

DIETARY REDUCTION OF PHOSPHATE IMPROVES MUSCULAR FUNCTION IN AGED MICE

Patricia Sosa-Callejas¹, Patricia Plaza¹, Elena Alcalde-Estévez^{1,2}, Manuel Rodríguez-Puyol^{1,3,4}, Diego Rodríguez-Puyol^{2,3,4}, Gemma Olmos^{1,3,4}, M^a Piedad Ruíz-Torres^{1,3,4}, Susana López-Ongil^{2,3,4}

¹Universidad de Alcalá, Departamento de Biología de Sistemas, Alcalá de Henares, SPAIN, ²Hospital Universitario Príncipe de Asturias, Fundación para la investigación Biomédica, Alcalá de Henares, SPAIN, ³Instituto Carlos III, REDinREN, Madrid, SPAIN, ⁴Instituto Reina Sofia de Investigación Renal, Irsin, Madrid, SPAIN.

Topic: K2) CKD. Pathophysiology, progression and risk factors.

OBJECTIVES

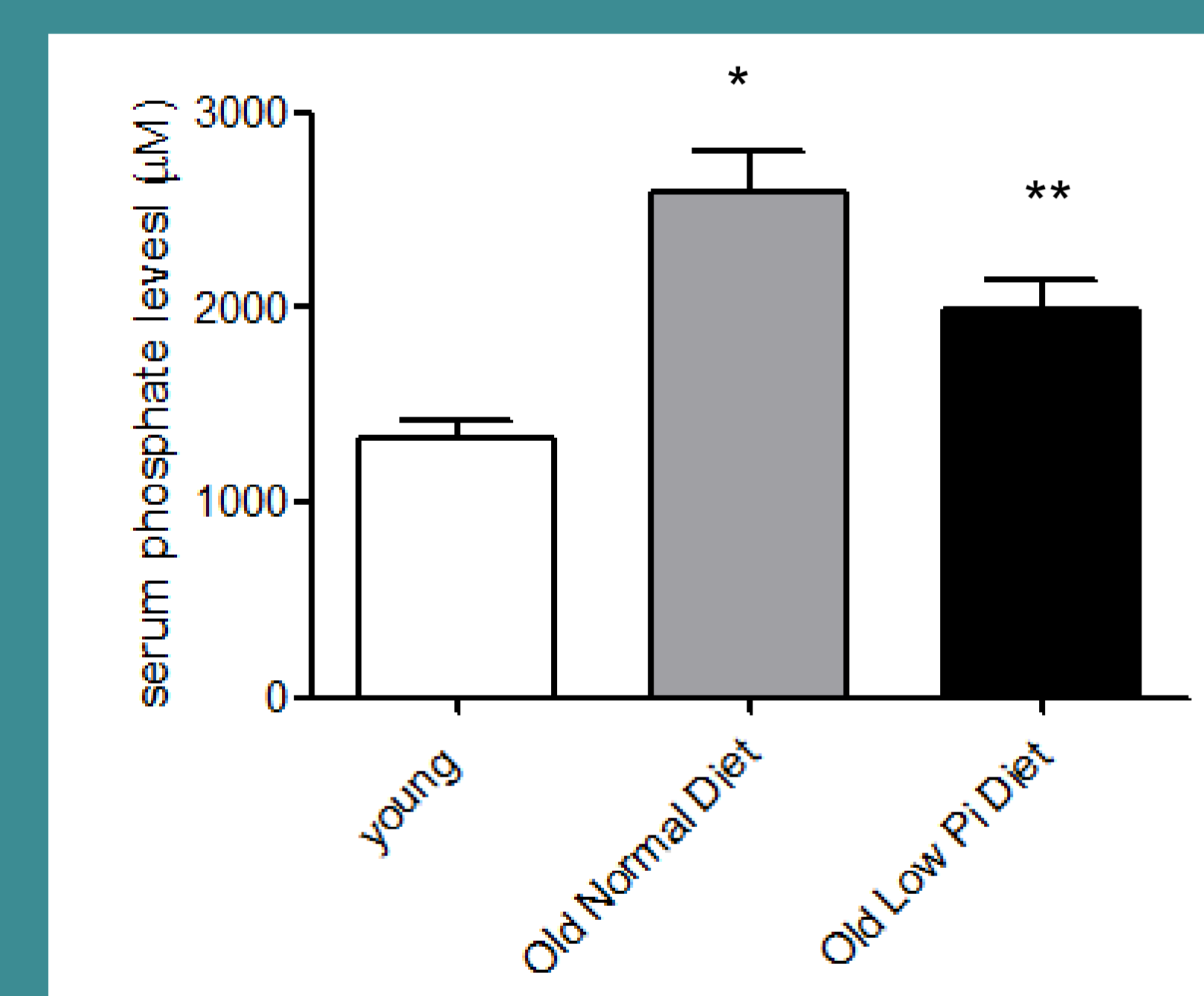
The hyperphosphatemia has been related to chronic kidney disease (CKD) and aging. Sarcopenia, which is defined by the loss of mass and muscular force, is a related condition to both cases. The aim of this work was to analyze the effect of a dietary reduction in phosphate intake on the aging related sarcopenia.

