The "Core" of the Workout Should Be on the Ball

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New technology and high priced machines and equipment that claim to aid in enhancing performance have inundated the market in recent years. However, a simpler approach may be more beneficial for athletes. Stability balls have long been found in clinical and rehabilitative settings, and in recent years they have made their way into strength and conditioning protocols as a fundamental component of core training. This type of training facilitates the athlete's development of core musculature from the inside out.

Training with stability balls has proven to be successful in helping with the following specific areas:

1. Balance
2. Coordination
3. Proprioception
4. Kinesthetic Awareness
5. Strength
6. Power
7. Stability
8. Range of Motion

There are several general considerations in implementing a stability ball program that will be addressed in this article.

Selecting the Correct Ball

The first consideration when planning to implement stability balls into a core training program is to know what size and kind of ball to purchase. Stability balls come in 10 cm increments ranging from 45 cm to 85 cm. Generally, the following chart can be used to select the correct ball size.

Ball Diameter	Athlete's Height
45 cm – 17.7″	< 5′ 0″
55 cm – 21.6″	5′ 1″ to 5′ 7″
65 cm – 25.5″	5′ 8″ to 6′ 1″
75 cm – 29.5″	6′ 2″ to 6′ 7″
85 cm – 33.5″	> 6′ 7″

If the ball is too large, correct postural development will be compromised in addition to possible hyper-extension of the spine. If the ball is too small, proper elongation of the musculature will not be possible. This will lead to a decrease in range of motion, which will not optimally enhance development. Another rule of thumb for sizing is to sit on the ball and visually determine if the top of the thighs are parallel to the floor (the knees make a 90-degree angle) when the feet are placed flat on the floor directly under the knees. This would be an optimum positioning on a correctly fitted ball.

Most companies that manufacturer the stability ball have similar methods of developing their product. Differences generally range from texture to thickness of the rubber, but this is not an issue when determining which ball to select. All in all, when choosing a ball the most important factor to consider is to make sure the company clearly states their product is "burst-resistant."

Philosophy Behind Stability Ball Training

Training on a ball elicits greater neuromuscular stimulation than performing similar movements on a stable surface. This increase in stress aids the athlete in improving balance, coordination, and proprioception. A developed core leads to more neuromuscular efficiency, which then lends itself to more fluid and coordinated functional movement. Furthermore, since movements are integrated actions that primarily pass through the core, the transfer of energy and force from lower to upper extremity is higher

when an athlete has enhanced core development. Stability balls enhance performance by forcing the exerciser to use additional muscles in order to maintain balance.

Program Design Considerations

Drills on the ball should simulate the versatility of athletic movement whenever possible. Many core programs are restrictive, focusing on one component per movement, rather than blending many components into one. Core training involves stabilization, flexion, extension, and rotation of the musculature of the abdominals and back. Multiple movements can also be incorporated (i.e. lateral flexion and opposing side lateral extension or stabilization and lateral rotation). It is necessary to program the training on the stability ball to encompass as many components in a single movement as expertise and performance increases. Beginning with segmentation of the various components is vital in order for beginners to progress and learn how to adapt to the stimulus. This ensures muscular development and coordination, which is a fundamental development to avoid injury.

Progression on the ball can be seen in this schematic:

- Simple to complex
- Uni- to multi- dimensional
- Large to small base of support
- Low-neuromuscular demand to high-proprioceptive drills

In addition to these progression attributes, designing a program on the ball should evolve from low sets and repetitions of an exercise to multiple sets and high repetitions as proficiency increases. If an exercise is time related, increasing the time under the stress should also be systematically designed as well. As ability and neuromuscular coordination are improved, the time performing a specific drill should be increased.

Furthermore, it is imperative to have counterbalancing drills incorporated into the routine. Emphasizing the anterior more than the posterior musculature could lead to imbalance and possible injury. The inverse of this is also true. Incorporating drills that promote a balance between muscle groups will be beneficial in preventing overuse or imbalance injuries both in training and in subsequent competition.

Periodization

A program for core development on the stability ball will employ the same principles as traditional weight training. The stability ball program should be executed in three phases:

- The Neural-Adaptation and Foundational Phase
- The Accumulation and Developmental Phase
- The Advanced and Specialization Phase

Each phase of the program should be understood and executed thoroughly before progressing onto the successive phase. The *Neural-Adaptation and Foundational Phase* is the most basic of the phases. It involves executing uni-dimensional movements and basic stabilization holds that aid in developing proper motor control. It is imperative to spend quality time perfecting the most basic movements of this phase before progressing. This phase should not be neglected even though it is the most basic. Once the athlete has established proper motor control and adaptation to the unstable surface, then progress can be made more rapidly during the second phase.

