

MICROPARTICLE PRODUCTION, NEUTROPHIL ACTIVATION & INTRAVASCULAR BUBBLES FOLLOWING OPEN-WATER SCUBA DIVING

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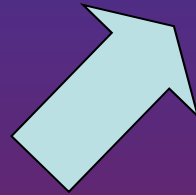
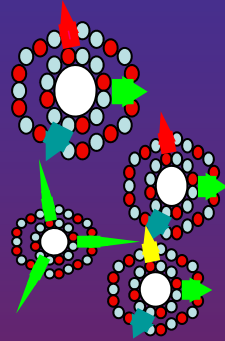
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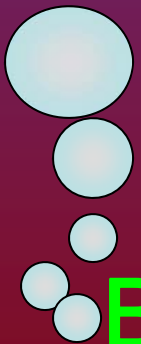
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HYPOTHESIS

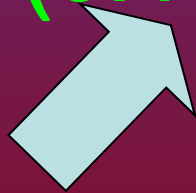
INFLAMMATORY
RESPONSES



MICROPARTICLES
(0.1 – 1 μm spheres)



BUBBLES



PREVIOUS MOUSE STUDIES

1. MICROPARTICLES INCREASE
POST-DIVE

2. MORE PROVOCATIVE DIVING
YIELDS MORE MPs

3. MPs (ESP. FROM PLATELETS)
LINK TO PMN, CAUSE
ACTIVATION & VASCULAR
INJURY

J Appl Physiology 110: 340, 2011

J Appl Physiology 112: 204, 2011

GOALS OF STUDY

EVALUATE INTRAVASCULAR CHANGES IN HUMAN DIVERS POST-DECOMPRESSION

Bubbles

Microparticle number

MPs surface markers (indicate cells of origin)

MPs size (enlarged MPs cause most injury)

