

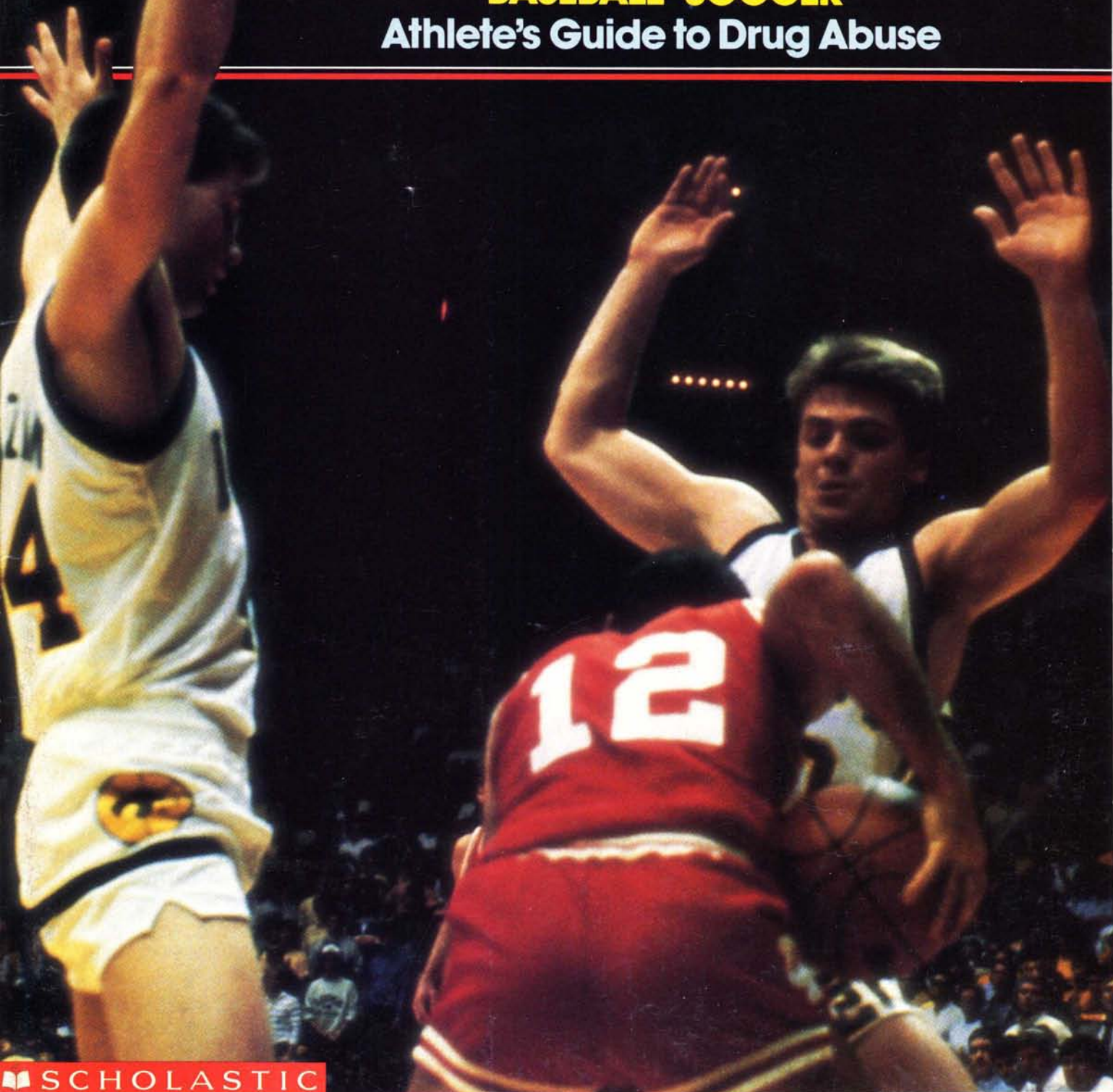
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OVERLOAD: MULTIPLE SETS VS 'SINGLE SET TO FAILURE'

By MATT BRZYCKI/Strength & Fitness Coordinator, Princeton University

ATHLETES who desire to increase their muscles in size and strength must stress—or challenge—them with a work load beyond the muscles' current capacity. Exercise physiologists and other fitness professionals refer to this as the "overload principle."