The *Accumulation and Developmental Phase* is the longest phase of the program. It involves working on range of motion and more complex movements while stabilizing. This phase is much more intense than the first in terms of difficulty of movements. This phase is where we develop more intricate balance and strength.

The *Advanced and Specialization Phase* is the most specific phase in terms of focusing on combination movements. Because of the need to have a strong foundational base of core development, this phase should not be entered into prematurely.

In terms of daily periodization, the following schematic (table 1) illustrates how one may design a daily regimen with respect to the phase. My recommendation is to begin each training session with stability ball core development after a thorough physiological warm up. Performing a stability ball routine prior to lifting will facilitate an increase in neuromuscular stimulation. This increase may aid in improved coordination and force production of the lifts performed following the core training segment of the program. There is no evidence of decreased athletic performance when executing an intense core training regime directly prior to lifting.

It is not necessary to achieve each of these components every day. However, stabilization should begin every training session, and the following components after stabilization should be addressed, but not necessarily in this particular order.

The following is an example of a 10-week Stability Ball training program that can be incorporated into a traditional non-sports specific regimen. This program should only be implemented after establishing a general yet thorough overall strength base. In addition, it is imperative to understand the concepts of "drawing in" to neutralize the spine and work the transverse abdominus and multifidous. This method is done by visualizing bringing the navel back towards the spine and maintaining that co-contraction while performing all the drills. This method takes time to understand and should be accomplished with simple measures before embarking upon more sophisticated training.

Generally, a thorough stability program should be executed a minimum of two days per week and no more than three times. A typical stability ball program will take approximately twenty

minutes to perform depending upon how adept you are with the drills. If incorporating the stability ball with other core training mediums, then programming should take into consideration what areas are going to be addressed by the ball and which ones will not.

Conclusion

All in all, stability ball training can be an integral component of an athlete's training program. By performing various movements that focus on all of the aforementioned components an athlete can improve coordination, balance, stabilization, strength, and power simply by using the unstable surface of the ball.

It should be noted that due to the nature of the ball, safety considerations should be strictly followed. Always try to maintain a neutral spine by performing the "drawing in" method to avoid exaggerated lower back arches. The tendency to "let the back relax" is a negative when performing core routines on the ball because of the increase pressure and chance of injury to the spine and musculature of the lower back.

If this is addressed, you can build a strong "core" foundation for training that will always be challenging and consistently improve performance.

About the Author

Paul Goodman earned his BA and MS from the University of Wisconsin. He is currently the Head Strength and Conditioning Coach at the University of Vermont. Before taking this position he previously served as an assistant for the University of Wisconsin-Madison.

Table 1

Phase	Daily Progression of Exercises
Neural-Adaptation and Foundational	Stabilization • Anterior (front) • Lateral (sides) • Posterior (back)
	Flexion
	Extension
	Rotation
Accumulation and Developmental	Dynamic Stabilization (stabilization of core while moving extremity) • Anterior (front) • Lateral (sides) • Posterior (back)
	Lateral Flexion
	Lateral Extension
	Rotational Flexion
	Rotational Extension
Advanced and Specialization	Dynamic Stabilization (stabilization of core while moving extremity) • Anterior (front) • Lateral (sides) • Posterior (back)
	Lateral Flexion
	Lateral Extension
	Rotational Flexion
	Rotational Extension (external resistance applied to various drills to increase intensity)

Table 2: Sample 10 Week Stability Ball Core Training Program—Phase 1

Phase 1		Week 1			Week 2			Week 3		
Component	**Drill**	**Sets**	**Reps**	**Time**	**Sets**	**Reps**	**Time**	**Sets**	**Reps**	**Time**
Stabilization	Balanced Sitting (Figure 1)	1		:60	1		:60	1		:60
	Elbow Bridge (Figure 2)	2		:25	2		:35	2		:45
	Side Bridge (Figure 3)	1 ea.		:20 ea.	2 ea.		:20 ea.	1 ea.		:35 ea.
	Heels on Ball Elbows Down (Figure 4)	1		:60	1		:60			
	Heels on Ball Arms Across (Figure 5)				1		:40	2		:50
	Hands on Ball (Figure 6)	1		:30	1		:40	1		:45
	Shoulder Bridge—both feet down (Figure 7)	1		:60	1		:30	1		:40
	Shoulder Bridge—elbows down/one leg up (Figure 8)				1 ea.		:20 ea.	1 ea.		:30 ea.
Flexion	Crunch (Figure 9)	3	20					2	25	
	Heel Grab Crunch (Figure 10)				3	25		2	20	
Extension	Reverse Hyper (Figures 11 & 12)	3	15					2	20	
	Superman—hands (Figure 13)				2	20		2	12	
Rotation	Leg Rotations (Figure 14)	2	8 ea.		2	10 ea.		2	12 ea.	