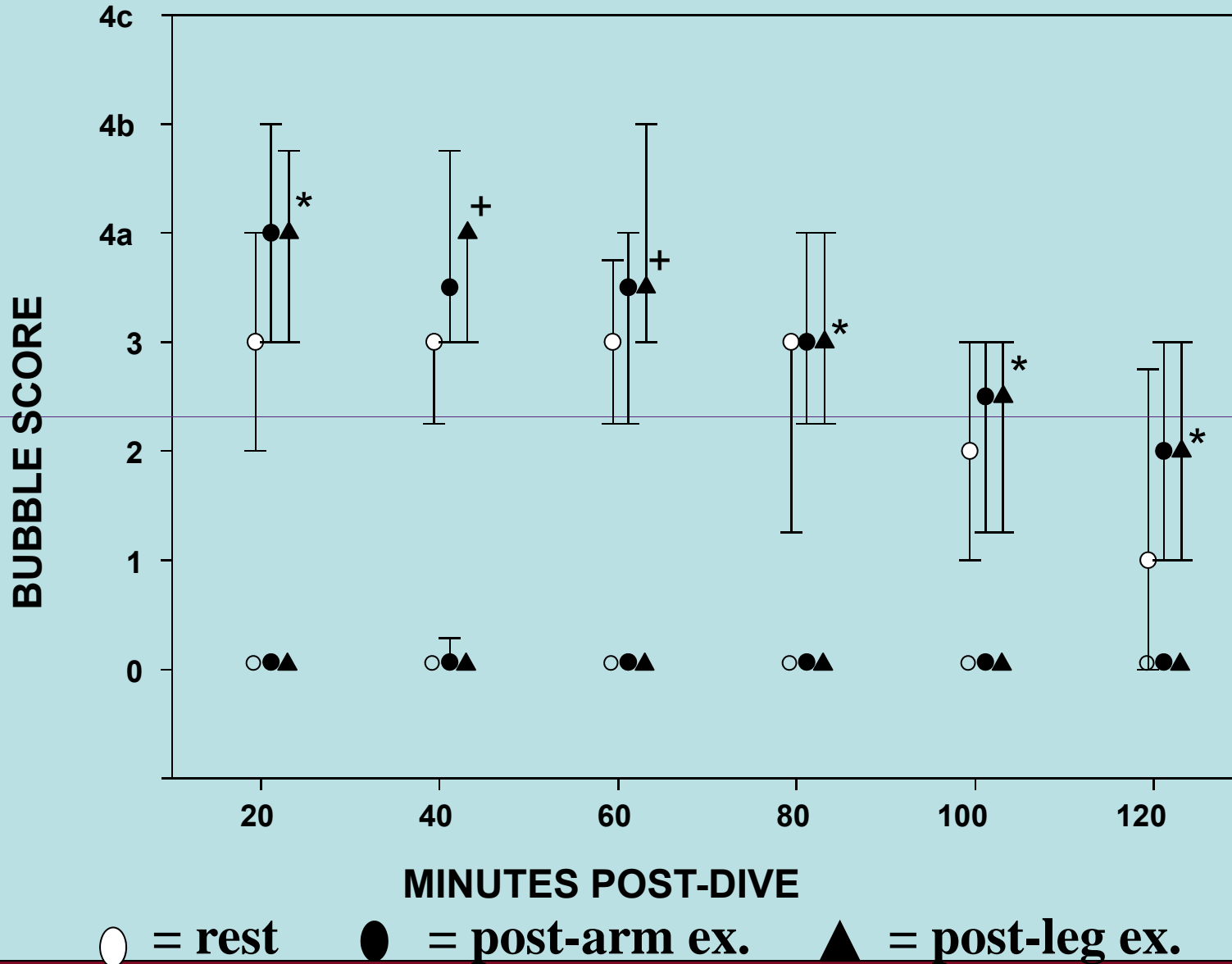
Neutrophil activation

16 male divers: 18 msw for 47 minutes daily X 4 days

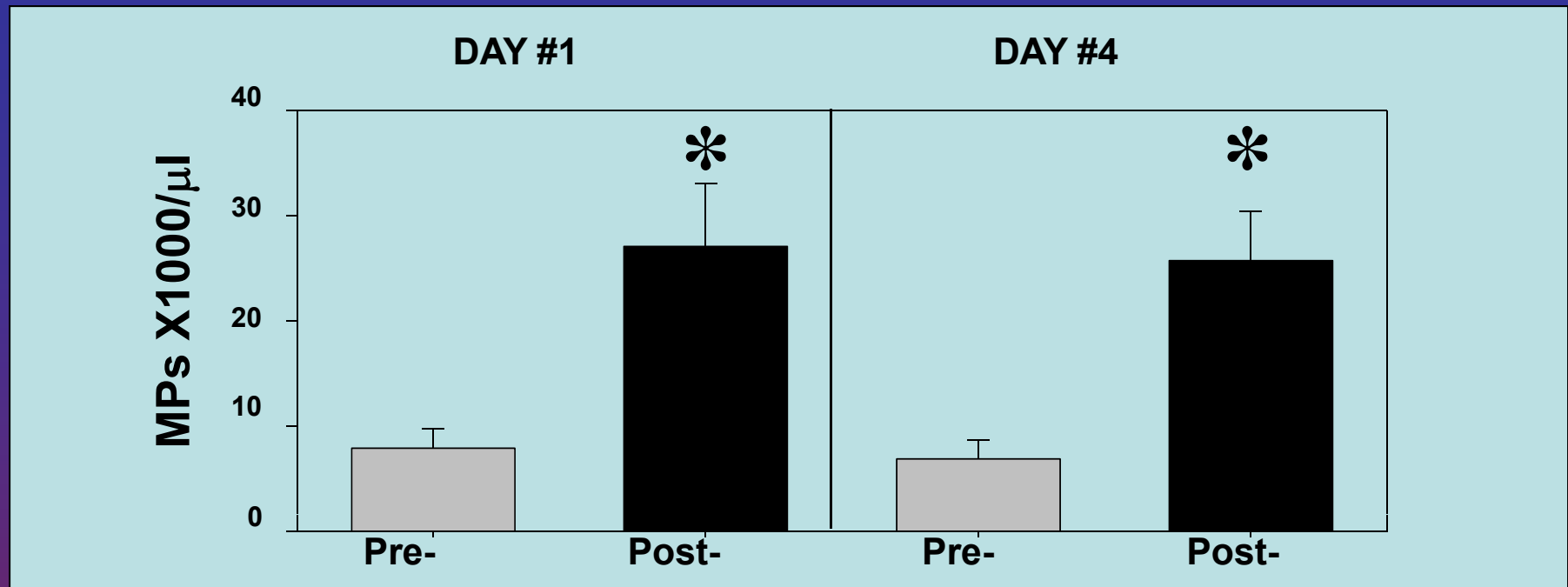
Post-dive bubbles assessed daily

Blood before/ 80 min after day 1 and 4 dives

BUBBLE SCORES DAY #1 (18 msw) & CONTROL(5 msw)

