

## Predicting Energy Expenditure of an Acute Bout of Resistance Exercise in Men and Women

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### ABSTRACT

Energy expenditure from resistance exercise (RE) is an important consideration for exercise prescription, yet prediction models are lacking. **PURPOSE:** To develop regression equations to predict energy expenditure (kcal) for RE involving each major muscle group using commonly measured demographic & exercise variables as predictors. **METHODS:** Fifty-two healthy, active subjects (27 men, 25 women, age 20-58 yrs, height  $174.1 \pm 10.5$  cm, weight  $188.7 \pm 42.6$  kg,  $VO_{2max}$   $36.8 \pm 9.2$  ml/kg/min) were strength tested to determine their 3-5 repetition max (RM) on commercial pneumatic RE equipment 1 week prior to their experimental RE bout. Body composition was assessed using DEXA. For the experimental RE, a warm-up set followed by 2-3 sets of 8-12 reps at 60-70% predicted 1RM were performed for each exercise. Each set started every two minutes. Exercises progressed order: leg press, chest press, leg curl, lat pull, leg extension, triceps extension, biceps curl.  $VO_2$  was measured continuously throughout the RE bout via automated metabolic cart. Total exercise volume (TV) was calculated as sets\*reps\*weight lifted. Multiple Linear Regression (Stepwise Removal) was used to determine the best model to predict kcal consumption based on the highest adjusted  $R^2$  and least amount of variance inflation. **Results:** Table.

EXERCISES	REGRESSION COEFFICIENT								MODEL FIT	
	HT (cm)	AGE (y)	GENDER (m=1, F=0)	FATMASS (kg)	LEANMASS (kg)	WEIGHT (kg)	VOLUME m3 (kg)	CONSTANT	R Square	SEE
<b>TOTAL</b>	0.874	-0.596		-1.016	1.638		2.461	-110.742	0.773	28.465
<b>LEG PRESS</b>	0.12	-0.093		-0.252	0.297		1.169	-13.837	0.83	4.40
<b>CHEST PRESS</b>	0.186	-3.173		-0.198	0.271		4.211	-28.468	0.68	4.70
<b>LEG CURL</b>		-0.129			0.245	-0.1	5.189	6.633	0.62	5.36
<b>LAT PULL</b>		-0.165		-0.128	0.187		4.725	8.483	0.67	4.96
<b>LEG EXTENSION</b>		-0.08	-1.635	-0.185	0.394		4.252	1.444	0.70	5.31
<b>TRICEPS PUSH</b>	0.255		-5.124	-0.239	0.39		1.919	-44.891	0.72	4.99
<b>BICEPS CURL</b>	0.292	-0.091	-7.068		0.351	-0.156	15.059	-44.262	0.62	5.603

**CONCLUSIONS:** Energy expenditure for a total RE bout and for specific RE exercises can be reasonably estimated in adult men and women using commonly measured demographic and RE variables. With regards to fitness, performance, and weight management, these equations will aid practitioners and exercising adults in documenting kcal expenditure from RE.