elevated gas pressure is an oxidative stress response and that anti-oxidants may offer protection from pathological effects associated with decompression.

## AA prophylaxis & post-dive treatment inhibits PMN activation



## AA prophylaxis inhibits 2 X 10<sup>6</sup> Da dextran vascular leak

