ESSENTIAL EXERCISES

By Chris Beardsley and Paul Carter

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Welcome to the Essential Exercises book! Here, you will find a range of exercises that we believe provide the ideal foundation for any bodybuilding training program. Beginners, intermediates, and advanced lifters will all benefit from including these exercises in their routines. What is more, beginners can likely make great progress for a long time focusing exclusively on them. We hope you find them valuable and we wish you the best of luck and the greatest of success in your training.

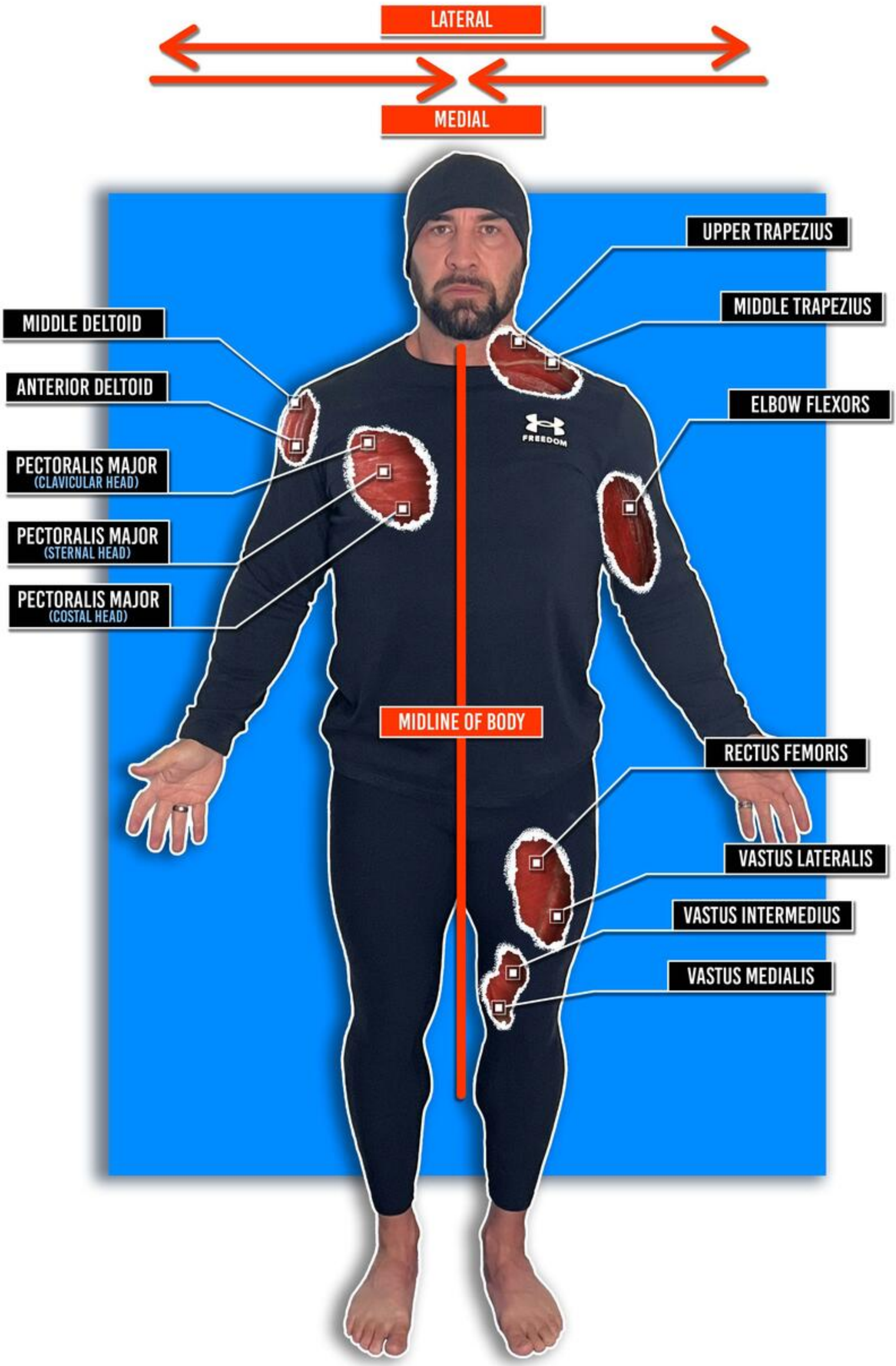
Chris Beardsley and Paul Carter

Contents

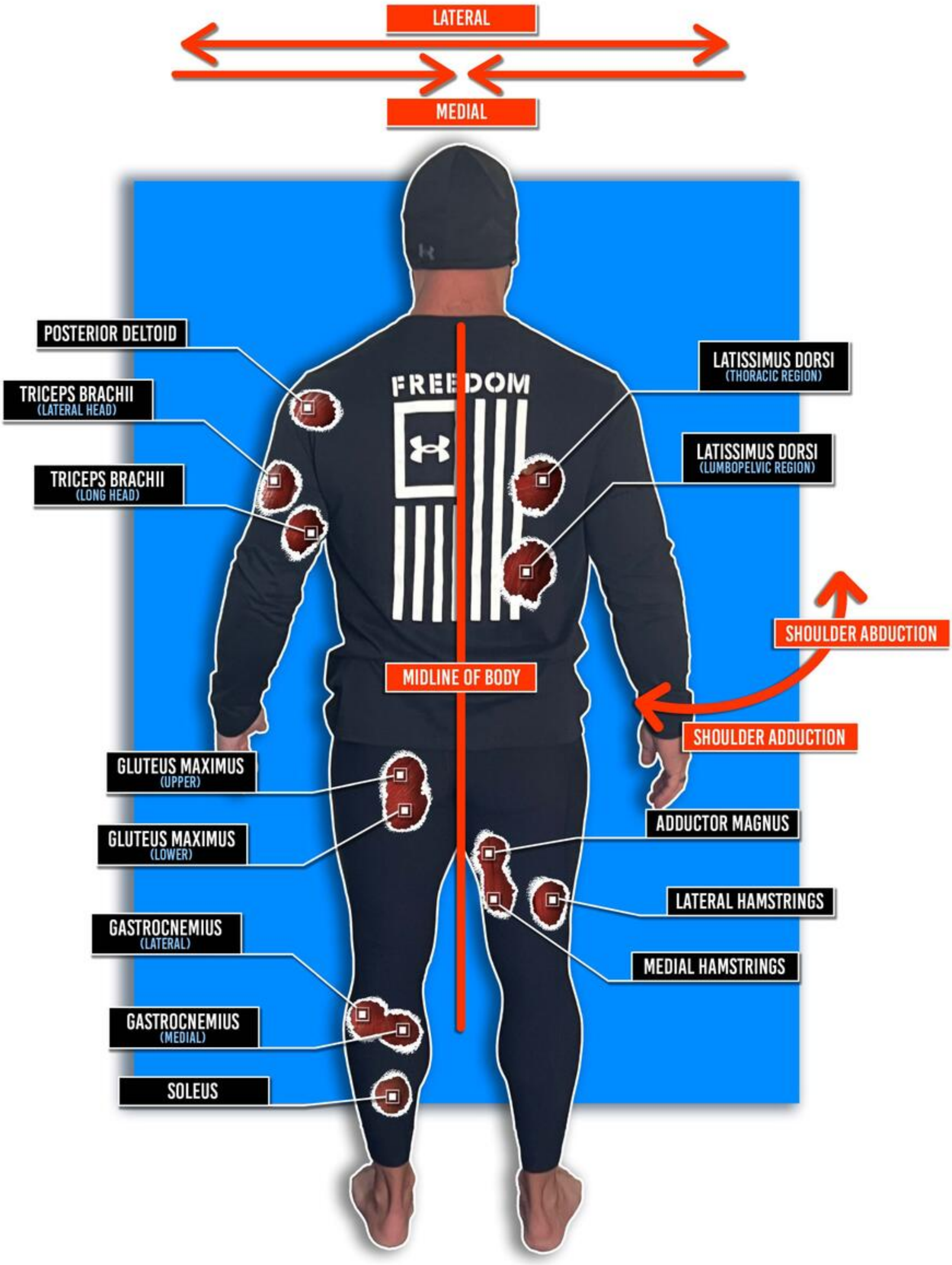
Background

Learn basic anatomy, key terminology, and find out about why internal moment arm lengths and sarcomere operating lengths are the keys to exercise selection