Table 3: Sample 10 Week Stability Ball Core Training Program—Phase 2

Phase 2		Week 4			Week 5		
Component	**Drill**	**Sets**	**Reps**	**Time**	**Sets**	**Reps**	**Time**
Stabilization	4 Point Kneeling (Figure 15)	1		:60	1		:60
	2 Point Kneeling (Figure 16)						
	Rollouts—w/hold on last one (Figure 2)	2	10	:15	2	12	:20
	Side Bridge (Figure 3)	2 ea.		:30 ea.	2 ea.		:35/:30 ea.
	Heels on Ball Arms Across (Figure 5)	1		:30	1		:40
	Heels on Ball—one leg off (Figure 17)	1 ea.		:10 ea.	1 ea.		:15 ea.
	Hip Bridge—Time indicates both feet down; one leg up, keep hips up the entire time (Figure 18)	1		:30/:10 ea.	1		:30/:20 ea.
Flexion	Pikes (Figure 19)	2	5		2	7	
	Diagonal Crunch (Figure 20)	1	10 ea.		1	15 ea.	
	Lateral Crunch (Figure 21)	1 ea.	15 ea.		1 ea.	20 ea.	
	Crunch With Hip Extension (Figures 22 & 23)						
Rotation	90 degree Pikes w/Lateral Flex & Rotation (Figure 24)	1	6 ea.		1	8 ea.	
Extension	Superman—ankles (Figure 25)	2	15				
	Back Extension				1	15	

Table 4: Sample 10 Week Stability Ball Core Training Program—Phase 2

Phase 2 (continued)		Week 6			Week 7		
Component	**Drill**	**Sets**	**Reps**	**Time**	**Sets**	**Reps**	**Time**
Stabilization	4 Point Kneeling (Figure 15)	1		:30	1		:30
	2 Point Kneeling (Figure 16)	1		:30	1		:60
	Rollouts—w/hold on last one (Figure 2)	3	10	:20	3	12	:25
	Side Bridge (Figure 3)	2 ea.		:40/30 ea.	2 ea.		:40 ea.
	Heels on Ball Arms Across (Figure 5)	1		:50	1		:60
	Heels on Ball—one leg off (Figure 17)	1 ea.		:20 ea.	1 ea.		:20 ea.
	Hip Bridge—Time indicates both feet down; one leg up, keep hips up the entire time (Figure 18)	1		:40/:25 ea.	1		:40/:30 ea.
Flexion	Pikes (Figure 19)	1	10		2	7	
	Diagonal Crunch (Figure 20)	1	15 ea.		1	20 ea.	
	Lateral Crunch (Figure 21)	1 ea.	20 ea.		1 ea.	25 ea.	
	Crunch With Hip Extension (Figures 22 & 23)	1	20		1	25	
Rotation	90 degree Pikes with Lateral Flex & Rotation (Figure 24)	1	10 ea.		1	12 ea.	
Extension	Superman—ankles (Figure 25)	1	15		1	20	
	Back Extension	1	15		1	20	

Table 5: Sample 10 Week Stability Ball Core Training Program—Phase 3

Phase 3		Week 8			Week 9			Week 10		
Component	**Drill**	**Sets**	**Reps**	**Time**	**Sets**	**Reps**	**Time**	**Sets**	**Reps**	**Time**
Stabilization	2 Point Kneeling w/Med Ball Pass (Figure 16)	1		:60	1		:90	1		:120
	Rollouts Feet Up—w/hold on last one (Figure 26)	2	10	:10	2	12	:20	2	15	:30
	Side Bridge (Figure 3)	2 ea.		:45/:35 ea.	2 ea.		:50/:35 ea.	2 ea.		:60/:40 ea.
	Heels on Ball Arms Across (Figure 5)	1		:70	1		:80	1		:90
	Hamstring Curl (Figures 27 & 28)	2	15		1	12				
	Single Leg Hamstring Curl (Figures 29 & 30)				1 ea.	8 ea.		2 ea.	10 ea.	
Flexion	Single Leg Pikes (Figure 31)	1	8 ea.		3	6 ea.		3	10 ea.	
	Diagonal Crunch (Figure 20)	1	20 ea.		2	15 ea.		2	20 ea.	
	Crunch w/Hip Extension—plate behind head (Figures 22 & 23)	1	15		1	20		1	25	
Rotation	Hydrants (Figure 32)	1	6 ea.		2	8 ea.		2	10 ea.	
Extension	Back Extension w/Rotation reps indicated by each direction—front, right side, left side (Figure 33)	1	10 ea.		2	8 ea.		2	10 ea.	