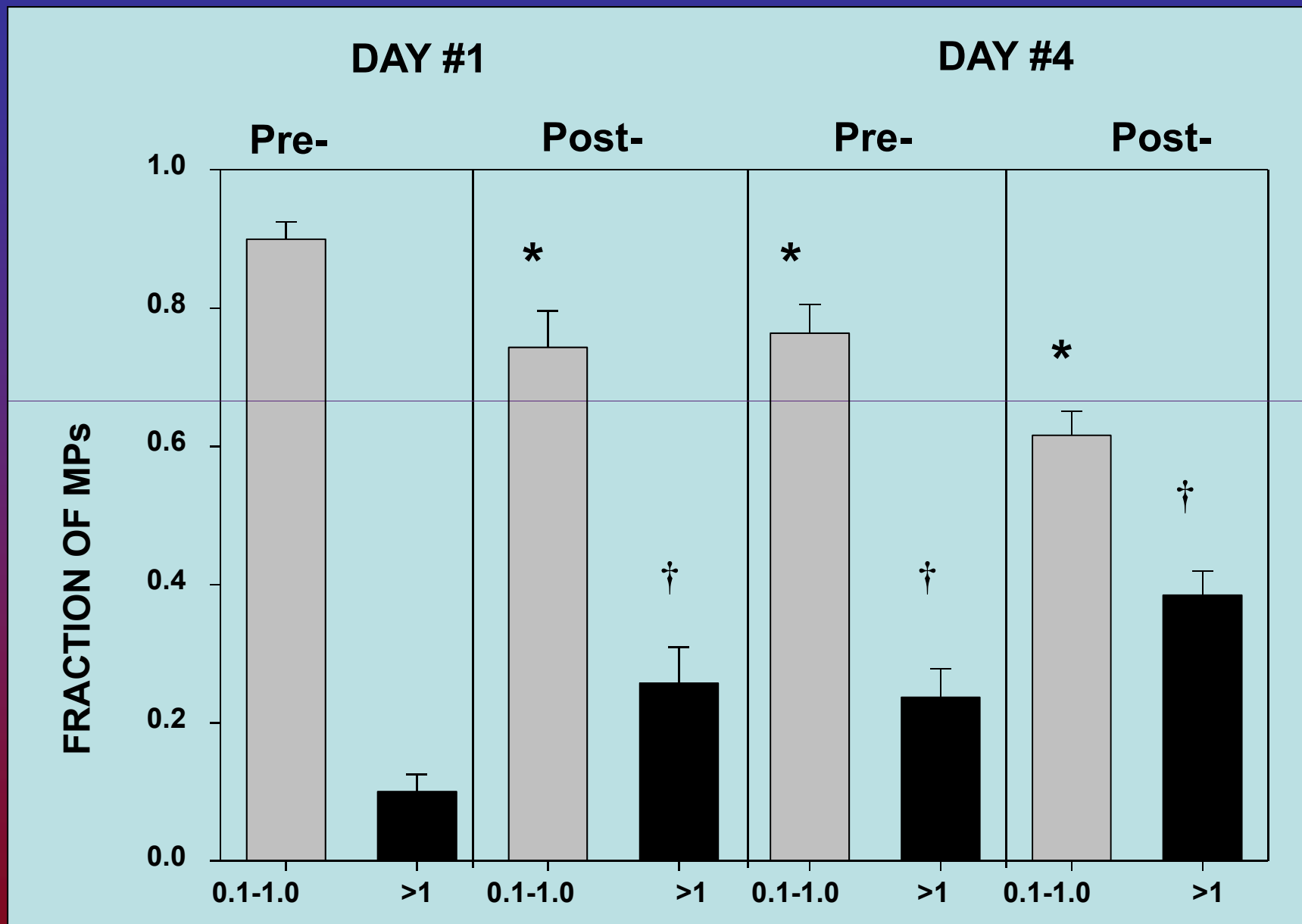


[MODIFIED BRUBAKK SCALE]