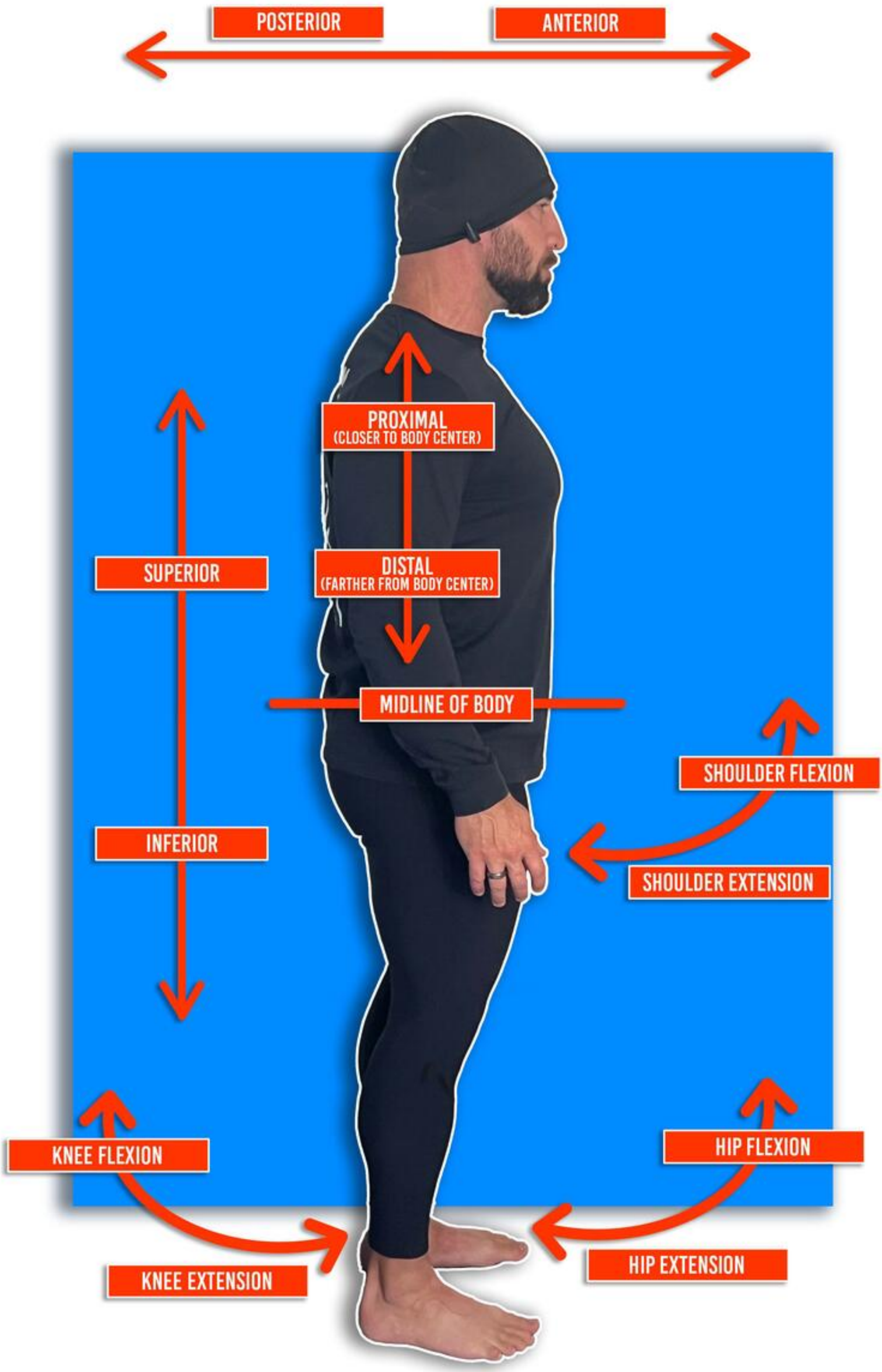
Basic anatomy



Basic anatomy



Basic anatomy



Important terminology

Key anatomical terms	
Anatomical position	We are in the anatomical position when we are standing upright with straight legs and arms by our sides
Superior	When a part of the body is superior to another part, it is located higher up whenever we are standing in the anatomical position
Inferior	When a part of the body is superior to another part, it is located lower down whenever we are standing in the anatomical position
Anterior	When a part of the body is anterior to another part, it is located closer to the front side of the body
Posterior	When a part of the body is posterior to another part, it is located closer to the rear side of the body
Medial	When a part of the body is medial to another part, it is located closer to a line drawn down the middle of the body (called the midline)
Lateral	When a part of the body is lateral to another part, it is located further away from the midline
Proximal	When a part of the body is proximal to another part, it is located closer to the center of the body (the torso)
Distal	When a part of the body is distal to another part, it is located further away from the center of the body (the torso)

Important terminology

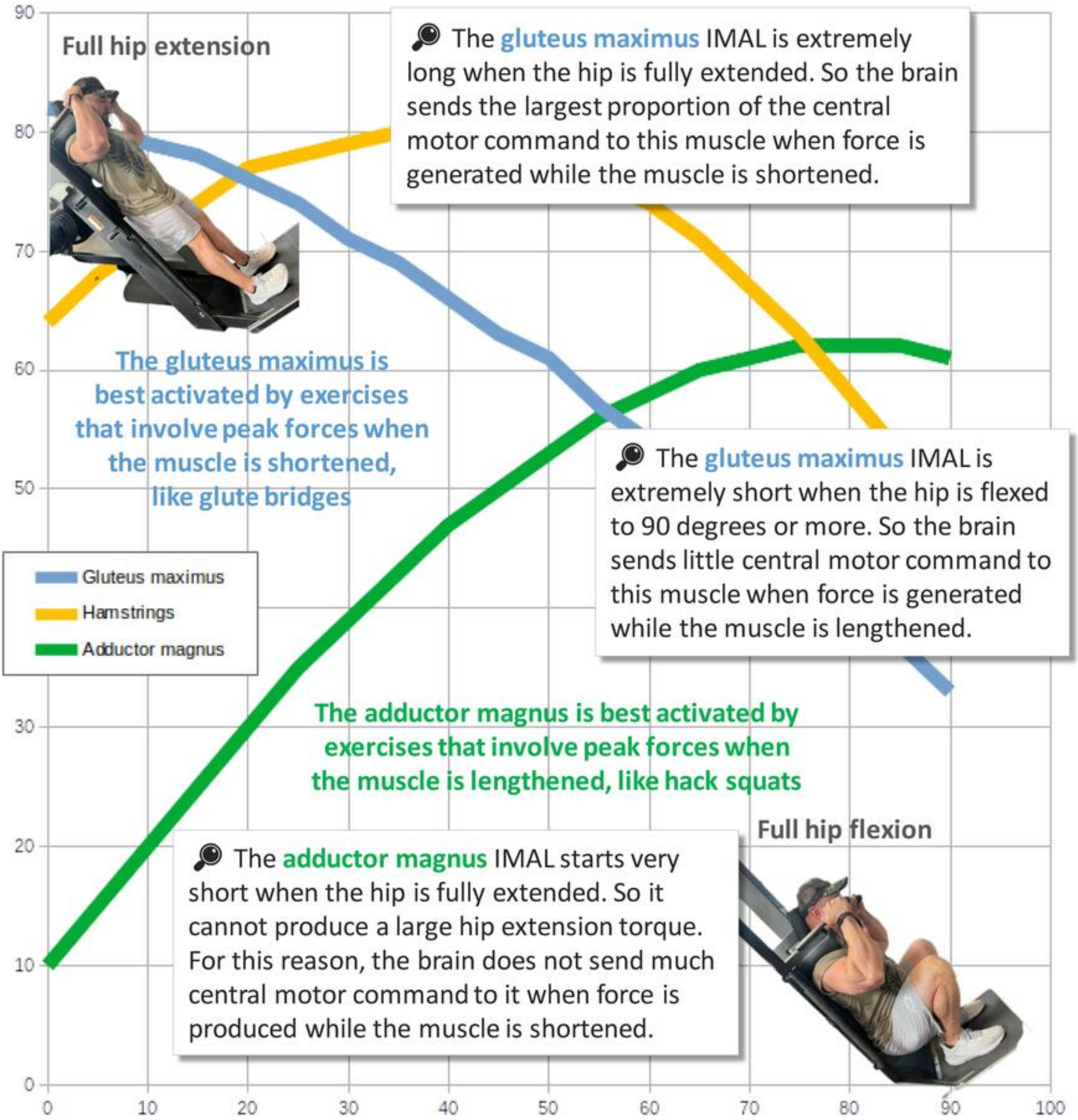
Key physiological terms	
Motor unit recruitment	The central nervous system organizes muscle fibers into groups called motor units. When a motor unit is switched on (recruited), this activates all of the muscle fibers in that group. When many motor units are recruited, this corresponds to lots of activated muscle fibers.
Central motor command	Central motor command is the name of the electrical signal that is sent from the motor cortex in the brain to the muscle in order to recruit motor units.
Voluntary activation	Voluntary activation is the main measurement method for assessing how many motor units we can switch on during a maximal effort. If a muscle has a low level of voluntary activation (called a voluntary activation deficit), it is not possible to switch on all of its motor units.
Principle of neuromechanical matching (PNM)	The PNM determines which muscle or region of a muscle receives the majority of the central motor command that is generated in the motor cortex during a movement. It states that whichever muscle or region of muscle has the best leverage will receive the largest part of the electrical signal. Leverage is largely determined by internal moment arm length.
Internal moment arm length (IMAL)	The IMAL of a muscle is the perpendicular distance between the center of the joint that the muscle crosses and the line of action of that muscle. Joint torque is the product of the muscle force and the IMAL. Hence, the longer the IMAL, the greater the joint torque for a given muscle force, and the more efficient a muscle is at producing a given movement.

Important terminology

Key physiological terms	
Mechanical tension	Mechanical tension refers to the pulling forces that muscle fibers produce and experience in either muscular contractions or static stretch.
Active mechanical tension	Active mechanical tension is the pulling force that a muscle fiber generates when it forms actin-myosin cross-bridges upon activation.
Passive mechanical tension	Passive mechanical tension is the pulling force that a muscle fiber generates when it resists being lengthened. The magnitude of these pulling forces depend upon the extent to which the sarcomeres inside the muscle fiber are stretched and this in turn depends upon the sarcomere operating length ranges.
Stretch-mediated hypertrophy (SMH)	SMH is the increase in muscle fiber size that is stimulated by passive mechanical tension. When passive mechanical tension is detected by a muscle fiber, it responds by increasing in length by adding new sarcomeres in series.
Sarcomere operating length range (SOLR)	The SOLR of a muscle refers to the extent to which its sarcomeres are elongated over the joint angle range of motion. Some muscles have sarcomeres that stay mostly quite short. Others have sarcomeres that stretch very far.
Stretched position	The stretched position of an exercise refers to the point when the muscle is longest. It does not always mean that the muscle is actually experiencing passive mechanical tension.
Contracted position	The contracted position of an exercise refers to the point when the muscle is shortest. The muscle fiber mechanical tension can vary very widely between muscles in this position.