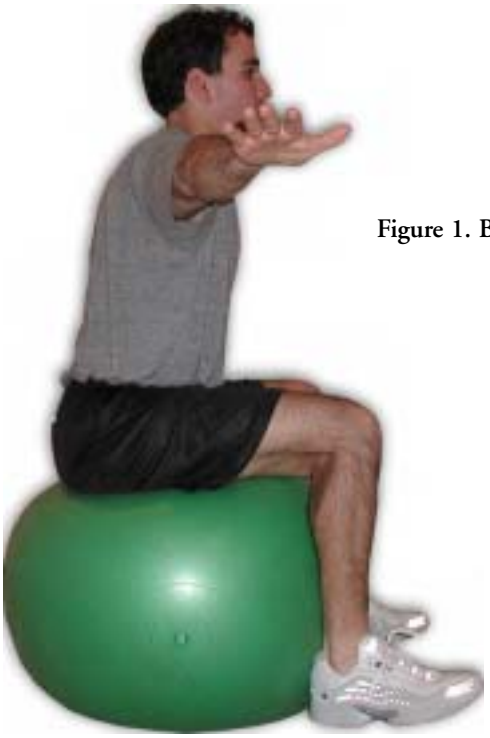


Figure 1. Balanced Sitting

Figure 2. Elbow Bridge

Figure 3. Side Bridge

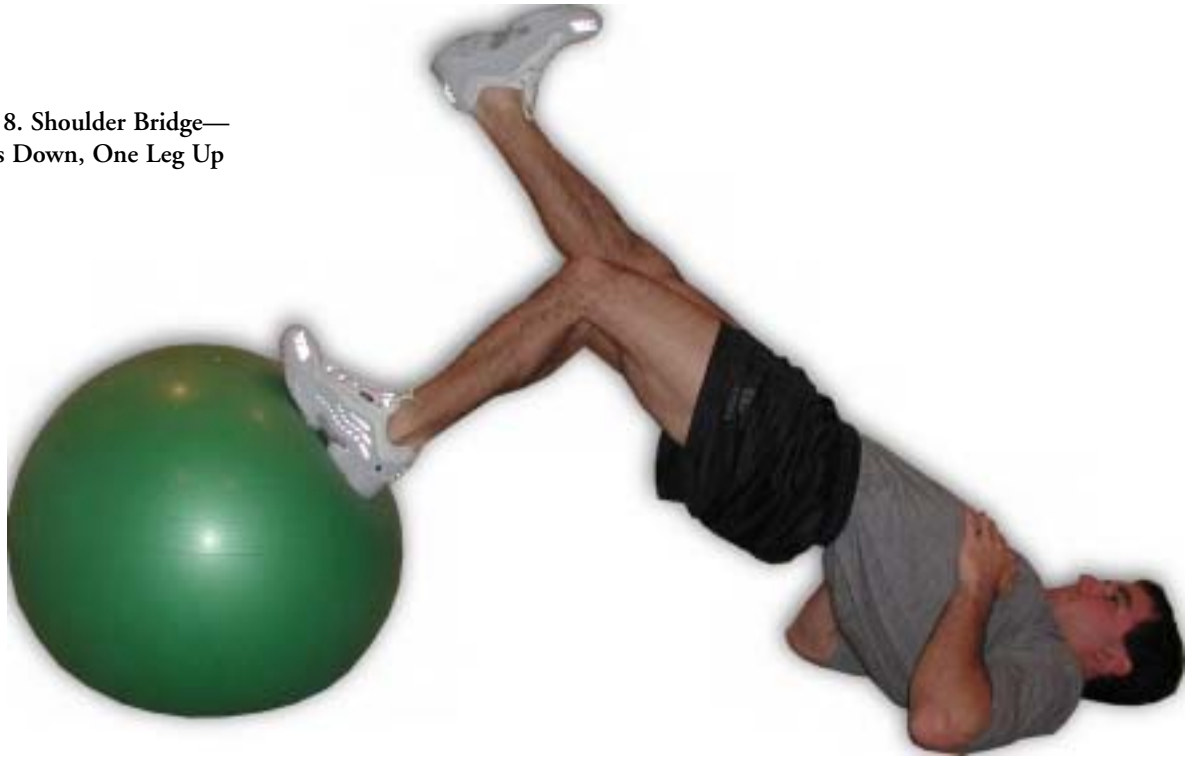
Figure 4. Heels on Ball Elbows Down

Figure 5. Heels on Ball Arms Across

Figure 6. Hands on Ball

Figure 7. Shoulder Bridge—Both Feet Down

Figure 8. Shoulder Bridge—Elbows Down, One Leg Up



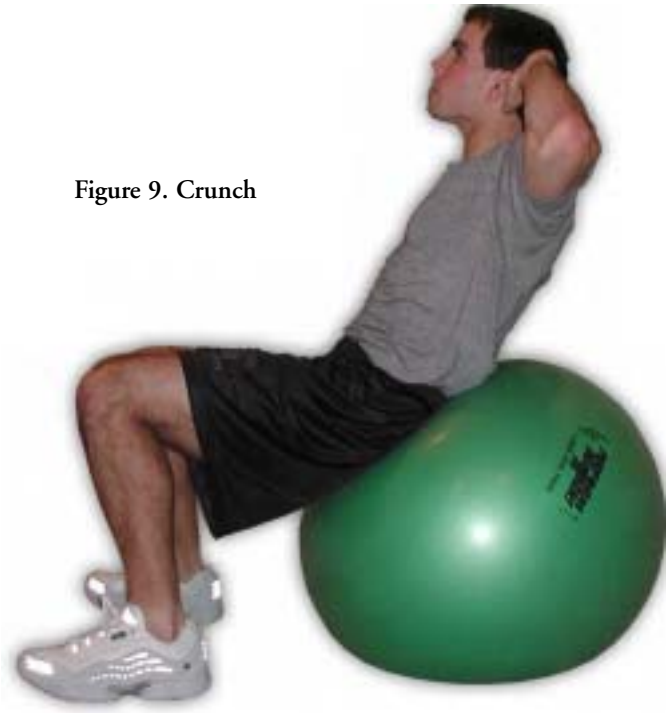


Figure 9. Crunch

Figure 10. Heel Grab Crunch

Figure 11. Reverse Hyper Extension (part 1)

Figure 12. Reverse Hyper Extension (part 2)