The muscles can be stressed with either multiple sets or a single set performed at high intensity. Multiple-set programs are certainly effective in overloading the muscles. Indeed, such routines have been used for decades by bodybuilders and competitive weightlifters.

Since many strength coaches have such backgrounds, most high school, college, and professional teams subscribe to the traditional multiple-set programs. Each successive set makes a deeper inroad into the mus-

cle, and the cumulative effect provides an overload.

The point to remember is that the resistance used and/or repetitions performed must build from one workout to the next in order to achieve maximal improvement. This, in effect, is a progressive overload.

Care must also be taken to ensure adequate recovery between workouts. The muscle tissue actually breaks down. The tissue rebuilds and gets stronger during the recovery phase. A 48 to 72 hour period is needed for the muscle to recover from a strength workout.

That's why the athlete should lift three times per week on alternate days (e.g., Monday, Wednesday, Friday). Fact: Too many sets or too many exercises can actually be counterproductive, as they create a catabolic training effect that re-

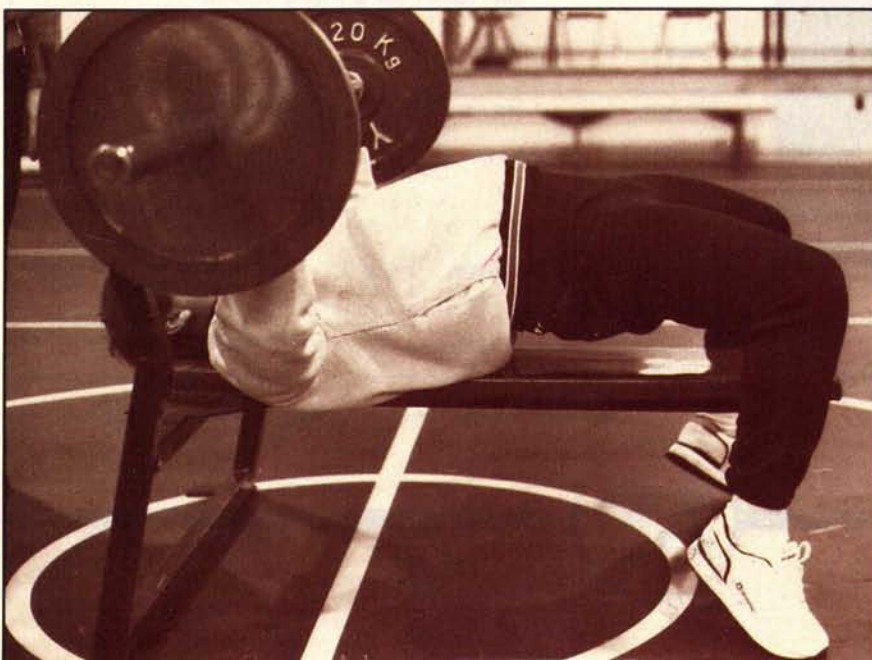
tards muscular growth. In other words, the excessive activity breaks down the muscles faster than they can recover.

A growing number of strength coaches now subscribe to the so-called "high intensity" or "single-set-to-failure" programs. At the collegiate level, Providence, West Point, Penn State, Michigan, and Vanderbilt are among the notable examples of schools that subscribe to nontraditional, high-intensity programs. In the professional ranks, the Washington Redskins, San Diego Chargers, Seattle Seahawks, Phoenix Cardinals, and Cincinnati Bengals also use the nontraditional approach.

A high-intensity (or single-set) program can be just as productive as a multiple-set program, provided each set is performed to the point of absolute muscular failure. Whereas a multiple-set program is successful due to the cumulative effect of each set, a "single-set-to-failure" program is successful due to the cumulative effect of each repetition.