Internal moment arm lengths (IMALs)

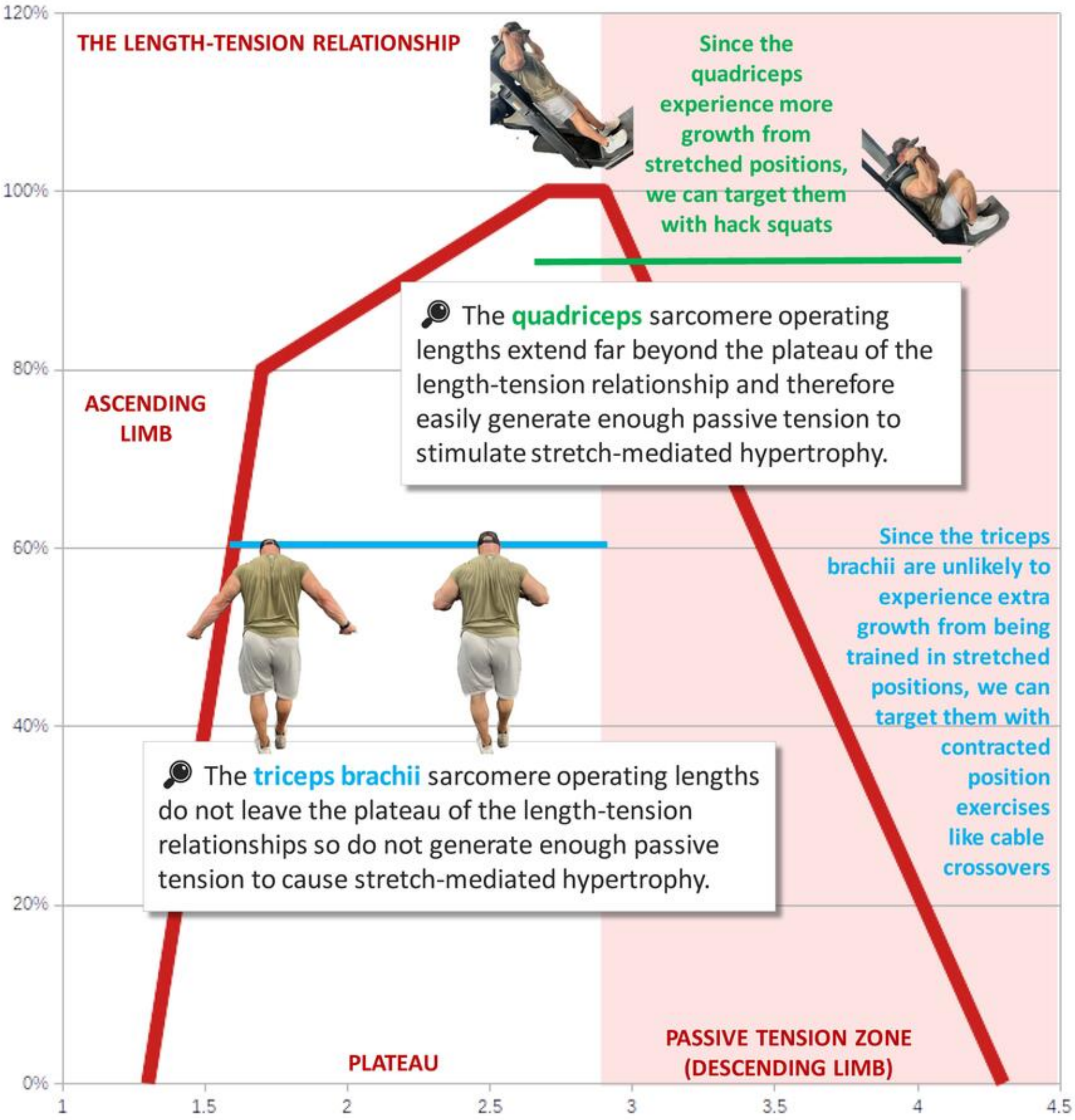
IMALs determine which muscle is activated during an exercise. In the example below, the gluteus maximus, hamstrings, and adductor magnus hip extensor IMALs are shown over the hip flexion joint angle range of motion. Clearly, each hip extensor has a longer IMAL at a different joint angle, which means that different exercises can be used to target them



The **principle of neuromechanical matching** tells us that muscles receive more central motor command when they have longer IMALs than other muscles for producing the joint torque that is required to complete an exercise. Importantly, different exercises have peak force requirements and therefore sticking points at different joint angles. This means that the muscle that receives the largest amount of central motor command (and consequently experiences the most hypertrophy) will differ depending on the exercise that is performed.

Sarcomere operating lengths

The **sarcomere operating lengths** of a muscle likely determine whether it can experience a sufficiently high level of passive tension so as to stimulate stretch-mediated hypertrophy. In the example below, the sarcomere operating lengths of the quadriceps extend into the zone that produces high levels of passive tension but those of the triceps brachii do not.



Sarcomere operating lengths vary considerably between muscles. Sarcomere operating lengths are influenced by the resting sarcomere length and by the extent to which the muscle fiber lengthens. Muscles often have long resting lengths if they need to create high forces in contracted positions (as in the quadriceps and gluteus maximus). The long resting length means that the sarcomeres work on the plateau of the length-tension relationship in the contracted position and then easily reach the zone where passive tension is created.

Lower body exercises

Learn which exercises provide the best foundation for the leg muscles

Machine hack squat

LONG POSITION EXERCISE

🔎 A large degree of knee flexion is achievable in the hack squat due to the hip position. The resulting long muscle length is useful for causing stretch-mediated hypertrophy.

🔎 The high stability of the machine hack squat allows a higher level of motor unit recruitment than free weight squat variations. This is very useful, since the quadriceps suffer from a naturally low level of voluntary activation.

Knee flexion angle

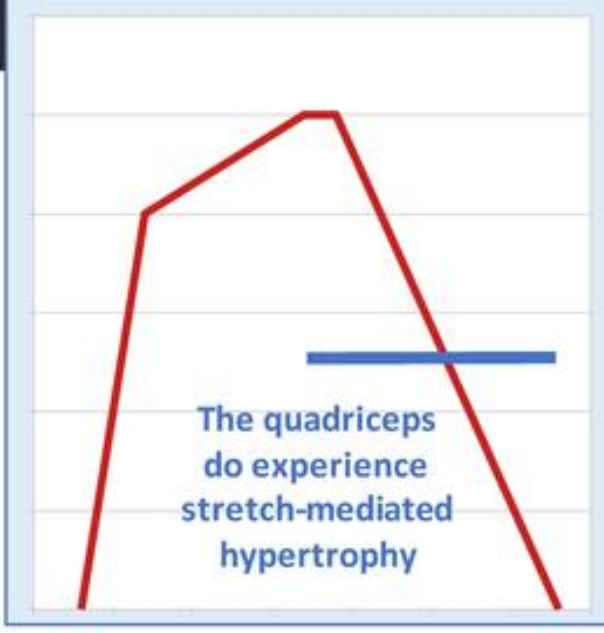
PRIME MOVER MUSCLES

Single-joint quadriceps (vastus lateralis, vastus medialis, and vastus intermedius)
Adductor magnus
Gluteus maximus
Soleus

INTERNAL MOMENT ARM LENGTH (IMAL)

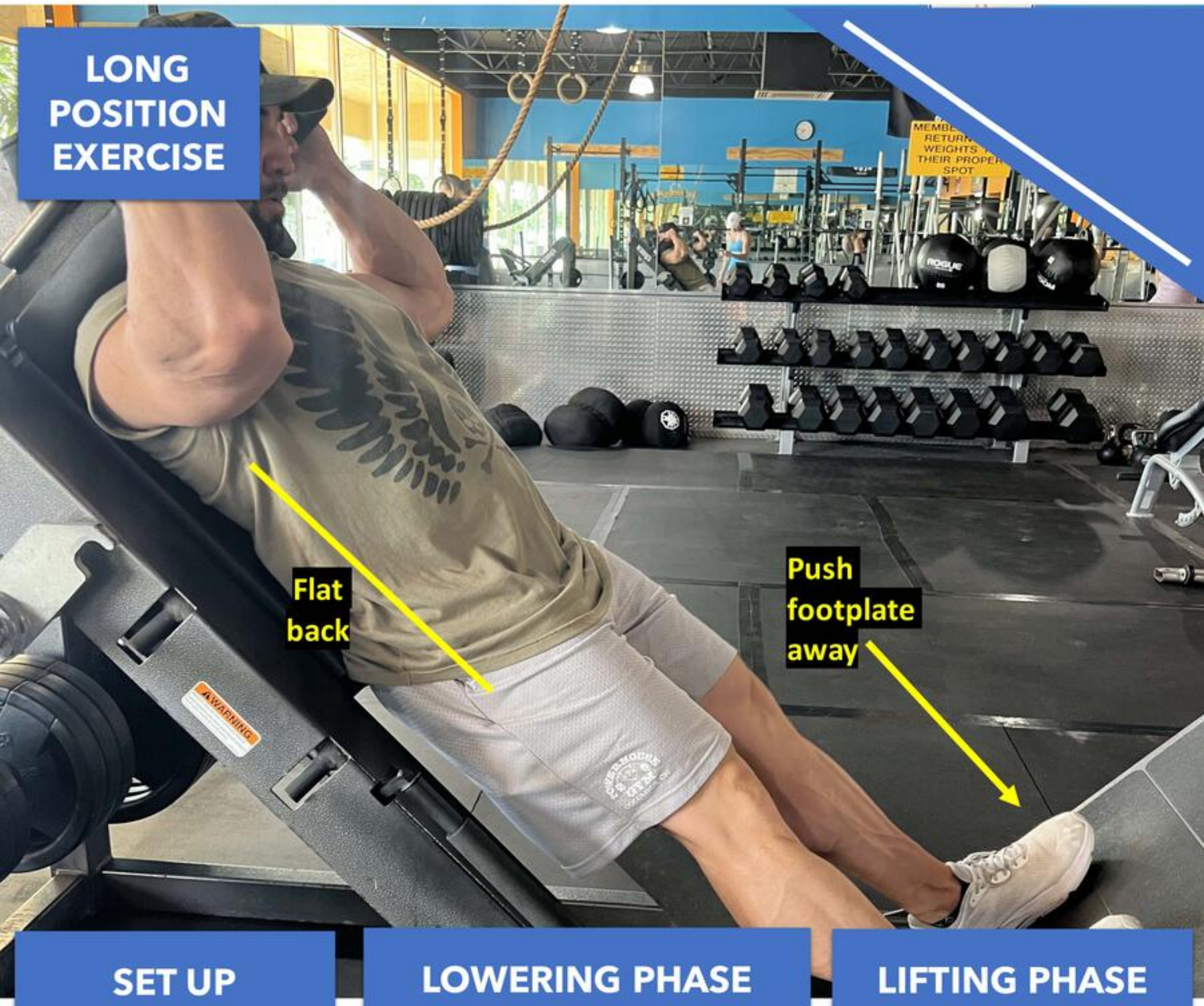
The single-joint quadriceps have similar IMALs to each other over the joint angle ROM, so different depths do not target different muscles. Peak force in the stretched position targets the adductor magnus instead of the gluteus maximus

LENGTH-TENSION RELATIONSHIP



Beginners can program this exercise for developing all of the listed prime mover muscles. **Intermediate lifters** and **advanced lifters** can program it only to develop the single-joint quadriceps (vastus lateralis, vastus medialis, and vastus intermedius) in addition to the adductor magnus but note that it will help maintain the soleus and gluteus maximus. Even so, when an individual lifter has extremely good leverage for the gluteus maximus during this exercise, it may still be developed despite their having a more advanced training status.