METHODS

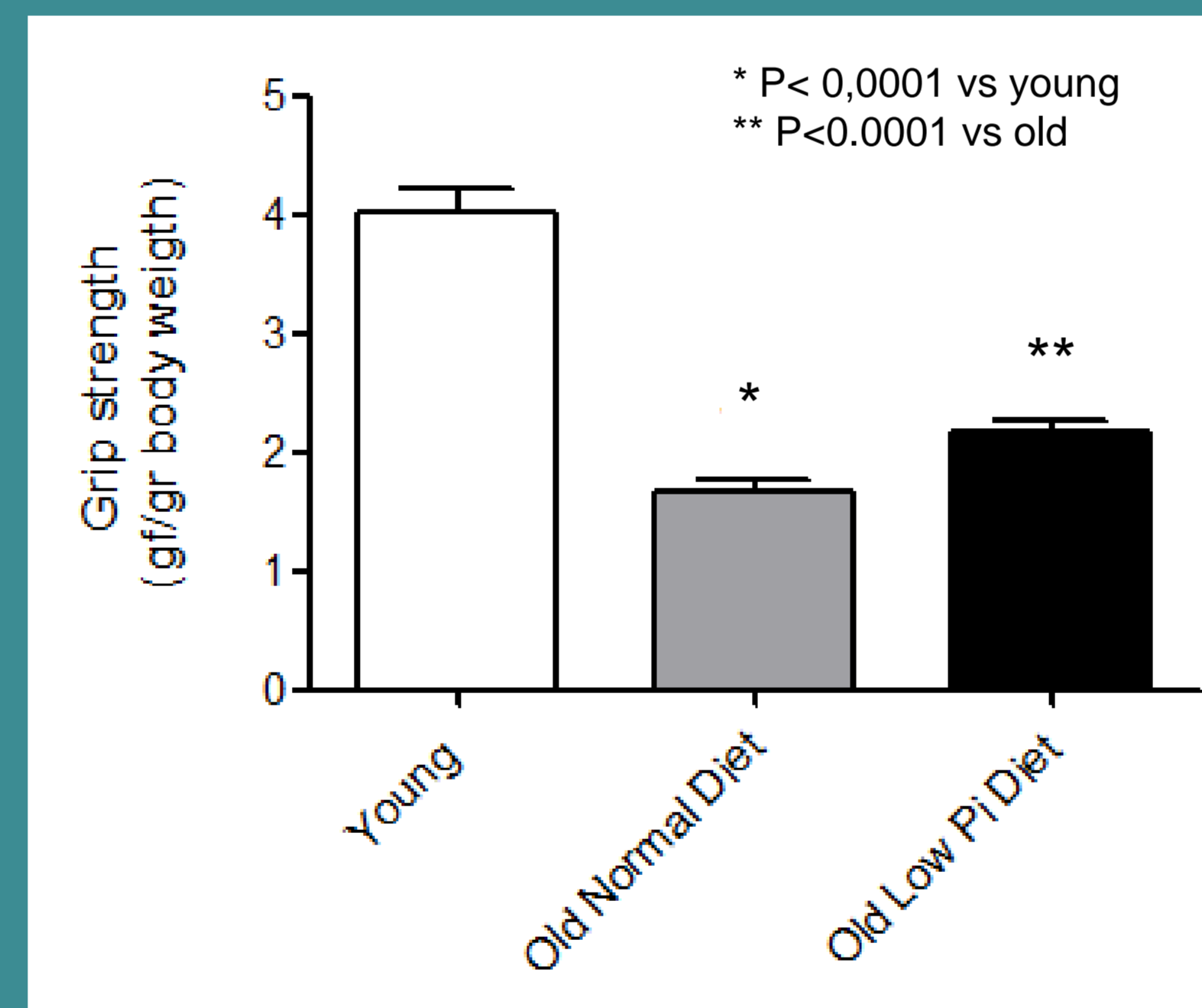
Twenty-four months old C57BL6 mice were used for this study. Mice were fed with normal diet containing 0.6% of phosphate until 21 months, after that, one group of mice continued with normal diet and the other group was fed with a low phosphate diet, containing a 0.2% of phosphate, for the following 3 months. Old mice were compared with 5 months old mice. Muscle force was measured by a grip strength test. Isometric and tetanic force and relaxation time were recorded in tibial muscle after electrical stimulation. Gait parameters: speed, stride length and the hind paw base width were measured by footprint test. Serum phosphate concentration was evaluated with a commercial kit.

