Exercise Prescription in Weight Training: Manipulating Program Variables

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“Progressive Overload” has been the foundation of progress in weight training over the years. The classic variables of load, frequency, duration, and intensity have been the cornerstones to achieve this overload. More specifically, the variables can be redefined as the following program variables:
1. Repetition Maximum Load.
2. Number of sets.
4. Order of Exercises.
5. Rest Periods.

The above five program variables better define how load, frequency, duration and intensity are achieved during the workout. It also gives the coach a finer control of knowing exactly how and where an overload is to occur. The strength and conditioning professional must seek even finer control in order to progressively grade workouts. The many new ideas generated about cycle training could use a finer control of the basic workout stress. These program variables can implicate many things about eventual training effects, from metabolic stress to strength gains (6).

The advantage of approaching weight training from a more specific exercise prescription basis is the ability to better individualize workouts. Individualization has greatly suffered due to the large number of athletes and limited space coaches are often forced to work with. Thus, many times the programs written are not “optimal.” It is important to always keep in mind as a reference what would be considered “optimal” programming.

When program variables are available for manipulation one can make gradual changes in the athlete’s workout routine. Examine the following example and see how each program variable could change the workout. Only part of a workout is presented.

<table>
<thead>
<tr>
<th>Workout A</th>
<th>Reps</th>
<th>Rest</th>
<th>Reps</th>
<th>Rest</th>
<th>Reps</th>
<th>Rest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bench Press</td>
<td>10</td>
<td>2 min.</td>
<td>10</td>
<td>2 min.</td>
<td>10</td>
<td>2 min.</td>
</tr>
<tr>
<td>Flys</td>
<td>10</td>
<td>2</td>
<td>10</td>
<td>2</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Tricep Extensions</td>
<td>10</td>
<td>2</td>
<td>10</td>
<td>2</td>
<td>10</td>
<td>2</td>
</tr>
</tbody>
</table>

Changing the repetition maximum from a 10 RM to a 5 RM makes a dramatic difference in the strength training outcome. Training at or below an 8 RM primarily develops the strength component (1). Twelve RM and greater results in endurance gains, this being the primary component trained. The 10 RM is in the middle of the repetition continuum and builds both, but at a slower rate (1).

Turning to the number of sets, research has demonstrated that multiple sets are effective in strength development. Five sets yields a greater training effect than 3 sets. The number of sets also effects the loading factor on the muscle. Thus, fine control on load duration and intensity can be manipulated by the number of sets of a particular exercise (2).

The choice of exercises is very important because it determines at what angle the training effects in the muscle will occur. This is a prime consideration when trying to make the workout specific to the sport. Specificity has been of vital interest to sports conditioning.

Another factor to consider is whether to choose a “body-part” exercise (one that isolates a particular muscle) or a “structural” exercise (one that uses a combination of muscles to perform one lift). The “body-part” versus “structural” exercise choice may have a lot to do with the power and coordination development for athletes. Again, choice of the number and kind of exercises in a workout gives the coach a fine control of...
grading the workout regarding intensity and duration.

The order in which the exercises are performed is closely related to the "pre-exhaustion" techniques which increase intensity and loading. In this example, putting the bench press last and performing flies and triceps extensions first dramatically changes the workout. The assistance angles have now been "pre-exhausted" before the performance of the bench press. This makes the exercise tougher from a loading and intensity factor.

By reducing the rest periods, intensity increases even nearer to the point of metabolic loading (increases of lactic acid), giving rise to the concept of "supersetting." Reducing or increasing rest periods directly controls metabolic loading and thus, intensity. The rest variable can also be applied between workouts, thus dictating frequency and allowing even more control over cycling and periodization of training.

As can be seen, the manipulation of these five program variables within a total workout suggests almost infinite possibilities for workout design. It can also be seen that the "magic" workout may apply to only one point in time, as something can always be changed, challenging boredom and workout staleness.

As a final reminder, coaches should examine the workouts they have designed and characterize them according to the five program variables. By being aware of program possibilities and matching the workout to the sport, the coach can make positive program changes. Program design can be a dynamic process, involving evaluation of every variable.

References

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