Machine hack squat



SET UP

Start at the bottom and find the position where you get both full knee flexion and also full contact with the foot

LOWERING PHASE

Push your knees out just enough to allow yourself to get full knee flexion. Make sure to keep your back flat on the pad throughout the whole exercise range of motion

LIFTING PHASE

Push the floor (or the footplate of the machine) away from you throughout the whole lifting phase

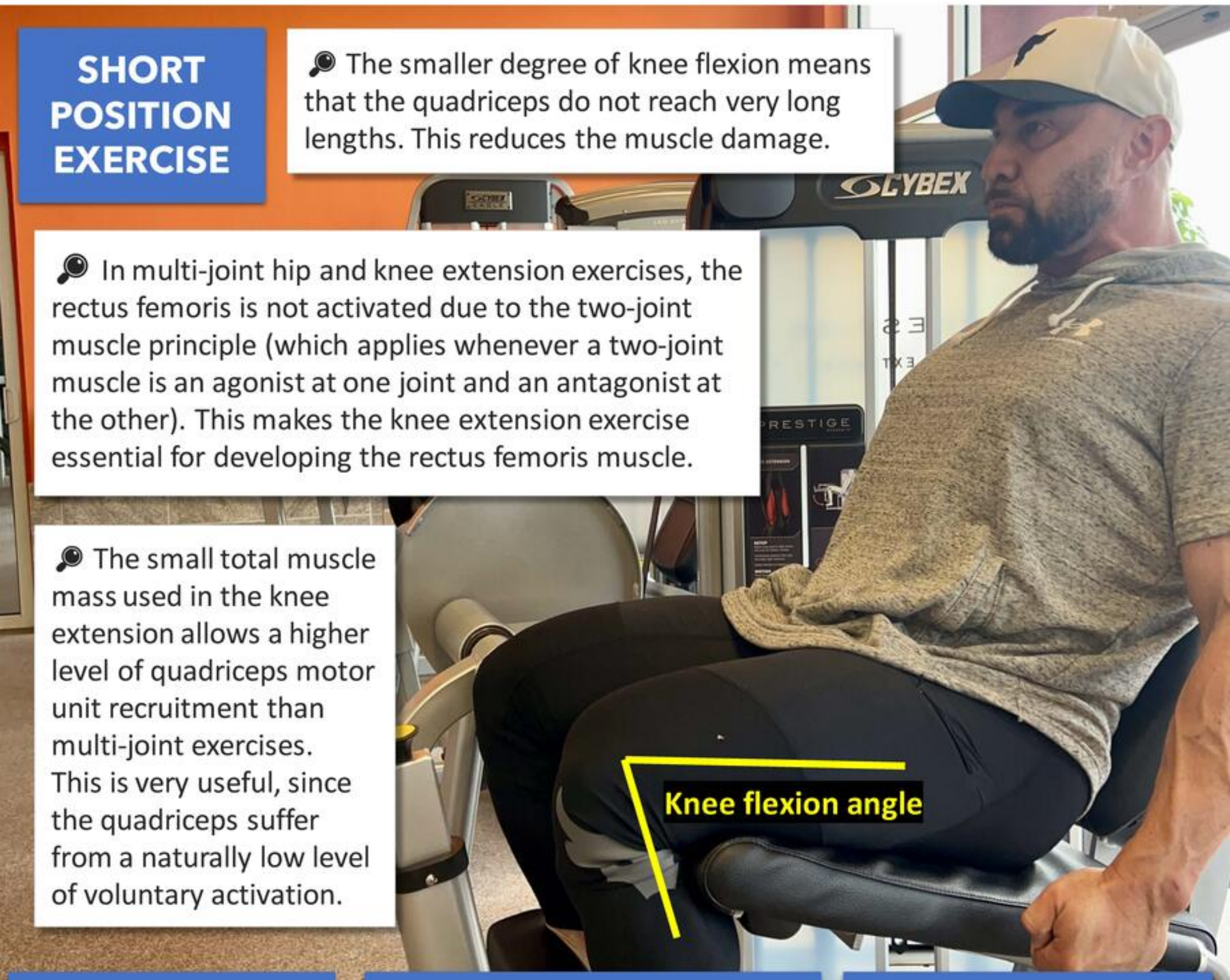
Seated knee extension

SHORT POSITION EXERCISE

🔎 The smaller degree of knee flexion means that the quadriceps do not reach very long lengths. This reduces the muscle damage.

🔎 In multi-joint hip and knee extension exercises, the rectus femoris is not activated due to the two-joint muscle principle (which applies whenever a two-joint muscle is an agonist at one joint and an antagonist at the other). This makes the knee extension exercise essential for developing the rectus femoris muscle.

🔎 The small total muscle mass used in the knee extension allows a higher level of quadriceps motor unit recruitment than multi-joint exercises. This is very useful, since the quadriceps suffer from a naturally low level of voluntary activation.



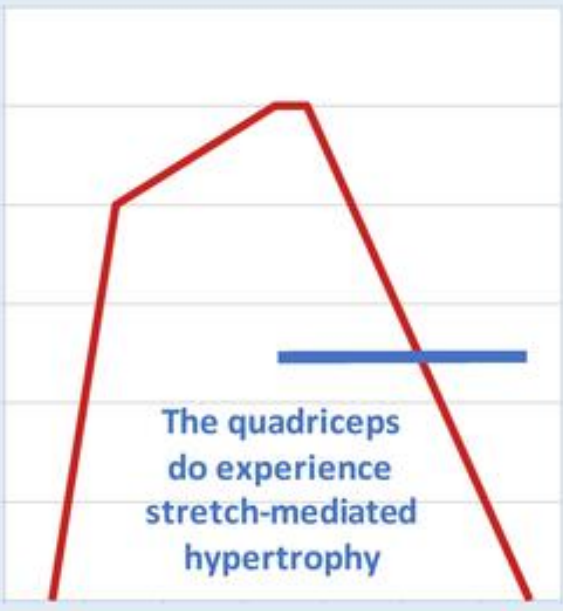
PRIME MOVER MUSCLES

Two-joint quadriceps (rectus femoris)
Single-joint quadriceps (vastus lateralis, vastus medialis, and vastus intermedius)

INTERNAL MOMENT ARM LENGTH (IMAL)

All of the quadriceps have similar IMALs to each other over the joint angle ROM, so different knee angles do not target different muscles. Even so, the distal region of the rectus femoris likely has better leverage than the proximal region in this exercise

LENGTH-TENSION RELATIONSHIP



Beginners, intermediate lifters, and **advanced lifters** can program this exercise for all of the listed prime movers. However, it should be noted that the rectus femoris itself divides into upper and lower regions and the knee extension primarily develops the lower region. For full rectus femoris development (as may be necessary for certain advanced lifters), a hip flexion exercise is also needed to target the upper region of the rectus femoris.

Seated knee extension

SHORT POSITION EXERCISE

🔎 Small changes in the way that an exercise is performed can greatly enhance stability and so increase the levels of motor unit recruitment that can be achieved at maximal effort.

SET UP

Set up the seat position and any other setting so that your knee is in line with the pivot point of the weight stack

LOWERING PHASE

Lower the weight slowly and under control until you reach the starting position. Hold the seat handles firmly to avoid any other movements of the body