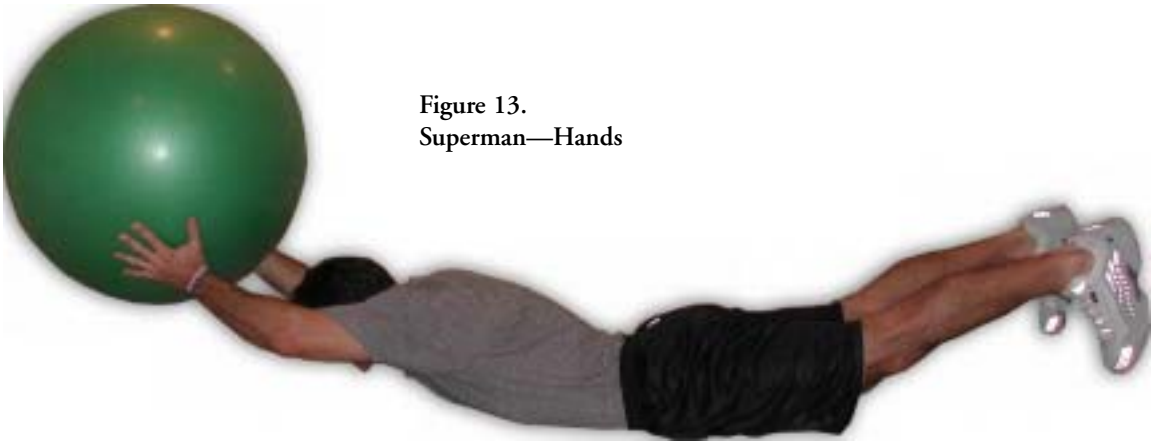


Figure 13.
Superman—Hands

Figure 14. Leg Rotations

Figure 15.
4 Point Kneeling

Figure 16.
2 Point Kneeling

Figure 17. Heels on Ball One Leg Off

Figure 18. Hip Bridge—One Leg Up

Figure 19. Pikes

Figure 20. Diagonal Crunch

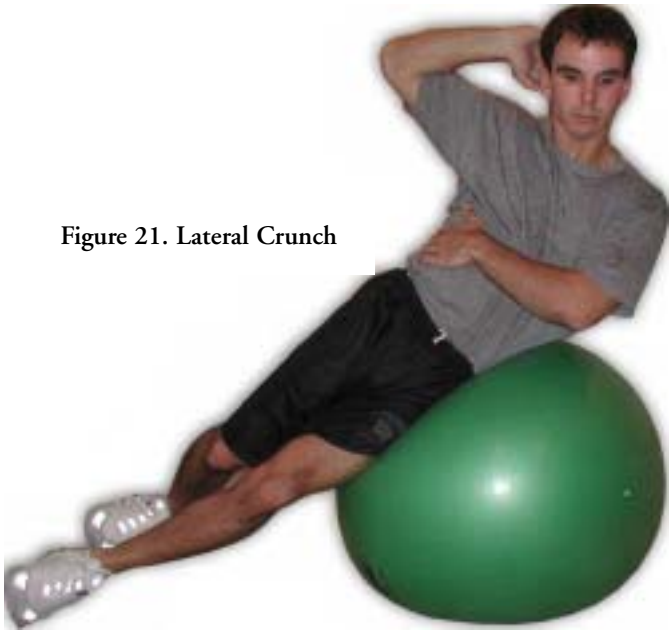


Figure 21. Lateral Crunch

Figure 22. Crunch with Hip Extension (part 1)

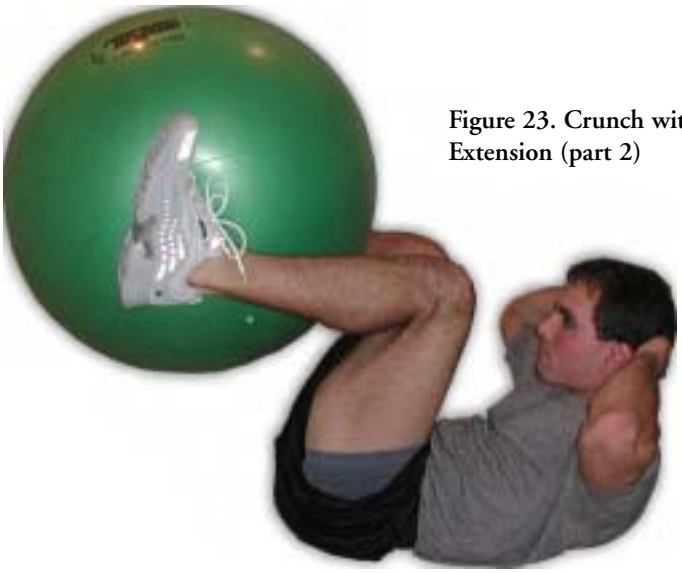