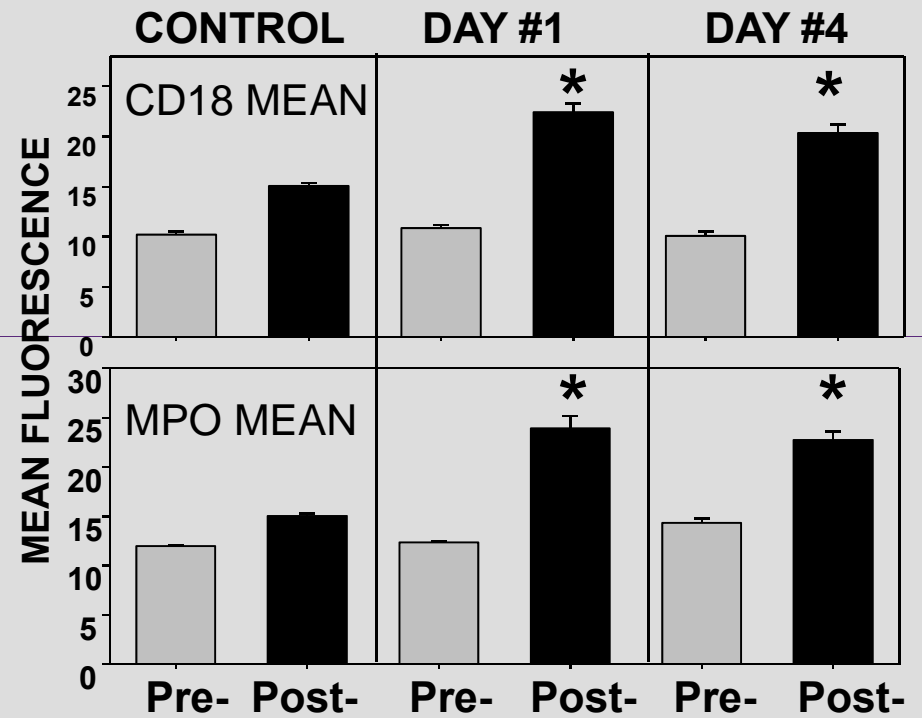
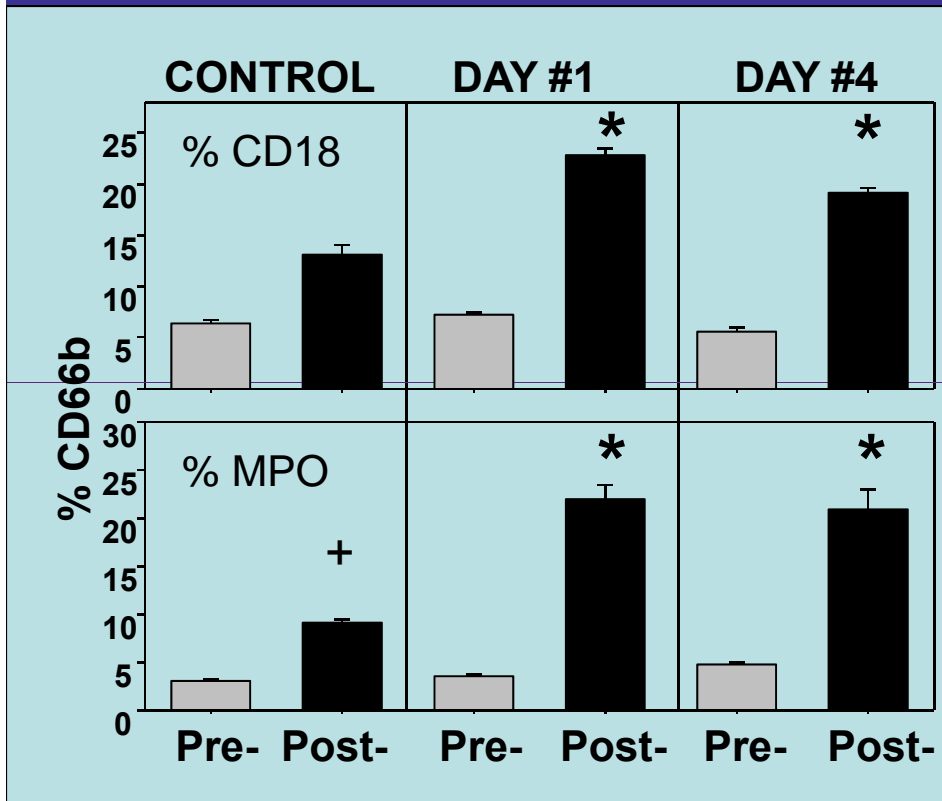
PLATELETS	CD41	0.34 ± 0.05	4.85 ± 0.06 *	0.31 ± 0.05	3.36 ± 0.21 †
	CD66b	0.14 ± 0.02	2.26 ± 0.25 *	0.44 ± 0.06	3.13 ± 0.38 †
ENDOTHELIUM	CD31	0.56 ± 0.15	2.40 ± 0.33 *	0.92 ± 0.12	2.44 ± 0.10 †
LEUKOCYTES	CD14	0.40 ± 0.06	2.79 ± 0.26 *	0.41 ± 0.08	2.17 ± 0.17 †
RBCs	CD235a	0.31 ± 0.04	0.96 ± 0.09 *	0.63 ± 0.12	1.61 ± 0.16 †
TISSUE FACTOR	CD142	0.008 ± 0.01	0.74 ± 0.05 *	0.02 ± 0.01	0.84 ± 0.07 †
ENDOTHELIUM	vWF	0.43 ± 0.03	2.38 ± 0.16 *	0.44 ± 0.05	2.69 ± 0.17 †