RESULTS

Old mice had a 40% increase in serum phosphate concentration respect to young mice. Old animals feeding with hypophosphatemic diet showed reduced level of phosphate serum linked to a better muscle function.



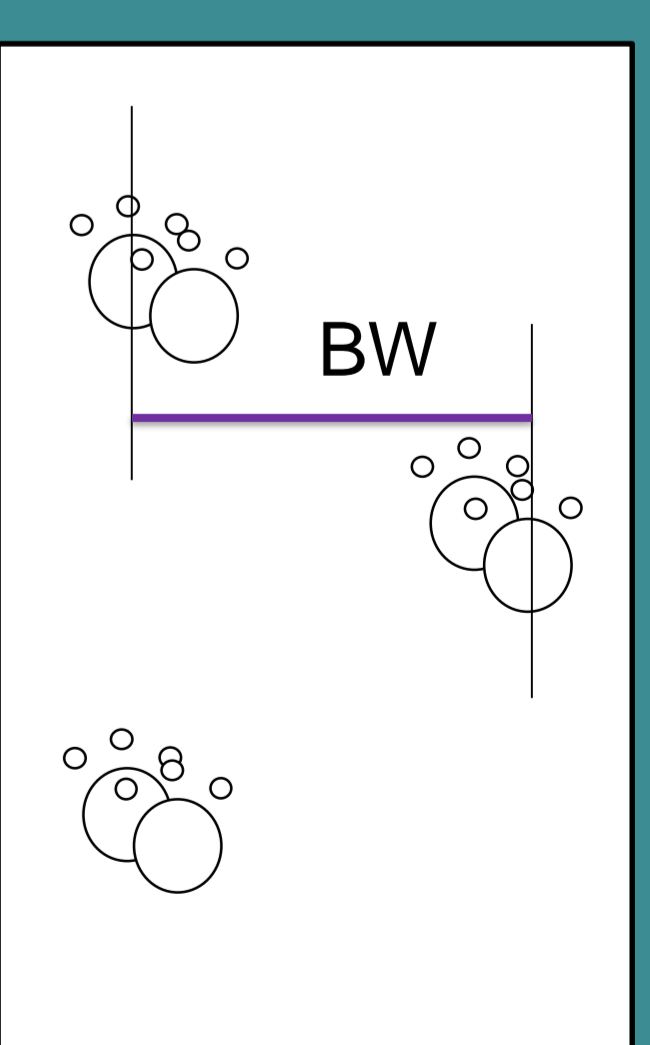
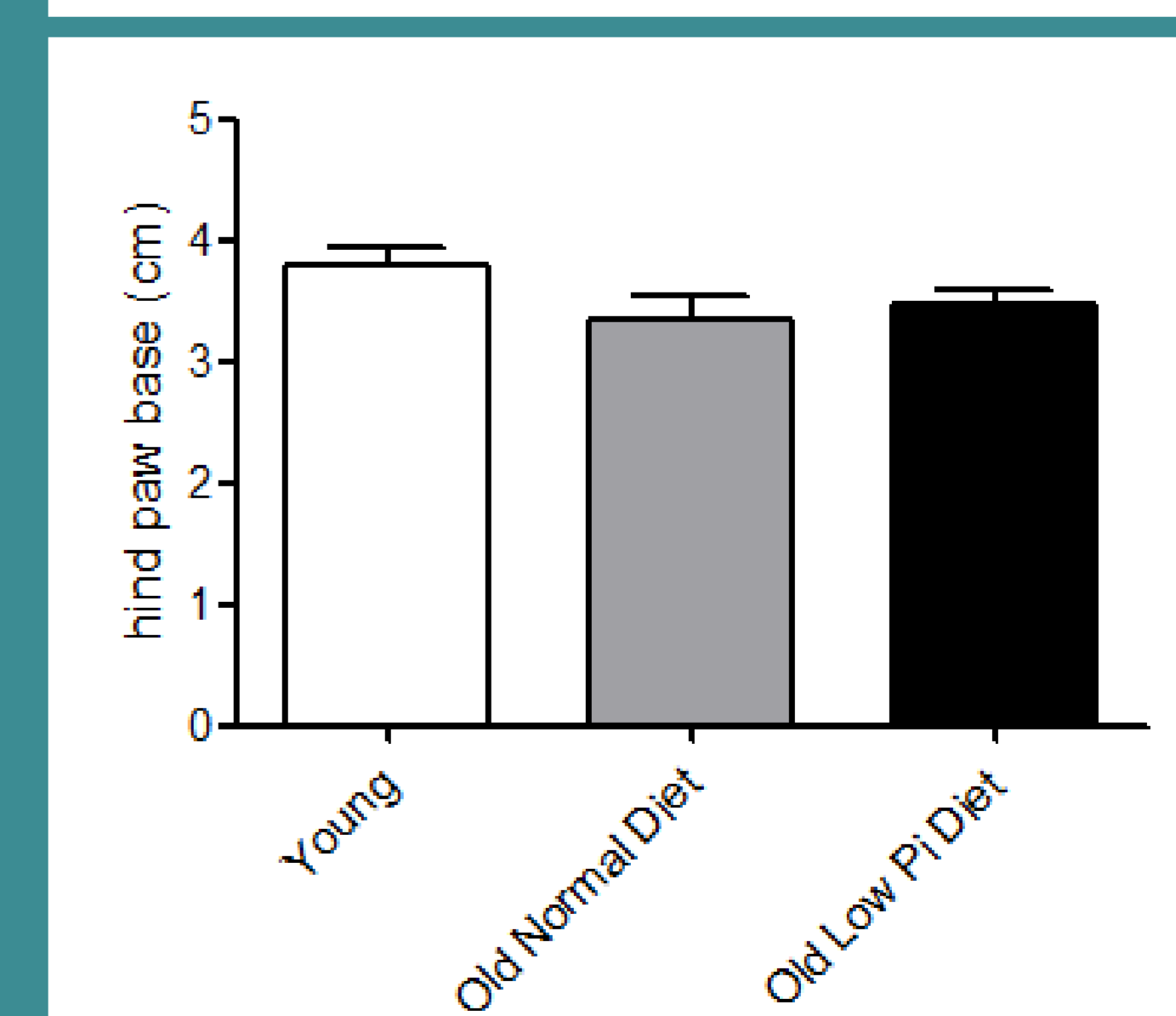
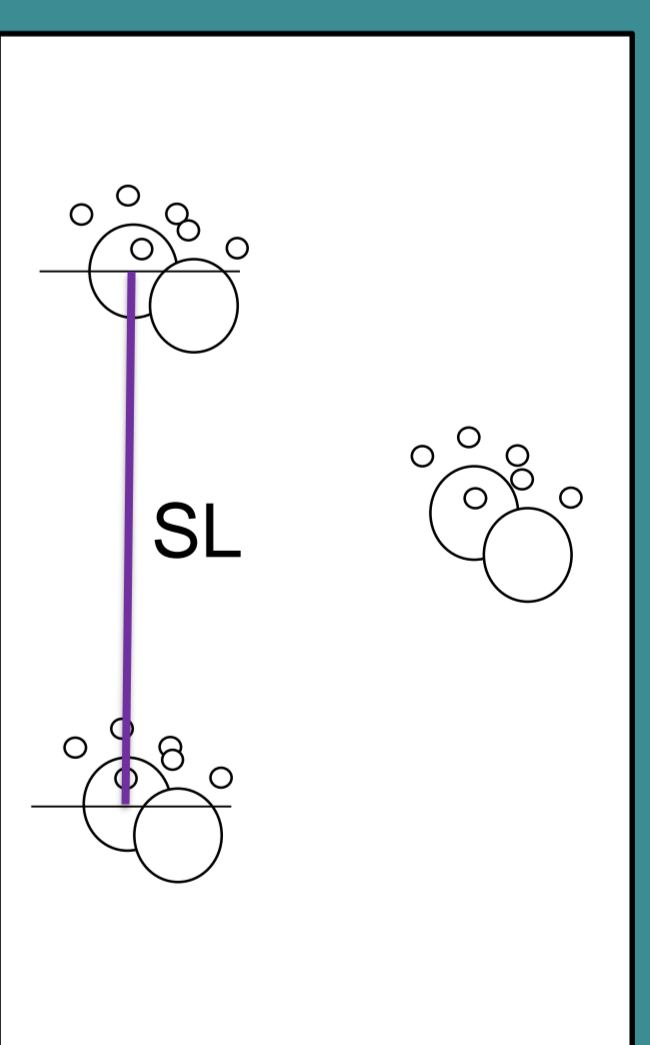