LIFTING PHASE

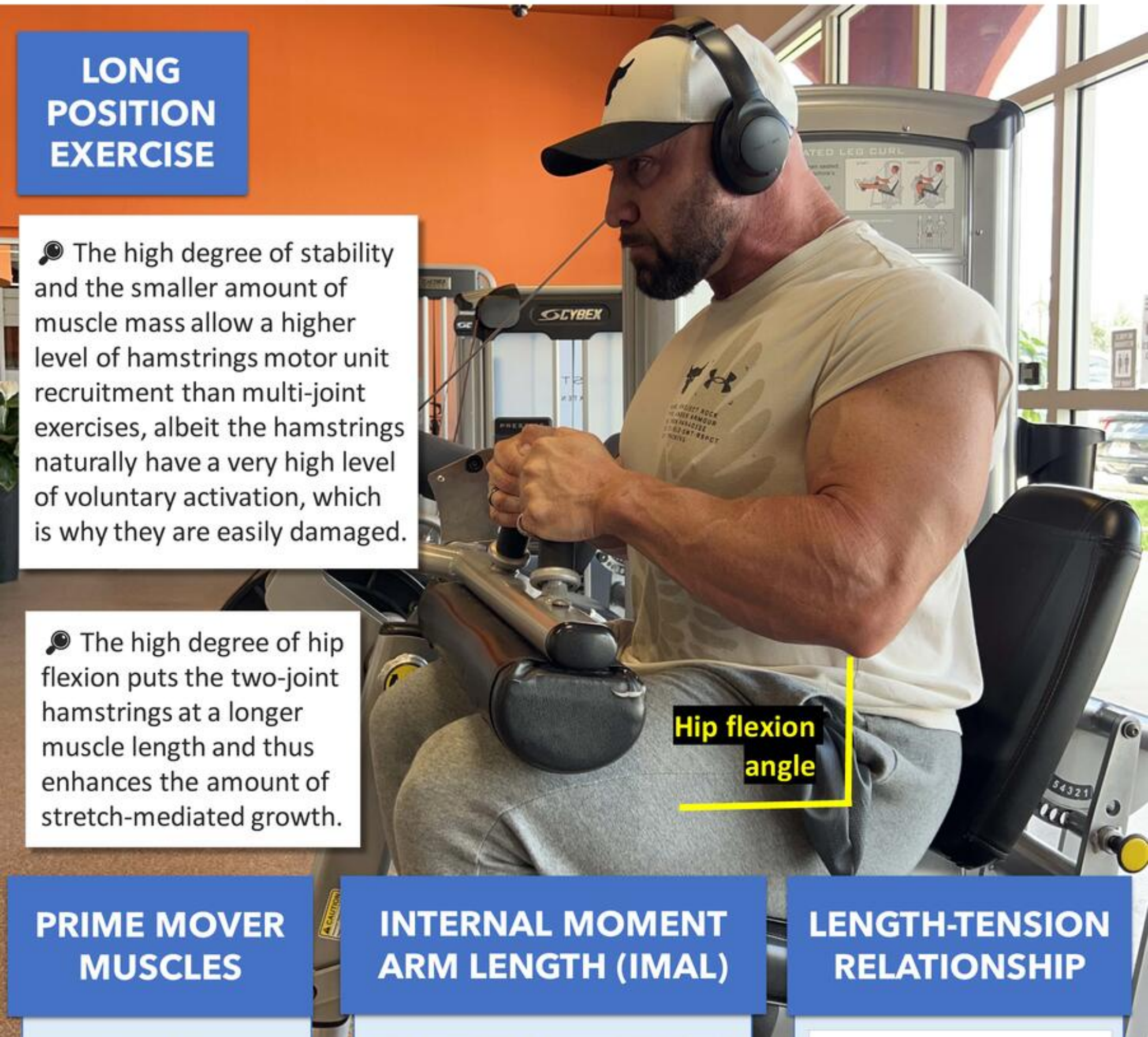
Drive your toes towards the ceiling throughout the whole exercise range of motion

Seated leg curl

LONG POSITION EXERCISE

🎾 The high degree of stability and the smaller amount of muscle mass allow a higher level of hamstrings motor unit recruitment than multi-joint exercises, albeit the hamstrings naturally have a very high level of voluntary activation, which is why they are easily damaged.

🎾 The high degree of hip flexion puts the two-joint hamstrings at a longer muscle length and thus enhances the amount of stretch-mediated growth.



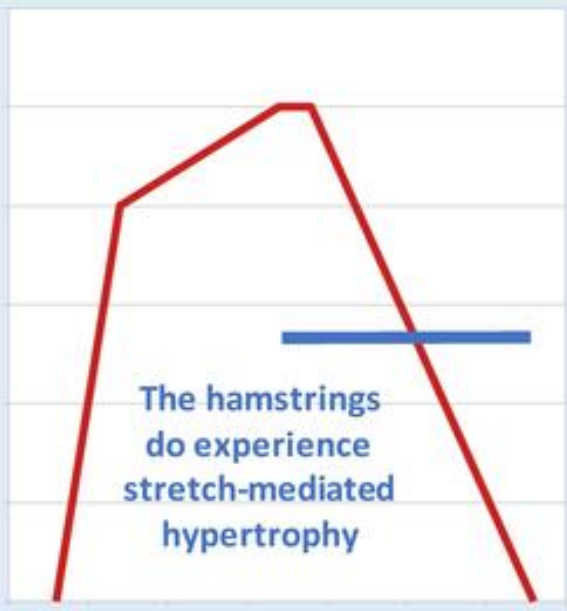
PRIME MOVER MUSCLES

Two-joint hamstrings (biceps femoris long head, semitendinosus and semimembranosus)
Single-joint hamstrings (biceps femoris short head)

INTERNAL MOMENT ARM LENGTH (IMAL)

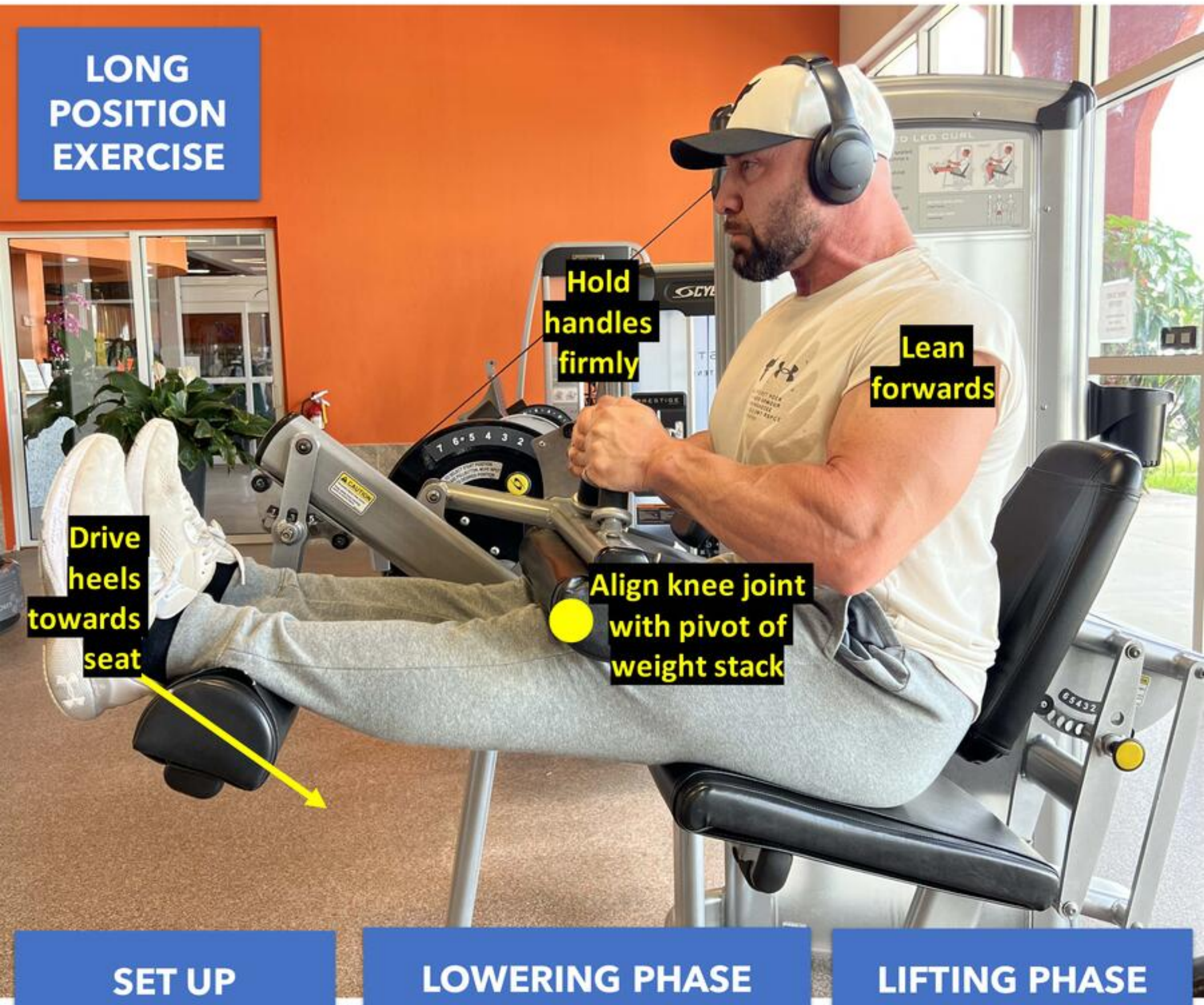
The semitendinosus (and likely also the biceps femoris short head) has a longer IMAL then the other hamstrings in leg curls and so is likely to be developed to a greater extent. The distal regions of all muscles seem to have better leverage than the proximal regions

LENGTH-TENSION RELATIONSHIP



Beginners, intermediate lifters, and **advanced lifters** can program this exercise for all listed prime movers. Yet, knee flexion exercises likely involve more emphasis on the biceps femoris short head and the semitendinosus compared to the biceps femoris long head and semimembranosus. Also, they involve more emphasis on the distal parts of each muscle than the proximal portions. For total hamstrings development, more advanced lifters may wish to include hip extension exercises to supplement the seated leg curl.

