KINETICS OF SIMULATED ON-WATER DRAGON BOAT PADDLING

Sarah Ho, Richard Smith, and Damien O'Meara*

**Exercise, Health and Performance Research Group,
Faculty of Health Sciences, University of Sydney, Sydney, Australia***

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INTRODUCTION: Dragon boat racing involves 20 paddlers propelling the boat through power at the blade which is transferred to boat movement through the paddler's contact with the boat at the feet and seat. However, the magnitude of these forces and their synchronisation and contribution to boat movement is unknown. Thus the aim of this study is to investigate the kinetics of simulated on-water paddling.
METHOD: Two competitive dragon boat paddlers (m=1, f=1) volunteered for the study. Experimental procedures were approved by the local Ethics Committee. A simulator was constructed based on dimensions of a 20-crew boat. A 3D motion analysis system (EVaRT, v. 5, CA, USA) was used to collect kinetic data using 4 Kistler force plates and transducers (1000Hz) (Winterter, Switzerland). Paddle resistance was provided by air resisted paddle wheel (adapted Concept 2D, Victoria, Australia). Participants paddled 10 strokes at light and high intensity in the simulator. Seat and feet force timing was determined using paddle force.
RESULTS: At initiation of the stroke, front foot forces were applied in the anterior direction with less force applied in the medial and downward direction (Figure 1) while back foot forces were applied in the medial direction with less force applied in the posterior and downward direction (Figure 2). At paddle exit front and back foot forces were applied in the opposite direction until the beginning of the next stroke.

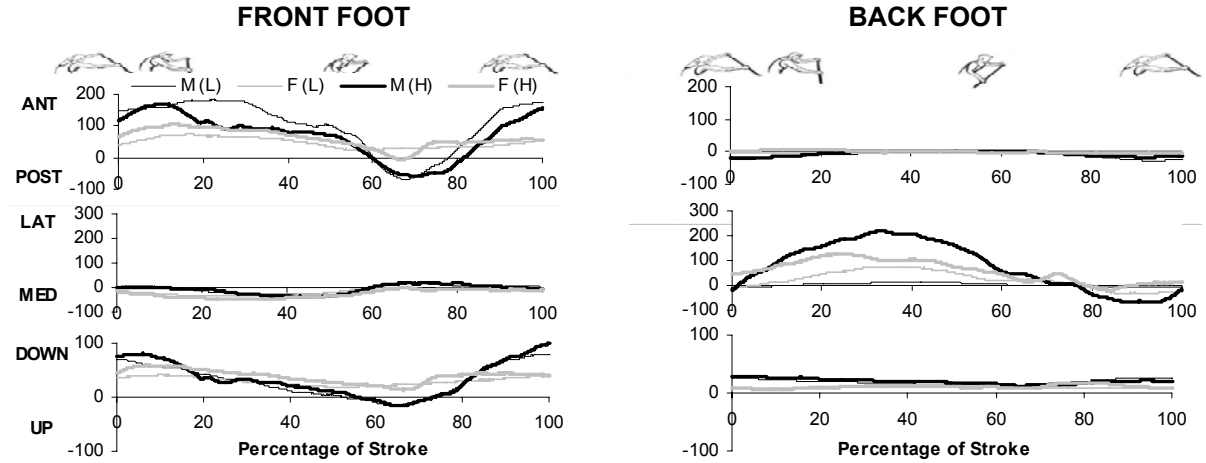

Figure 1) Front foot & Figure 2) Back foot forces in anterior-posterior, lateral-medial and downward-upward direction in newtons of male (M) & female (F) during light (L) and high (H) intensity paddling. Horizontal axis represents stroke time in %stroke with 0% = paddle entry, 60% = paddle exit.

DISCUSSION: Pattern of feet forces were similar between and within participants and were synchronised with corresponding phases of the stroke. Medial and anterior front foot forces were opposed by lateral and posterior back foot forces to maintain a balanced posture. This knowledge will provide an improved understanding of the kinetics of the front and back foot during paddling and how they may contribute to optimising paddle force generation and boat movement.

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