

CORE Strength & Endurance

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“Core” muscles are the muscles that support the midsection and spine. Think of core muscles as nature’s “protective girdle.” Strong core muscles with optimal endurance work to prevent back injuries and help promote optimal function.

Exercising your core muscles should be a *regular part of your workouts!

The Basics

Bowl of Stability: Core muscles act like a bowl around your spine. Optimal strength and endurance makes this “bowl” stronger and more stable. You also need to balance “stability” (strength & endurance) and “mobility” (Range of Motion/ROM).

Core Muscles: These muscles surround and brace your trunk or midsection. They form a wrap-around “girdle” or “bowl of support” that stabilizes your spine. Core muscles are more than just abdominals on the front of your body—they are also on your sides and mid/low/upper back areas. Some are deep and some are superficial which creates a layered effect for increased stabilization.

Strength vs. Endurance for ABS/Back: Excessive strength of core muscles won’t prevent back injuries, but core “endurance” has been shown to improve the protection of the spinal column—this is the “new philosophy” in ABS/Back exercise.

Science & Body Mechanics

Challenge to Compressive-Cost-Index: A high amount of challenge means you use a lot of core abdominal muscles. The cost of using these muscles relates to the amount of spinal compression (usually refers to lumbar spine) that takes place when they are used. A high cost index is optimal; this means that you are working the most amount muscles without creating unsafe compressive forces on your spine.

Compressive Force/Spinal Loading: This happens when you activate the core muscles. Some degree of compressive force occurs with all ABS/Back exercises. The key is to keep the compressive force or spinal loading within an acceptable range while still challenging those muscles enough to improve strength and endurance.

Fast Twitch Core Muscles: These are the superficial “strength-oriented” muscles near your skin.

Isometric Contraction: This is when a muscle is activated and develops force but no movement occurs. For core exercises, this would relate to “bracing.”

Slow Twitch Core Muscles: These are the deeper “endurance-oriented” muscles that are underneath the first layers of fast twitch core muscles.

ROM: Range of Motion (ROM) is the amount of travel that a limb or joint can safely perform. There is a “normal” ROM that is optimal and healthy. Pushing beyond a normal ROM increases risk for end-range position injuries.

Safety

End-Range Position: Point of danger for spinal injuries where the spine is at the end of normal ROM. You should avoid “pushing” the end-range positions of flexion or extension because of high compressive forces and increased chance for injury.

Neutral Spine Posture/Natural Curve: Your spine has a natural curve. When the spine is in its “natural position”—it has a “neutral posture” which is optimal.

- ✓ When performing ab exercises like Curl Ups (or “crunches”), use lumbar support to maintain neutral posture. Raise one knee to further stabilize the pelvis.
- ✓ Always perform core exercises with control—no jerking or pushing on end-ranges.

Techniques

Abdominal Bracing: Technique where you squeeze and “brace” all of your core muscles during exercises like Side Bridges and Bird Dogs. This is an example of “isometric contraction.”

Hollowing: Technique of drawing the navel into the spine that activates the deep abdominal wall muscles like transverse abdominis & internal oblique.

Summary

Functional Training of ABS/Back: Train core muscles for “your own” activities of daily living (ADLs). Competitive athletes have different functional needs than someone who exercises recreationally for wellness. After thorough preparation, athletes might need to perform exercises that have higher compressive loading forces but more “sport-specific” value to their activities.

- ✓ No “one exercise” can be labeled “the best” core exercise. Use a variety of core exercises that challenge all the various muscles surrounding your trunk. Some exercises will work certain muscles better than others.
- ✓ Some exercises are better for improving strength while others are better for improving endurance. Endurance exercises (bracing and holding) have been shown to prevent back injuries. Adding extra strength beyond the “functional strength” needed for one’s ADLs will not prevent back injuries.

Floor Exercises: Beginner

1. **Cat/Camel:** Flex your back (don’t press end-range position or stretch), relax and let back sag (extension). This “flosses” your nerve roots at each spinal joint. *Start each ABS/Back session with 5-6 cycles of cat/camel.
2. **Press Ups:** On stomach, gently extend spine by straightening arms.
3. **Isometric Contraction:** Lie on your stomach and squeeze your low-back muscles, hold, then release.
4. **Leg Extension:** On all fours, extend one leg at a time straight back.
5. **Bird Dog:** Similar to leg extension but extend opposing arm also.
6. **Curl Up:** Support lumbar spine and stabilize pelvis, curl chest off floor no more than 30°.
7. **Cross Curl Up:** Similar to Curl Up but twist torso and bring one elbow towards (but not touching) opposing crossed knee.
8. **Supine Bridge:** Extend hips & lift off floor until spine is straight & hold.
9. **Prone Bridge:** Lift hips off floor until spine is straight & hold.

Floor Exercises: More Advanced

1. **ABS Bicycling:** On back, alternate one elbow towards opposing knee while in curl up position of 30°.
2. **Superman Pointer:** Lie on stomach and extend legs and arms. To reduce difficulty, you can isolate one limb or extend opposing limbs instead of all four at the same time.
3. **Static Side Bridge:** Rest on forearm, elbow, and foot while bracing and hollowing. Be sure to keep body “straight” with spine in neutral posture.
4. **Dynamic Side Bridge:** Similar to Static Side Bridge except you alternate between sides and add a center position resting on both forearms and elbows simultaneously.

References

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- Juker, D., Mc Gill, S., Kropf P., Steffen, T. (1998). Quantitative intramuscular myoelectric activity of lumbar portions of psoas and the abdominal wall during a wide variety of tasks. *Medicine & Science in Sport & Exercise*, 30:2, 301-310.
- Mc Gill, Stuart. (2000). Low back stability: from formal description to issues for performance and rehabilitation. *ACSM Exercise and Sport Science Reviews*, 29:1, 26-31.

***These exercises are intended for normal healthy individuals. If you have an injury, or abnormal pain is present, see a physician or a certified physical therapist before continuing your exercises.**

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