Seated leg curl

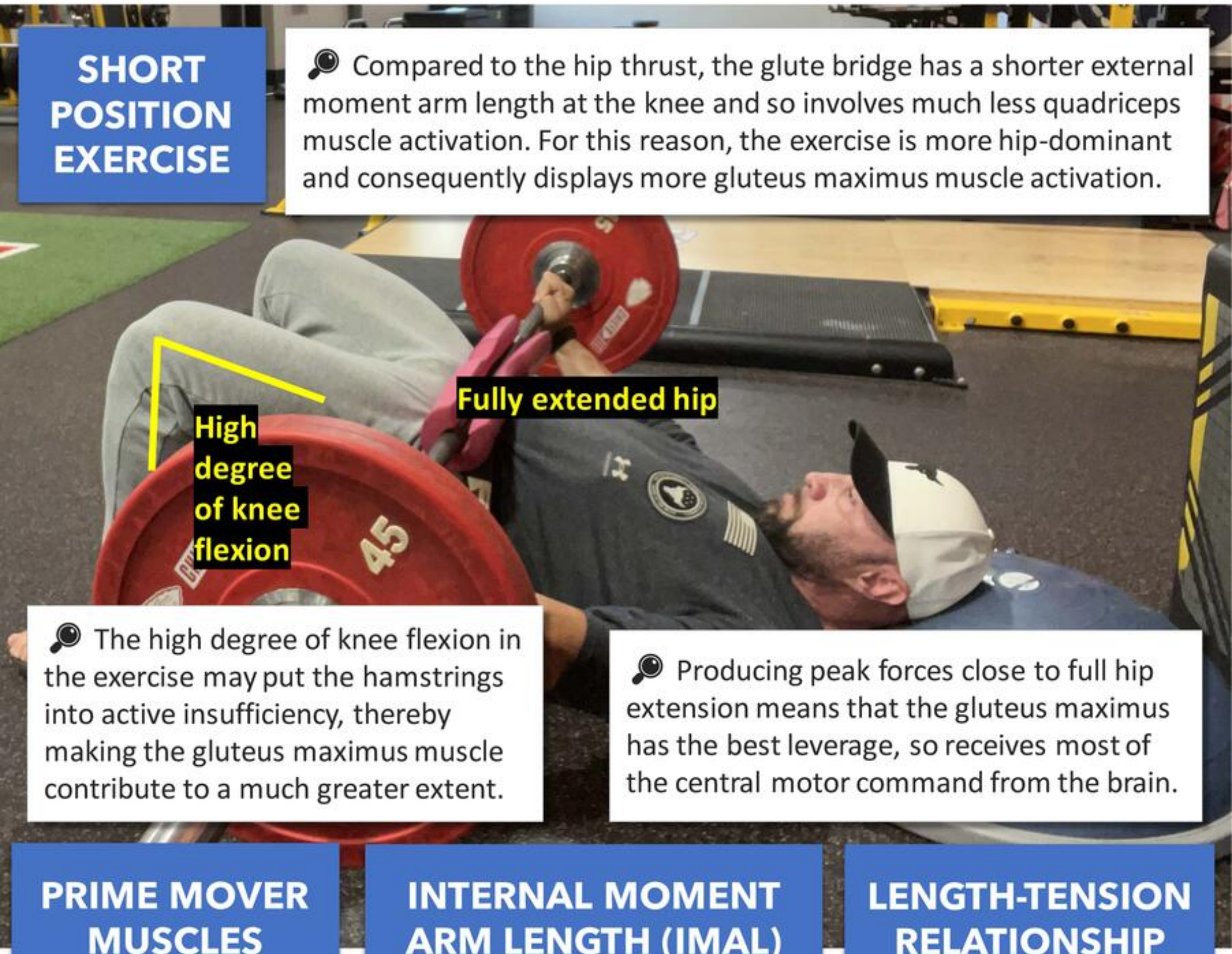


SET UP	LOWERING PHASE	LIFTING PHASE
Set up the seat so that your knee is in line with the pivot point of the weight stack. Lean forwards so as to increase hip flexion	Lower the weight slowly and under control until you reach the starting position. Hold onto the machine handles firmly to avoid any unnecessary movements of the body	Drive your heels towards the seat throughout the whole exercise range of motion

Barbell glute bridge

SHORT POSITION EXERCISE

Compared to the hip thrust, the glute bridge has a shorter external moment arm length at the knee and so involves much less quadriceps muscle activation. For this reason, the exercise is more hip-dominant and consequently displays more gluteus maximus muscle activation.



The high degree of knee flexion in the exercise may put the hamstrings into active insufficiency, thereby making the gluteus maximus muscle contribute to a much greater extent.

Producing peak forces close to full hip extension means that the gluteus maximus has the best leverage, so receives most of the central motor command from the brain.

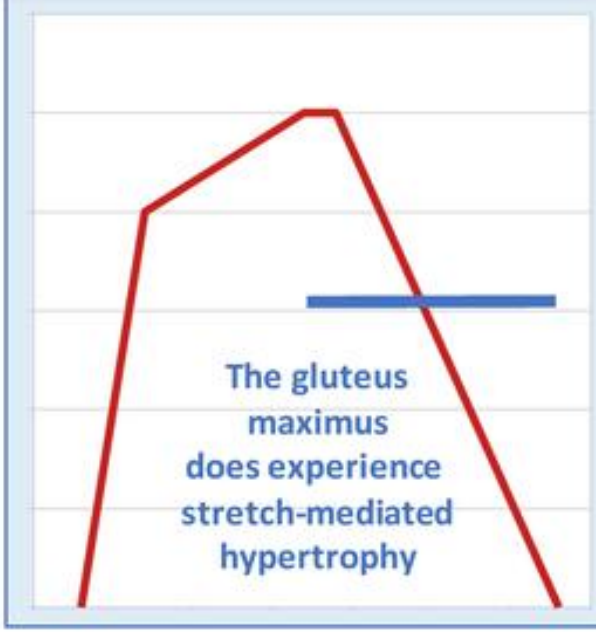
PRIME MOVER MUSCLES

Gluteus maximus (upper and lower)
Adductor magnus
Single-joint quadriceps
Two-joint hamstrings (mostly semitendinosus)

INTERNAL MOMENT ARM LENGTH (IMAL)

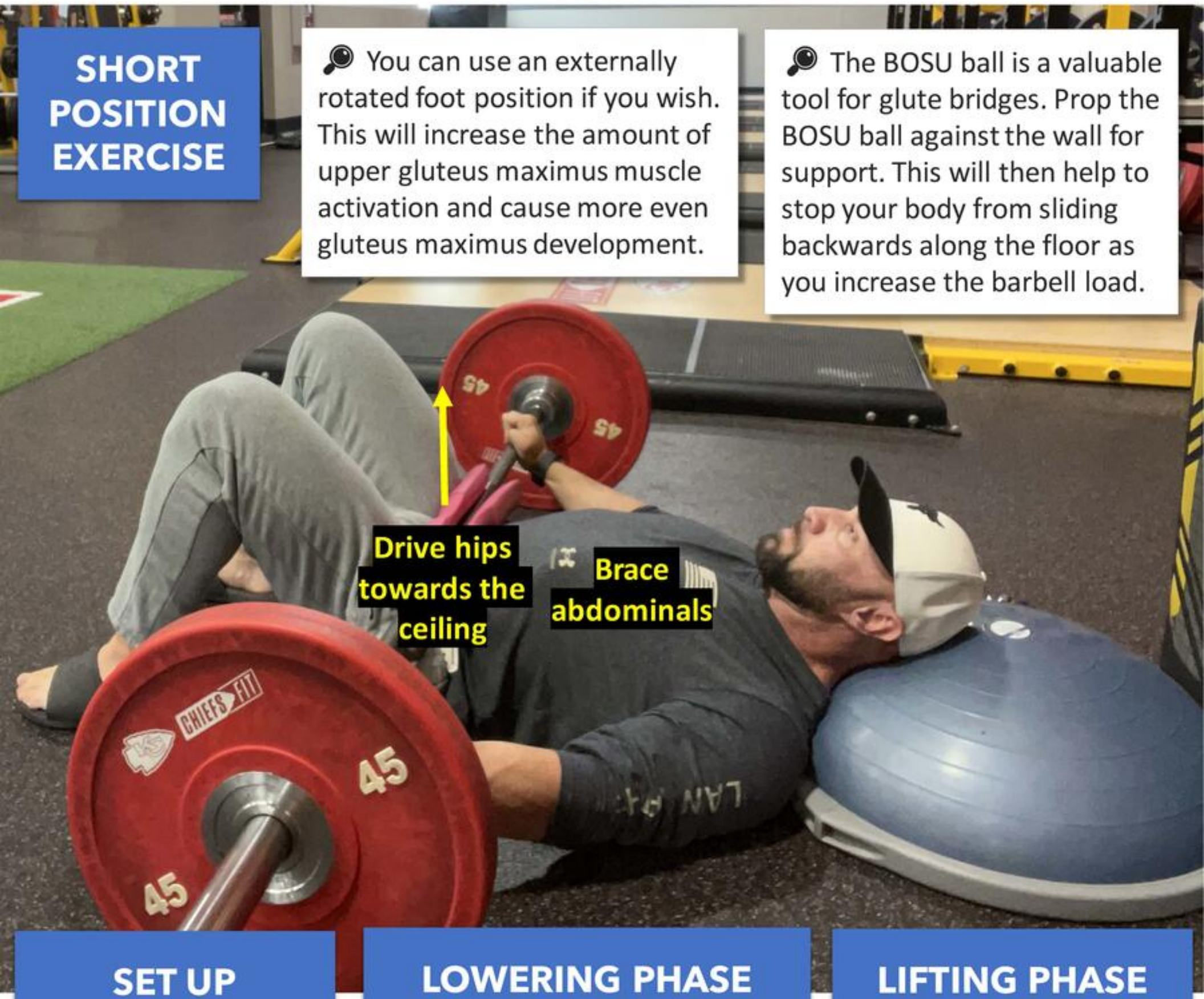
The gluteus maximus has its best leverage for hip extension when the hip is fully extended and the muscle is completely shortened. The lower region of the gluteus maximus likely has better leverage for hip extension than the upper region (as shown by its greater muscle activation)

LENGTH-TENSION RELATIONSHIP



Beginners can program this exercise for developing all of the listed prime mover muscles. **Intermediate lifters** can program it only to develop the gluteus maximus (upper and lower regions) and **advanced lifters** may find that they can only develop the lower region of the gluteus maximus. Importantly, given the very specific focus of this exercise on the gluteus maximus, intermediates and advanced lifters may not actually achieve a great deal of maintenance of the other prime movers despite their minor involvement in the exercise. Even so, where an individual lifter has very good leverage for one particular muscle in this movement pattern, they may find that they can still achieve development in this area.