MPs INCREASE FROM MANY VASCULAR CELL SOURCES



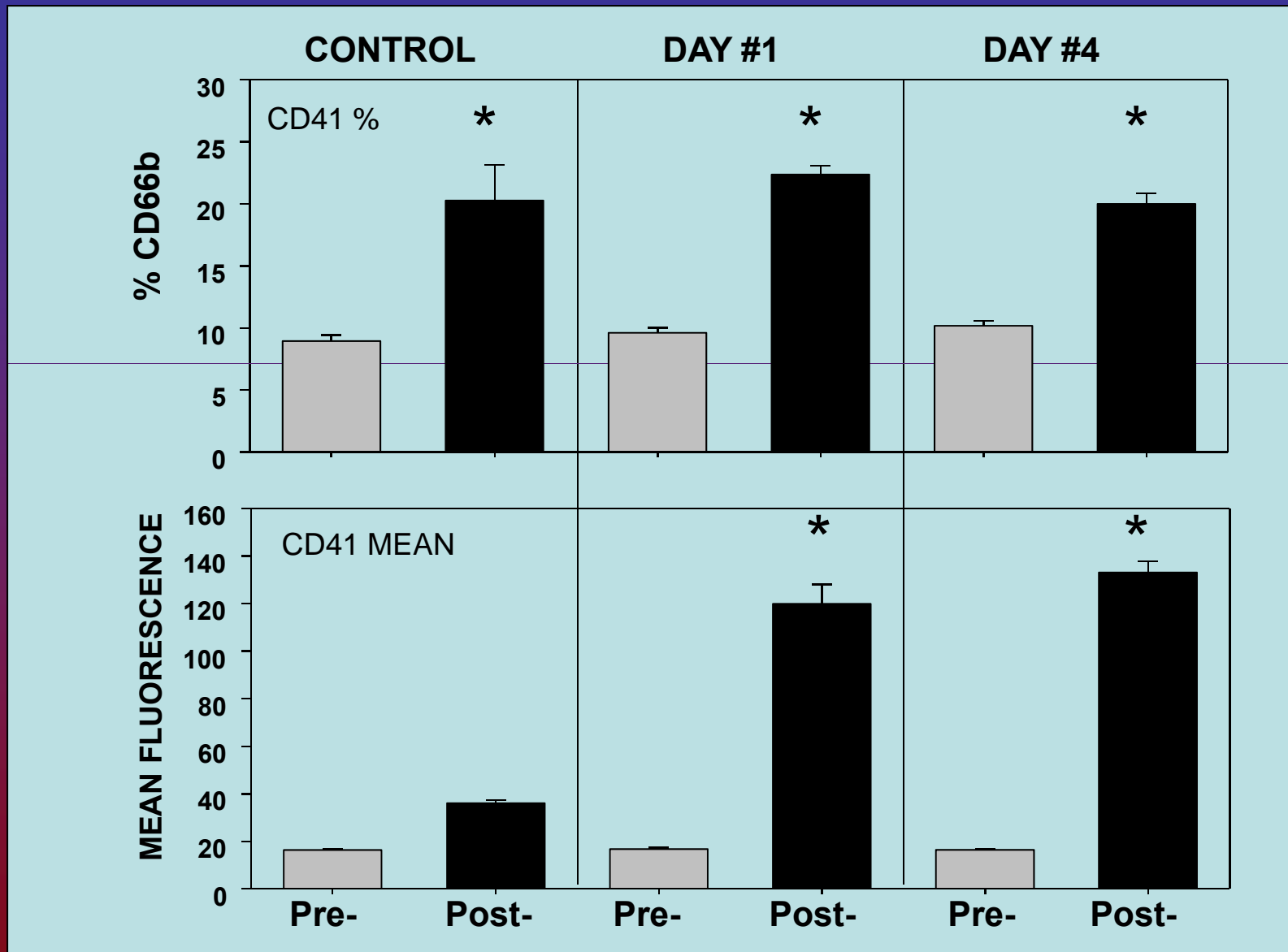
MORE MPs HAVE LARGE DIAMETERS POST-DECO.