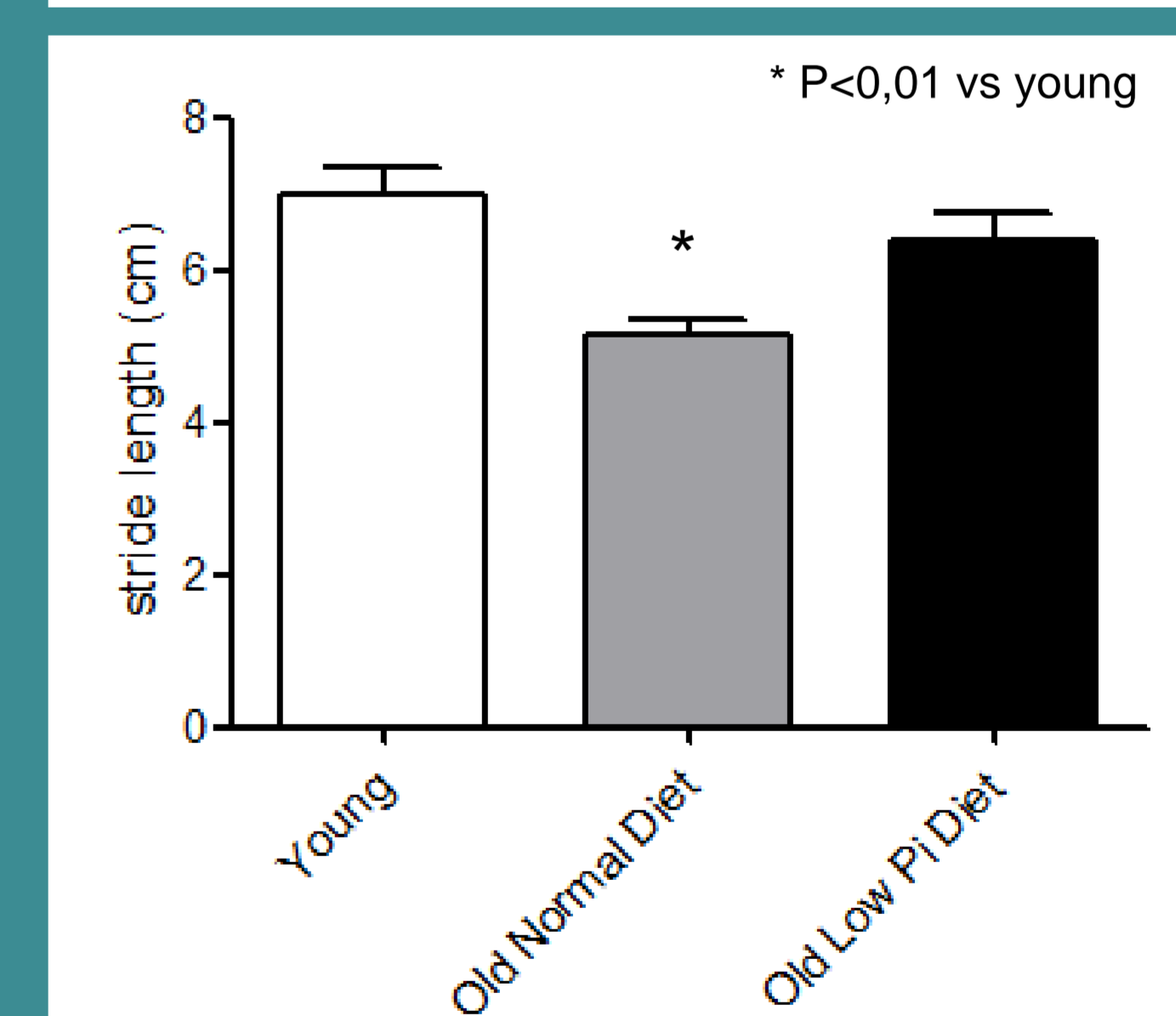
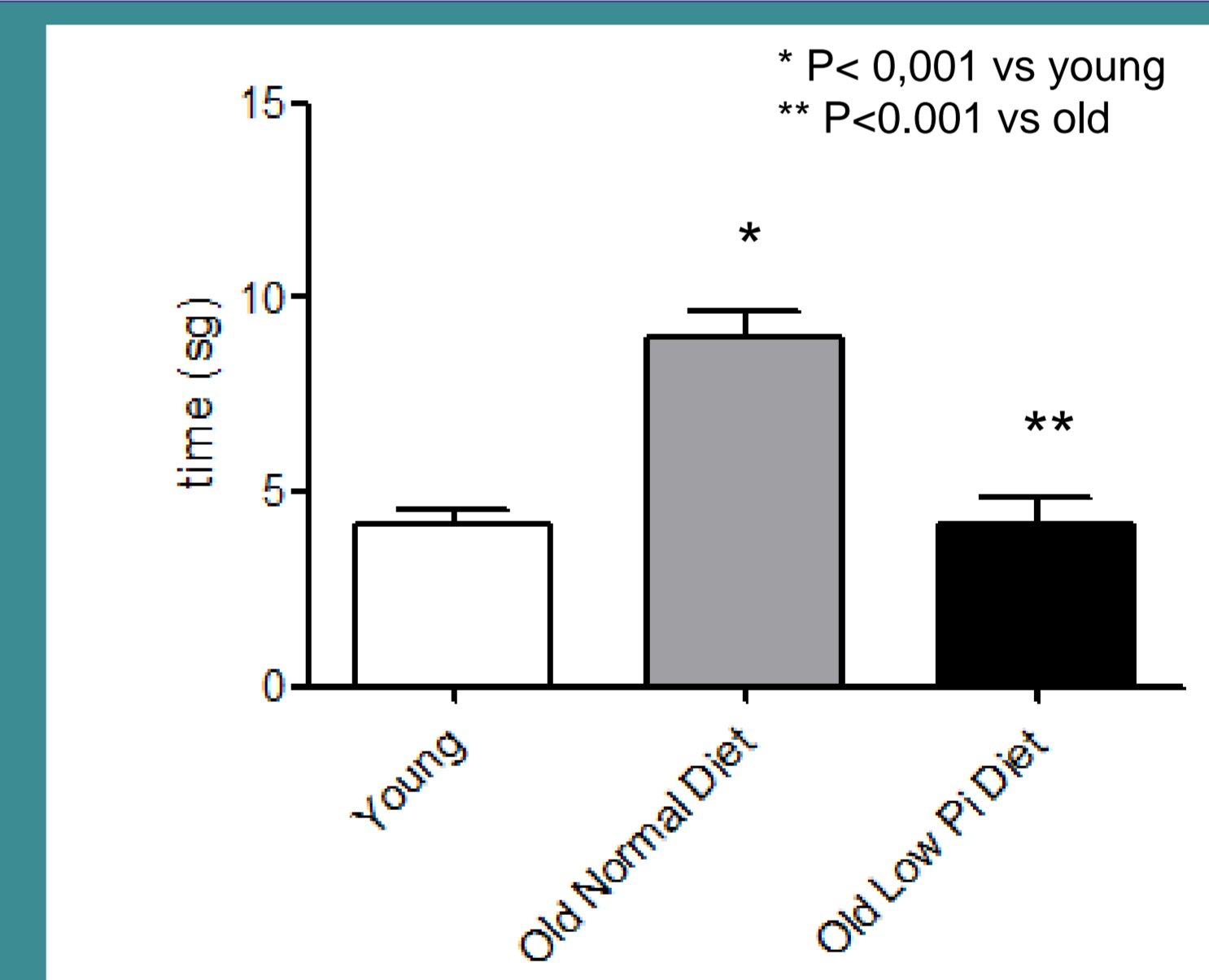
Old mice shown a reduction in forelimb strength measured by grip test. In addition, old mice shown a lower isometric and tetanic force and a higher relaxation time in tibial muscle measured by electrostimulation. Low phosphate diet increased forelimb strength, isometric and tetanic force.



	Young	Old Normal Diet	Old Low Pi Diet
Time to peak	21.6 ± 2.9	30.5 ± 9.7	25.7 ± 0.6
Isometric Force	6.6 ± 1.0	3.6 ± 1.1**	5.5 ± 0.3*
Tetanic Force	6.2 ± 0.4	3.4 ± 1.0**	4.8 ± 0.8*
Relaxation rate	3.9 ± 0.9	1.5 ± 0.5**	2.8 ± 0.5
Relaxation time	14.3 ± 2.8	25.3 ± 8.1	17.8 ± 3.3

* P<0.01 vs young
** P<0.05 vs old

Time to reach the goal was higher and stride length (SL) was lower in old mice than young mice. Mice fed with hypophosphatemic diet increased the gait speed and the stride length with respect to old mice fed with normal diet. No significant changes were found in hind paw base width (BW) in any group.



CONCLUSIONS

We propose that dietary restriction of phosphate improves muscle function, increasing tetanic and isometric forces and incrementing the speed gait in old mice. These results could point to a direct link between elevated serum phosphate levels and sarcopenia presented in CKD patients and the aged people.

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