Barbell glute bridge



SET UP

Set up the barbell with your feet relatively close to your body so that your knees form a steep angle at the top of the exercise

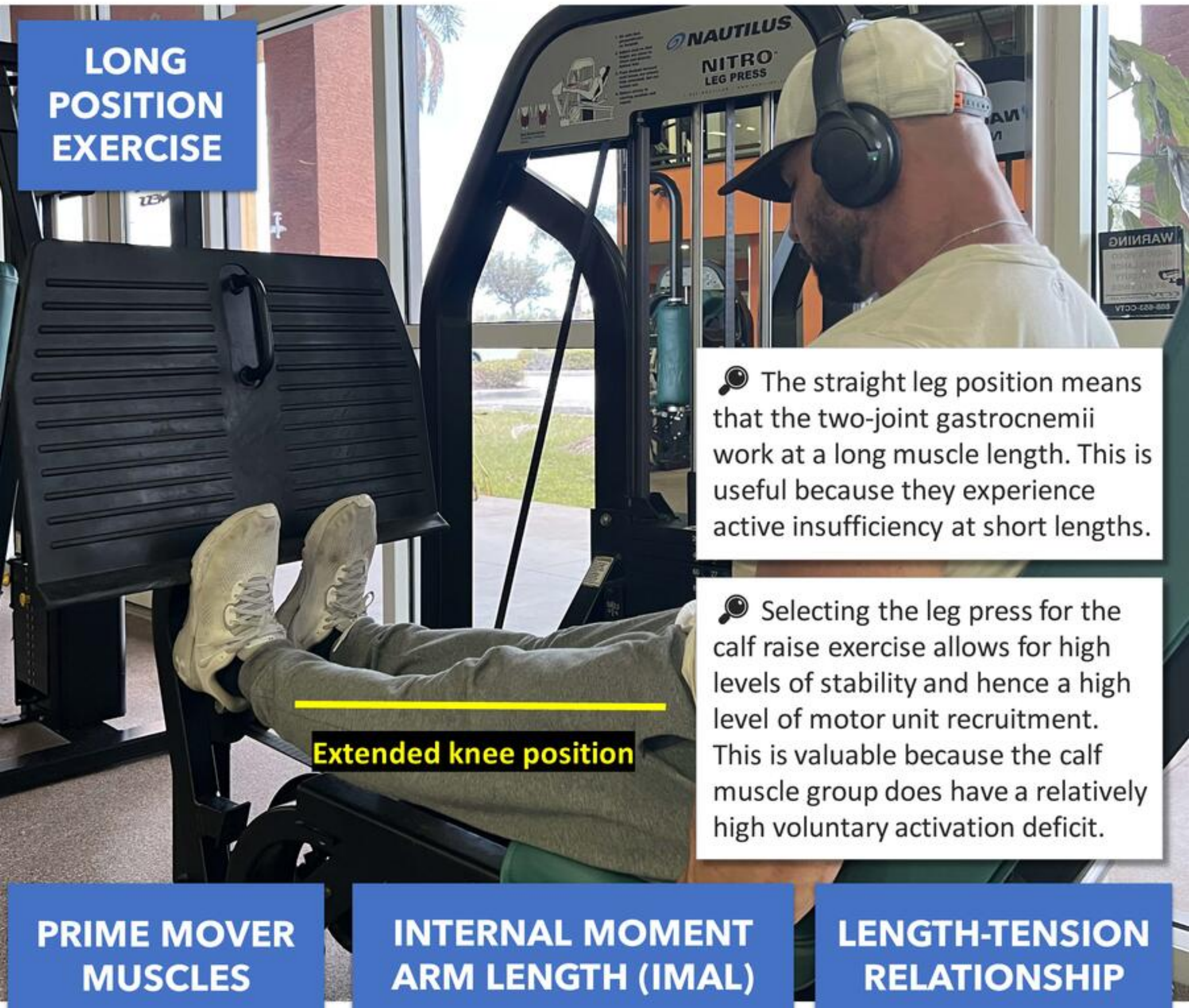
LOWERING PHASE

Lower the barbell back down to the floor carefully, moving slowly and under control

LIFTING PHASE

Drive your hips upwards towards the ceiling. Brace your abdominals throughout the entire movement

Calf raise in leg press machine



🔎 The straight leg position means that the two-joint gastrocnemii work at a long muscle length. This is useful because they experience active insufficiency at short lengths.

🔎 Selecting the leg press for the calf raise exercise allows for high levels of stability and hence a high level of motor unit recruitment. This is valuable because the calf muscle group does have a relatively high voluntary activation deficit.

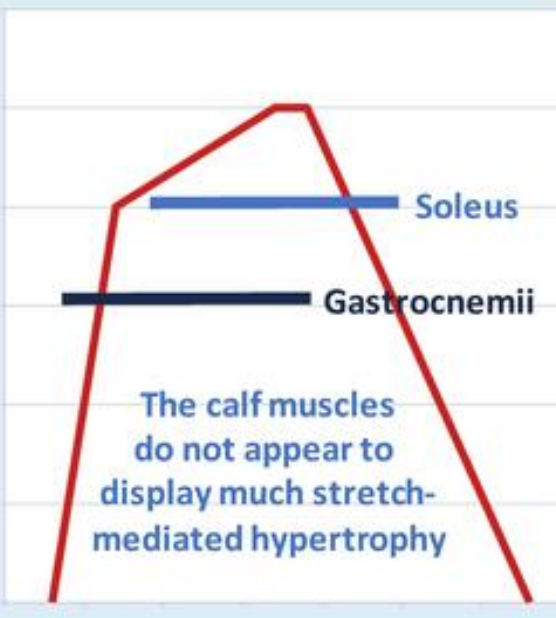
PRIME MOVER MUSCLES

Two-joint gastrocnemii (both lateral and medial heads)
Single-joint soleus

INTERNAL MOMENT ARM LENGTH (IMAL)

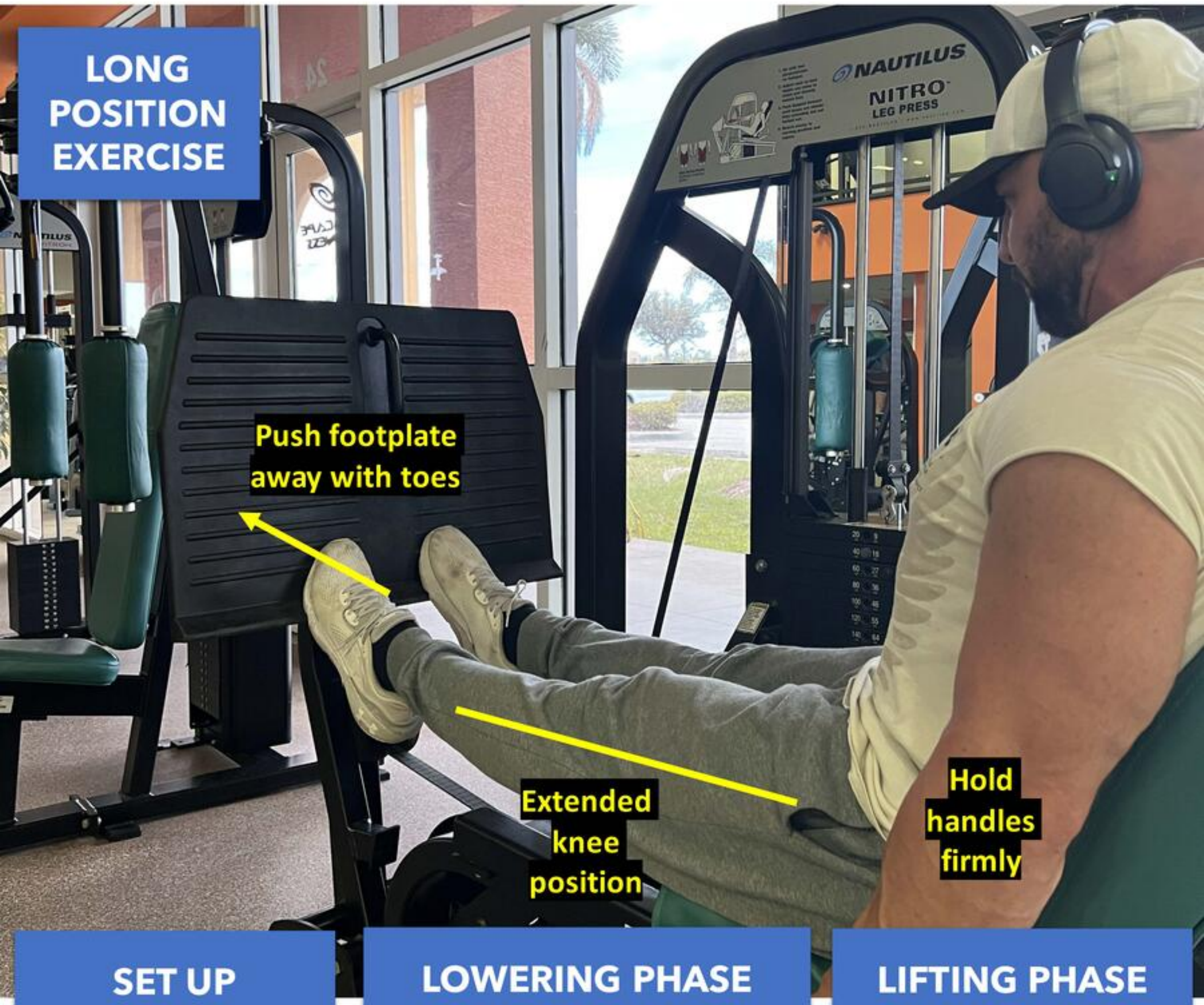
The gastrocnemii likely display longer plantar-flexion IMALs when the knee is extended compared to when the knee is flexed. All of the plantar-flexors have longer IMALs in the stretched position when the ankle is dorsiflexed than when the ankle is plantar-flexed

LENGTH-TENSION RELATIONSHIP



Beginners, intermediate lifters, and **advanced lifters** can program this exercise for all the prime movers. Intermediates and advanced lifters may wish to implement a pause in the stretched position for this exercise since the active length-tension relationship of the gastrocnemii is such that they likely experience little active mechanical tension at the top of the movement. Also, they may wish to experiment with different hip rotation angles (such that the toes point inwards or outwards) to bias the medial and lateral heads.

