Table 1. Three-zone Intensity Model Using Various Intensity Markers

Intensity Markers		Zone 1	Zone 2	Zone 3	Advantages/Limitations
Category terminology for exercise programming	Light	Moderate	Vigorous	Near maximal/ maximal	
Metabolic markers: VT1 and VT2* (HR relative to VT1 and VT2)*		Below VT1 (HR <VT1)	VT1 to just below VT2 (HR ≥VT1 to <VT2)	VT2 and above (HR ≥VT2)	▸ Based on measured VT1 and VT2 ▸ Ideally, VT1 and VT2 are measured in a lab with a metabolic cart and blood lactate ▸ Field assessments are relatively easy to administer, require minimal equipment, and provide accurate corresponding HRs at VT1 and VT2 ▸ Programming with metabolic markers allows for personalized programming
Talk test*		Can talk comfortably Can talk but not sing	Not sure if talking is comfortable Cannot say more than a few words without pausing for a breath	Definitely cannot talk comfortably	▸ Based on actual changes in ventilation due to physiological adaptations to increasing exercise intensities ▸ Very easy for practical measurement ▸ No equipment required ▸ Can easily be taught to clients ▸ Allows for personalized programming
RPE (terminology)*	Very, very weak to light	"Moderate" to "somewhat hard/strong"	"Hard/strong" to "very hard"	"Very strong to very, very hard/strong to maximal"	▸ Good subjective intensity marker ▸ Correlates well with talk test, metabolic markers, and measured %$\dot{V}O_2$max ▸ Easy to teach to clients
RPE (0 to 10 scale)*	0.5 to 2	3 to 4	5 to 6	7 to 10	▸ Good subjective intensity marker ▸ Correlates well with talk test, metabolic markers, and measured %$\dot{V}O_2$max ▸ 0 to 10 scale is easy to teach to clients
RPE (6 to 20 scale)	9 to 11	12 to 13	14 to 17	≥18	▸ Good subjective intensity marker ▸ Correlates well with talk test, metabolic markers, and measured %$\dot{V}O_2$max ▸ 6 to 20 scale is not as easy to teach to clients as the 0 to 10 scale ▸ *Note:* An RPE of 20 represents maximal effort and cannot be sustained as a training intensity.
%$\dot{V}O_2$R	30 to 39%	40 to 59%	60 to 89%	≥90%	▸ Requires *measured* $\dot{V}O_2$max for most accurate programming ▸ Impractical due to expensive equipment needed for assessment ▸ Increased error with use of *predicted* $\dot{V}O_2$max or *predicted* MHR ▸ Relative percentages for programming are population-based and not individually specific
%HRR	30 to 39%	40 to 59%	60 to 89%	≥90%	▸ Requires *measured* MHR and RHR for most accurate programming ▸ Measured MHR is impractical for the vast majority of trainers and clients ▸ Use of RHR increases individuality of programming vs. strict %MHR ▸ Use of *predicted* MHR introduces potentially large error; the magnitude of the error is dependent on the specific equation used ▸ Relative percentages for programming are population-based and not individually specific

Intensity Markers		Zone 1	Zone 2	Zone 3	Advantages/Limitations
%MHR	57 to 63%	64 to 76%	77 to 95%	≥96%	▸ Requires *measured* MHR for accuracy in programming ▸ Measured MHR is impractical for the vast majority of trainers and clients ▸ Use of *predicted* MHR introduces potentially large error; the magnitude of the error is dependent on the specific equation used ▸ Does not include RHR, as is used in %HRR ▸ Relative percentages for programming are population-based and not individually specific
METs	2 to 2.9	3 to 5.9	6 to 8.7	≥8.8	▸ Requires *measured* $\dot{V}O_2$max for most accurate programming ▸ Can use in programming more easily than other intensity markers based off $\dot{V}O_2$max ▸ Limited in programming by knowledge of METs for given activities and/or equipment that gives MET estimates ▸ Relative MET ranges for programming are population-based and not individually specific (e.g., a 5-MET activity might initially be perceived as vigorous by a previously sedentary client)
%$\dot{V}O_2$max	37 to 45%	46 to 63%	64 to 90%	≥91%	▸ Refer to %$\dot{V}O_2$R ▸ Actual measurement is individualized and not based on a prediction

Note: VT1 = First ventilatory threshold; VT2 = Second ventilatory threshold; HR = Heart rate; RPE = Rating of perceived exertion; $\dot{V}O_2$max = Maximal oxygen uptake; $\dot{V}O_2$R = Oxygen uptake reserve; HRR = Heart-rate reserve; MHR = Maximal heart rate; RHR = Resting heart rate; METs = Metabolic equivalents

*These are the preferred intensity markers to use with the three-zone model when designing, implementing, and progressing cardiorespiratory training programs using the ACE Integrated Fitness Training Model.