NEUTROPHIL (CD66b) ACTIVATION

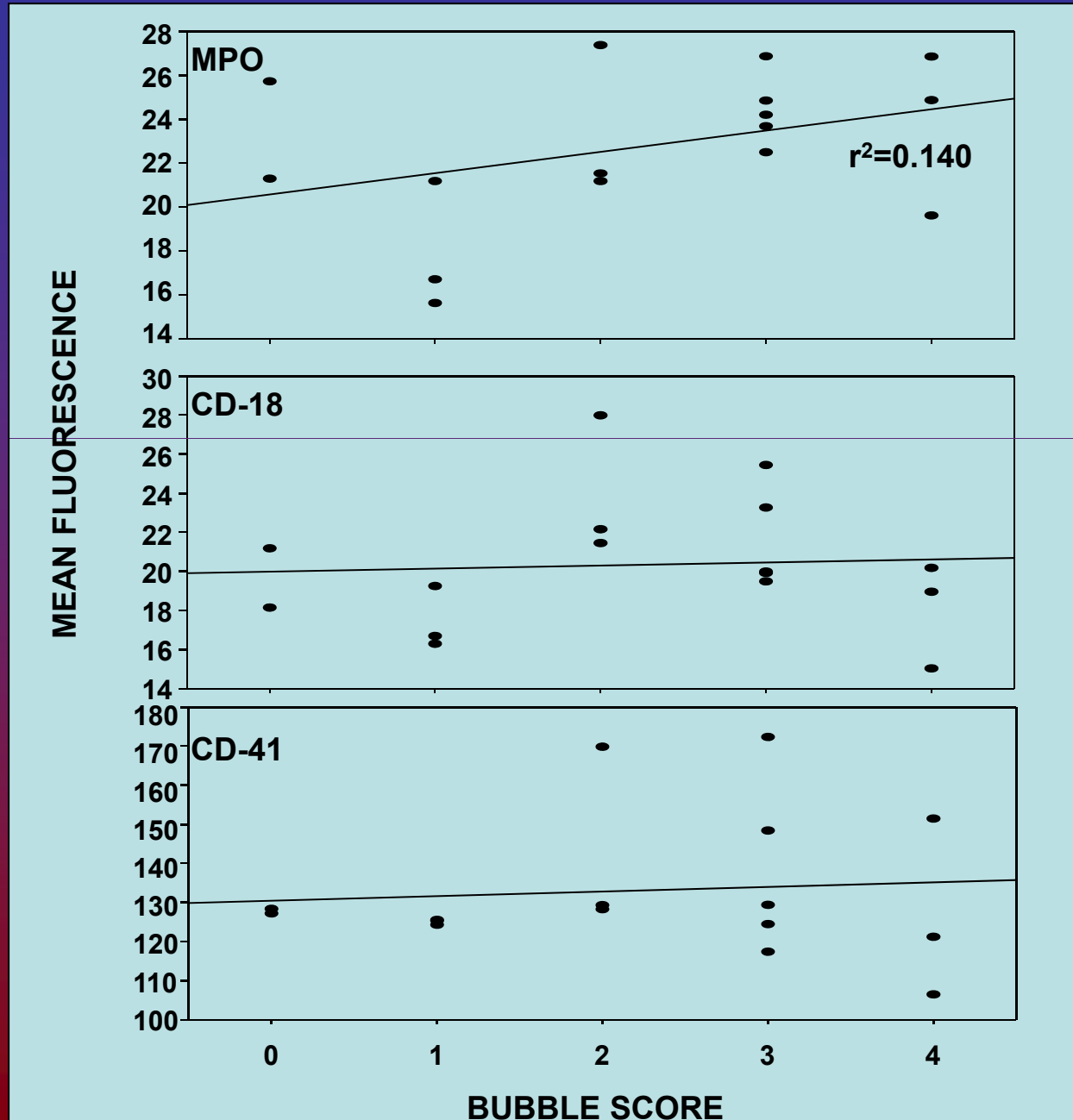


CD18 = β_2 INTEGRIN