How can this happen with only one set? Let us say you perform a set of leg extensions with 100 pounds. In order to overcome inertia and provide movement to the 100 pounds of resistance, your quadriceps must exert slightly more than 100 pounds of force.

The weight will not move if a force less than or equal to 100 pounds is applied. During the first repetition, only a small percentage of your available muscle fibers is working—just enough to move the weight. As you perform each repetition, some



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muscle fibers will fatigue. But fresh fibers will be simultaneously recruited to assist the fatigued fibers to generate ample force.

This will continue until the last repetition, when momentary muscular failure is finally reached. At this point, your available fibers will be unable to create enough force to raise the weight. During this final repetition, the cumulative effect of each preceding repetition will have stimulated as many muscle fibers as possible for growth.

Once again, it's critical to progress in the resistance used and/or the repetitions performed from one workout to the next. You must also allow for adequate recovery (48-72 hours) between sessions of high-intensity exercise.

The single-set-to-failure program has two ways of ensuring a sufficient overload.

The first way is by performing 3-

4 additional "post-fatigue" reps with the aid of a partner. These extra reps are sometimes termed "forced reps" or "negatives" and are done immediately after reaching muscular failure. The training partner raises the weight while the lifter resists the movement during the lowering phase.

Let's say you reach muscular failure on a barbell bench press. Your partner helps you raise the weight off your chest until your arms are extended. When you lower the weight back to your chest, the partner will add a little resistance by pushing down on the bar.

These post-fatigue reps are, in effect, positive-assisted and negative-resisted. (Raising the weight is typically referred to as the positive or concentric part of the movement; lowering the weight is usually referred to as the negative or eccentric part.)

The second way to encourage a proper overload of the muscles is by performing "breakdowns" or "stripping the weights" at the end of a set. Shawn Brown, the strength coach at Providence College, calls them "regressions"—an alternative to the forced reps.

When performing breakdowns, you (or your training partner) must quickly reduce the starting weight by about 25-30% and have the lifter do his 3-4 post-fatigue reps with the lighter resistance.

Let's say you do 14 reps with 200 pounds before reaching muscular failure in the calf raise. Your partner immediately strips the weight to about 140 to 150 pounds and you then attempt to perform 3-4 reps with the lighter weight.

Whether you perform forced reps or breakdowns after reaching muscular failure, you will be overloading in a safe, efficient manner.

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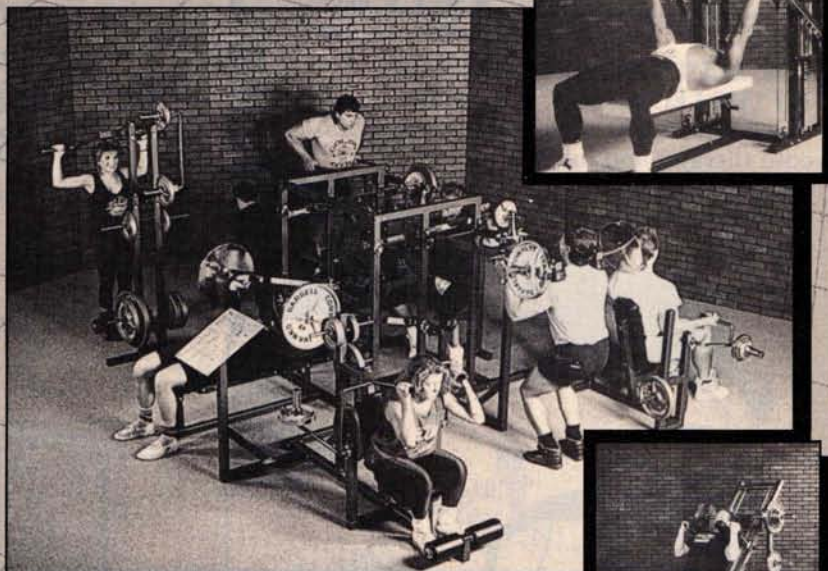
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