found to be significantly related to performance in the 500 metre and 1000 metre events. The two predictors taken together account for 56% and 74% of the variance in performance in 500 metres and 1000 metres respectively.

The excess oxygen consumption was partitioned to determine the relative importance of the lactic and alactic components of the oxygen debt. The lactic component of the debt was found to be significantly related to the performance criteria.

Generally, the results of the investigations reinforce the arguments in favour of specificity of testing methodology and training in relation to the activity.

Reference

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POST COMPETITION LACTATE LEVELS IN CANOE SLALOMISTS

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During the "Pre-World" international canoe slalom championships held at Bala, in North Wales in 1980, post competition blood samples were drawn from 19 competitors in four events. The events were:—

1. Mens Kayak singles in which the competitor uses a double blade paddle.
2. Mens Canadian singles in which a kneeling competitor uses a single blade paddle.
3. Mens Canadian doubles in which two canoeists each with a single paddle propel one canoe.
4. Womens Kayak singles — as mens K1.

Venous blood samples, from an antecubital vein,

TABLE I

The lactate content of blood plasma taken from members of the British canoe slalom teams in four events. BALA INTERNATIONAL 1980.

Event	Ints.	Resting lactate mmol/l	Post competition lactate mmol/l	Post event time to sampling	Unif fold lactate gain
K1 Men	RF	1.8	15.3	4	14
	JS	1.3	14.5	5	13
	RM	1.3	17.1	5	16
	AS	2.0	17.2	5	15
	PG	1.8	16.8	4	15
C1 Men	LW	1.6	15.3	5	14
	PK	2.1	14.3	4	12
	SC	1.9	11.9	5	10
	WB	1.2	10.8	5	10
	RW	2.0	9.6	5	8
C2 Men	PH	1.8	9.6	4	8
	RJ	1.7	8.8	5	7
	DS	1.9	13.8	5	11
	RN	2.1	12.6	4	11
	EJ	1.3	11.1	4	10
K1 Women	JH	2.0	9.6	4	8
	SC	1.3	12.8	5	12
	JR	1.5	12.8	5	11
	SG	1.9	13.6	4	12

TABLE II

Means and standard deviations of lactate levels from 19 competitors in four slalom events.

Event	Mean lactate mmol/l	Range mmol/l	SD	Sample size
K1 men	16.18	2.7	1.20	5
C1 men	13.10	4.5	1.75	4
C2 men	10.83	4.5	1.68	6
K1 women	12.20	4.0	1.77	4

TABLE III

Summary table for results of ANOVA on lactate levels from four events.

Variation	SS	df	MS	F
Between events				
Between events	81.31	3	27.10	9.09*
Within events	44.77	15	2.98	
TOTAL	126.08	18		

*F (3, 15) at .01 level = 5.42 is significant

were drawn between 4 and 5 minutes after each competitor had finished his/her event and subsequently assayed for lactate content. It can be seen from the results shown in Table 1 that the highest lactate level 17.2 mM/l was recorded in the mens K1 event. The highest mean lactate value 16.18 mM/l (Table 2) is calculated also from the mens K1 event. There was a

significant difference (.01 level) between events when the lactate values were treated by ANOVA (Table 3). ANOVA revealed a no-difference effect (.01 level of significance) between event-resting lactate values.

THE EFFECTS OF PLYOMETRIC TRAINING ON THE VERTICAL JUMP PERFORMANCE OF ADULT FEMALE SUBJECTS

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B. Miller

The aim of this study was to investigate the contention that a programme of plyometric exercises would improve the vertical jump performance of adult females.

Twenty-four female physical education students acted as subjects (Ss) and performed a standardised vertical jump test prior to being assigned to one of two groups. The mean vertical jump score was the same for each group. Group I trained with plyometric exercises and Group II acted as a control.

Ss in the plyometric training group trained once a week for eight weeks. They performed five sets of 10 repetitions of depth jumps from a height of 50 cms. All Ss were re-tested at the end of the eight week period. Results showed that Group I had improved their vertical jump performance by more than 5 cms ($t = 2.89$, $df = 22$, $p < 0.01$), whilst Group II showed no significant change.

In view of the results obtained in this study, it was suggested that sportswomen should consider the possible benefits of including depth jumping in a balanced conditioning programme. While Sinclair (1981) has emphasised that an adequate build-up of strength is required prior to undertaking such a regime, and Miller and Power (1981) have stated that depth jumps should be performed on to a gymnastic mat, it is concluded that a gradual introduction to the activity is unlikely to cause injuries.

References

Miller, B. P. and Power, S. L. D., 1981 "Developing power in athletes through the process of depth jumping". *Athletics Coach* 15 (2): 10-15.

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ECHOCARDIOGRAPHIC LEFT VENTRICULAR DIMENSIONS IN TWO GROUPS OF ROAD RACE CYCLISTS DURING A TRAINING SEASON

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Left ventricular dimensions were measured echocardiographically, in a group of 19 competitive cyclists and in a group of 19 untrained subjects matched for age and sex. The cyclists were divided into two age groups:

Group 1 — < 20 years: mean, 18 years, (range 17 to 19 years), $n=10$ and

Group 2 — > 20 years: mean, 26 years, (range 22 to 36 years), $n=9$.

The two groups followed similar training programmes but the older group had had perforce a longer experience of cycling. Measurements were made at the beginning and end of the competitive season.

The pre-training left ventricular dimensions were significantly greater ($p < 0.02$) in both groups of athletes compared with the controls (Table).

						Δ LV mass
		LVIDd	LVIDs	LVWT	LV mass	Δ LV vol
Group 1 $n=10$	Pre-training	5.2	3.4	0.8	180	4.6
	± 0.4	± 0.4	± 0.1	± 39		
	Post-training	5.5	3.5	1.3	360	
Group 2 $n=9$	Pre-training	5.5	3.4	1.0	260	3.5
	± 0.7	± 0.1	± 0.2	± 92		
	Post-training	5.6	3.6	1.3	380	
Controls $n=19$	Pre-training	4.7	3.2	0.8	150	
	± 0.5	± 0.4	± 0.2	± 61		

LVID = Left ventricular internal diameter

LVWT = Left ventricular posterior wall thickness

Left ventricular changes result from this type of athletic training were reflected largely in an increase in left ventricular mass rather than left ventricular volumes. On average the athletes increased their left ventricular