MPO = MYELOPEROXIDASE

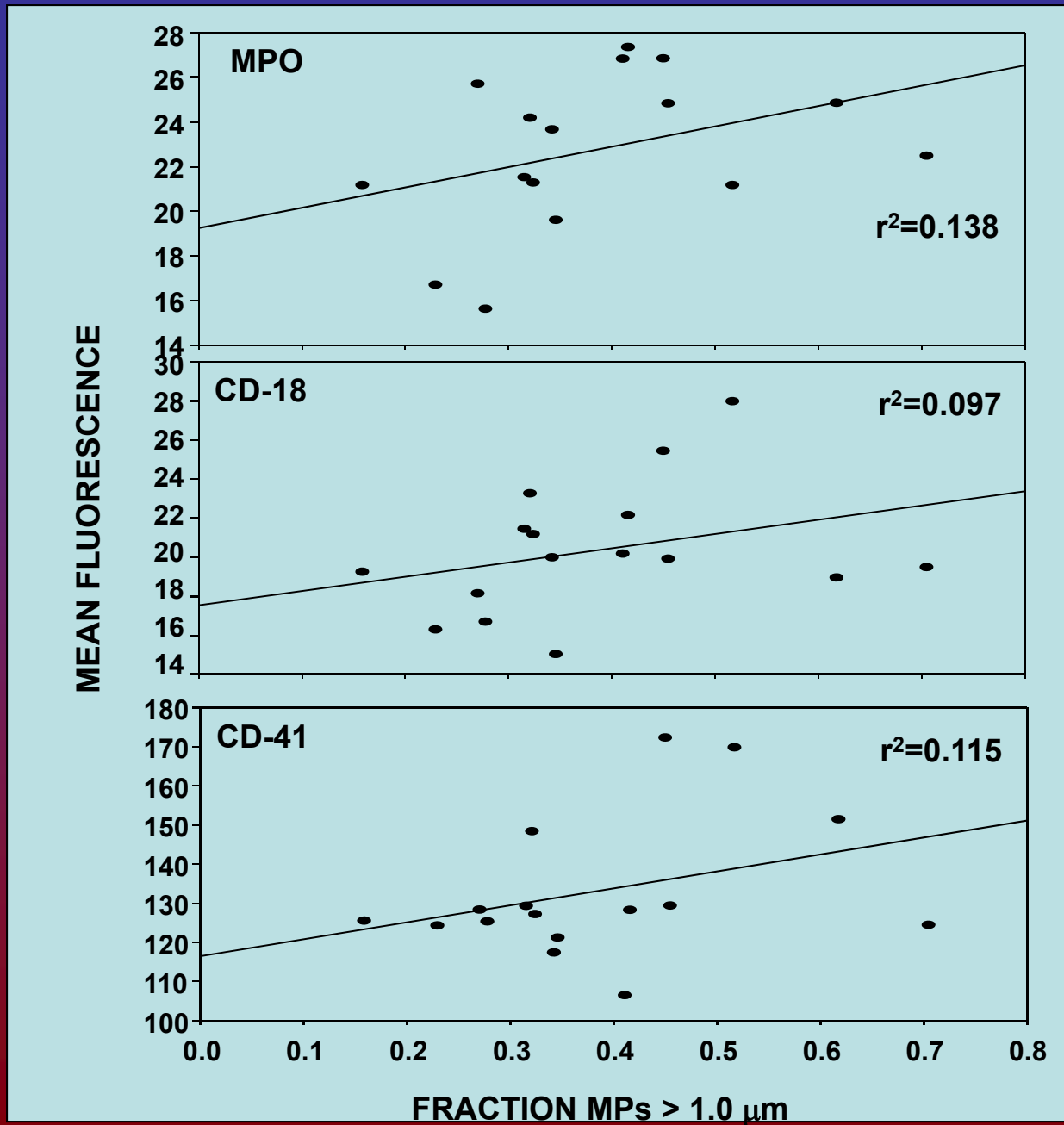
PLATELET (CD41) INTERACTION WITH PMN (CD66b)