Figure 23. Crunch with Hip Extension (part 2)

Figure 24.
90 Degree Pike

Figure 25. Superman—Ankles

Figure 26. Rollouts Feet Up

Figure 27.
Hamstring Curl
(part 1)

Figure 28.
Hamstring Curl
(part 2)

Figure 29.
Hamstring Curl—Single Leg
(Part 1)

Figure 30.
Hamstring Curl—Single Leg (Part 2)

Figure 31.
Single Leg Pike

Figure 33.
Back Extension—Rotation

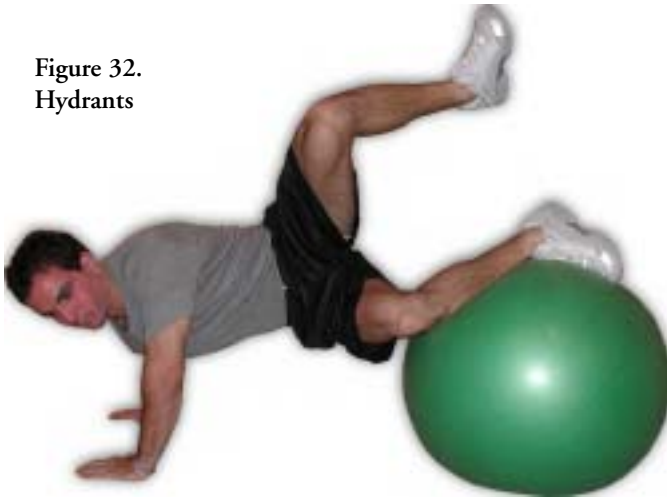


Figure 32.
Hydrants