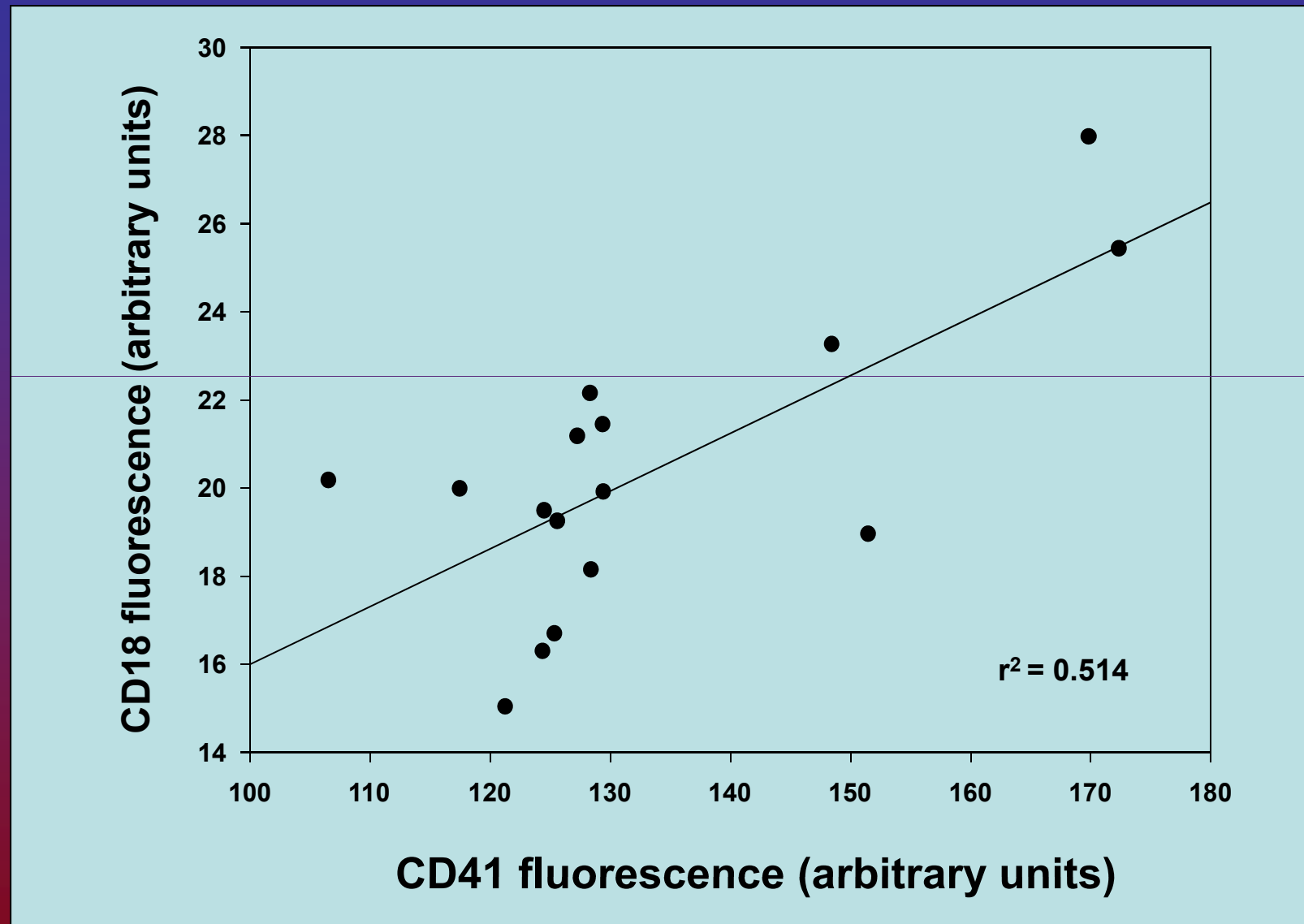
POST-4 BS vs PMN ACTIVATION VARIABLES



Post- dive 4 MPs size/PMN activation



RELATION BETWEEN PMN ACTIVATION & PLATELET LINK?



CONCLUSIONS

AFTER OPEN-WATER DECOMPRESSION:

Intravascular MPs increase 3.4 X

MPs 'size' increases

Neutrophil activation occurs

PMN-Platelet (or MPs) interactions occur

**Changes occur with each dive, little evidence
for lasting effects between dives**

Association between MPs, PMN & bubbles??

FOR THE FUTURE?

MORE OPEN-WATER STUDIES

EARLIER SAMPLE ACQUISITION

STUDY DIVERS WITH DCS ...

**WE GRATEFULLY ACKNOWLEDGE
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SCIENCE, EDUCATION & SPORTS**