Calf raise in leg press



SET UP	LOWERING PHASE	LIFTING PHASE
Start with the foot flat on the platform. Then, extend the knee. Finally, dorsiflex the ankle to begin in the stretched position	Lower the weight slowly and under control to the starting position. Hold onto the machine handles firmly to avoid other movements of the body. Pause in the stretched position for 4 seconds	Push the footplate of the machine away from you with your toes throughout the lifting phase

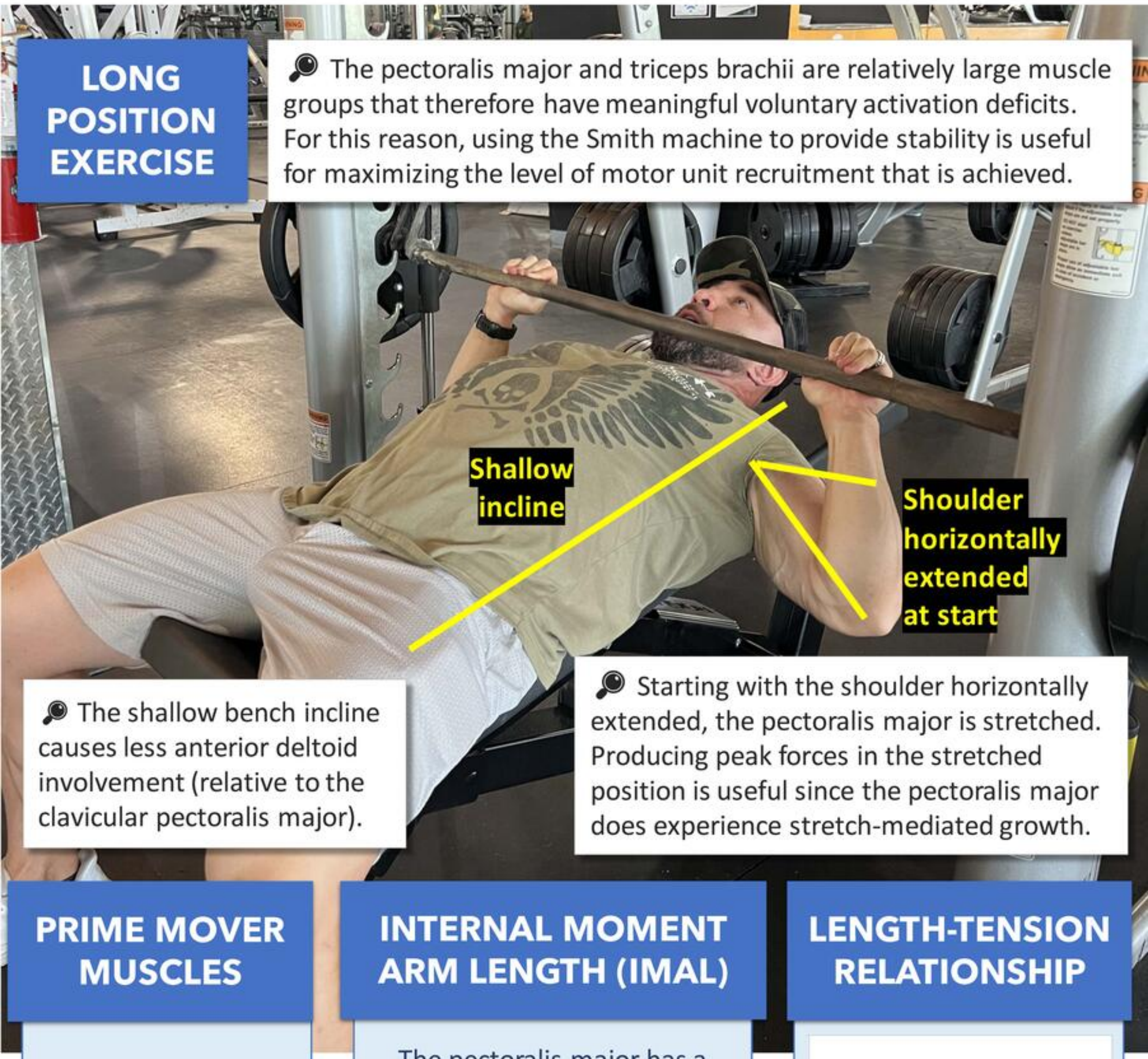
Upper body exercises

Learn which exercises provide the best foundation for the upper body muscles

Smith machine shallow incline press

LONG POSITION EXERCISE

🔎 The pectoralis major and triceps brachii are relatively large muscle groups that therefore have meaningful voluntary activation deficits. For this reason, using the Smith machine to provide stability is useful for maximizing the level of motor unit recruitment that is achieved.



🔎 The shallow bench incline causes less anterior deltoid involvement (relative to the clavicular pectoralis major).

🔎 Starting with the shoulder horizontally extended, the pectoralis major is stretched. Producing peak forces in the stretched position is useful since the pectoralis major does experience stretch-mediated growth.

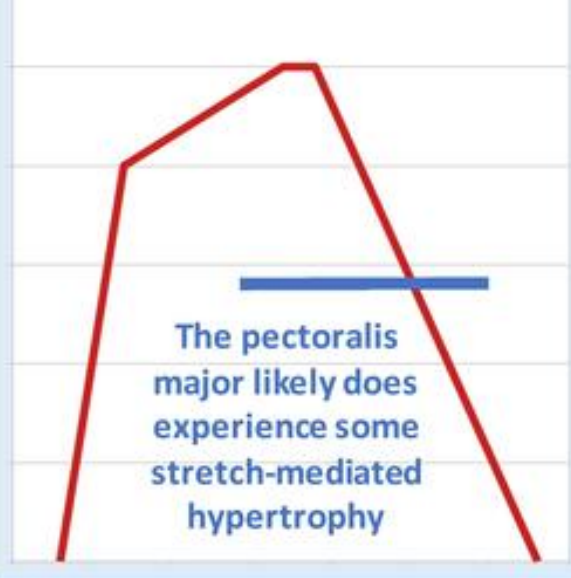
PRIME MOVER MUSCLES

Pectoralis major (clavicular and sternal heads)
Anterior deltoid
Triceps brachii (medial and lateral heads only)

INTERNAL MOMENT ARM LENGTH (IMAL)

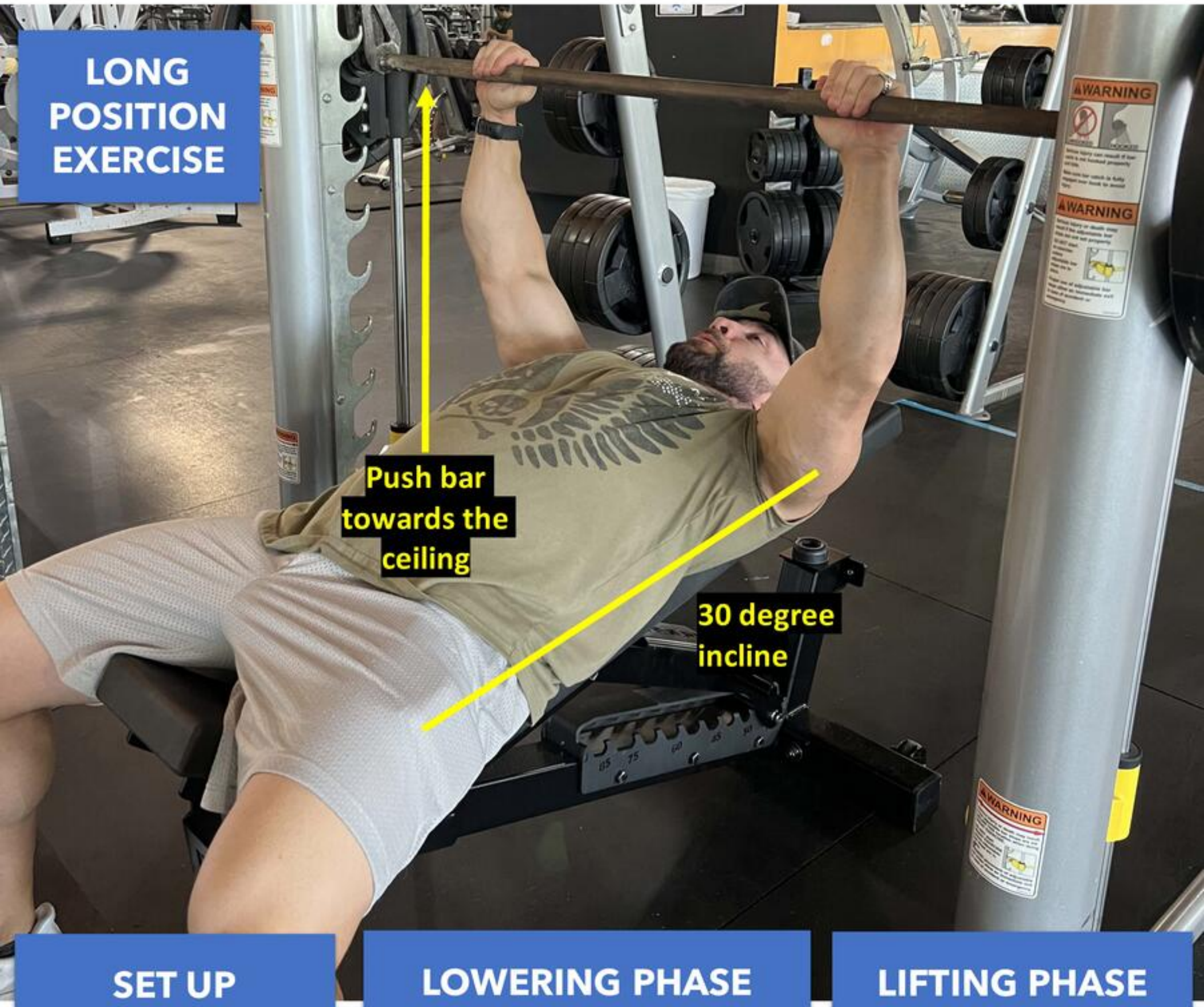
The pectoralis major has a longer IMAL at lower degrees of shoulder elevation while the anterior deltoid has a longer IMAL at higher degrees. By using weight as resistance, bench press variations tend to involve peak forces at lower degrees of shoulder elevation

LENGTH-TENSION RELATIONSHIP



Beginners can program this exercise for developing all of the listed prime mover muscles. **Intermediates** can program it only to develop the pectoralis major (clavicular and sternal heads) but note that it will maintain the other listed prime movers. **Advanced lifters** may only achieve new growth in the pectoralis major clavicular head when using this exercise but again can use it to maintain the other listed muscles. Even so, when an individual lifter has very good leverage for another of the prime movers, it may still be developed.

Smith machine shallow incline press



SET UP

Set the bench to approximately 30 degrees from the horizontal. Use a grip slightly wider than your shoulders

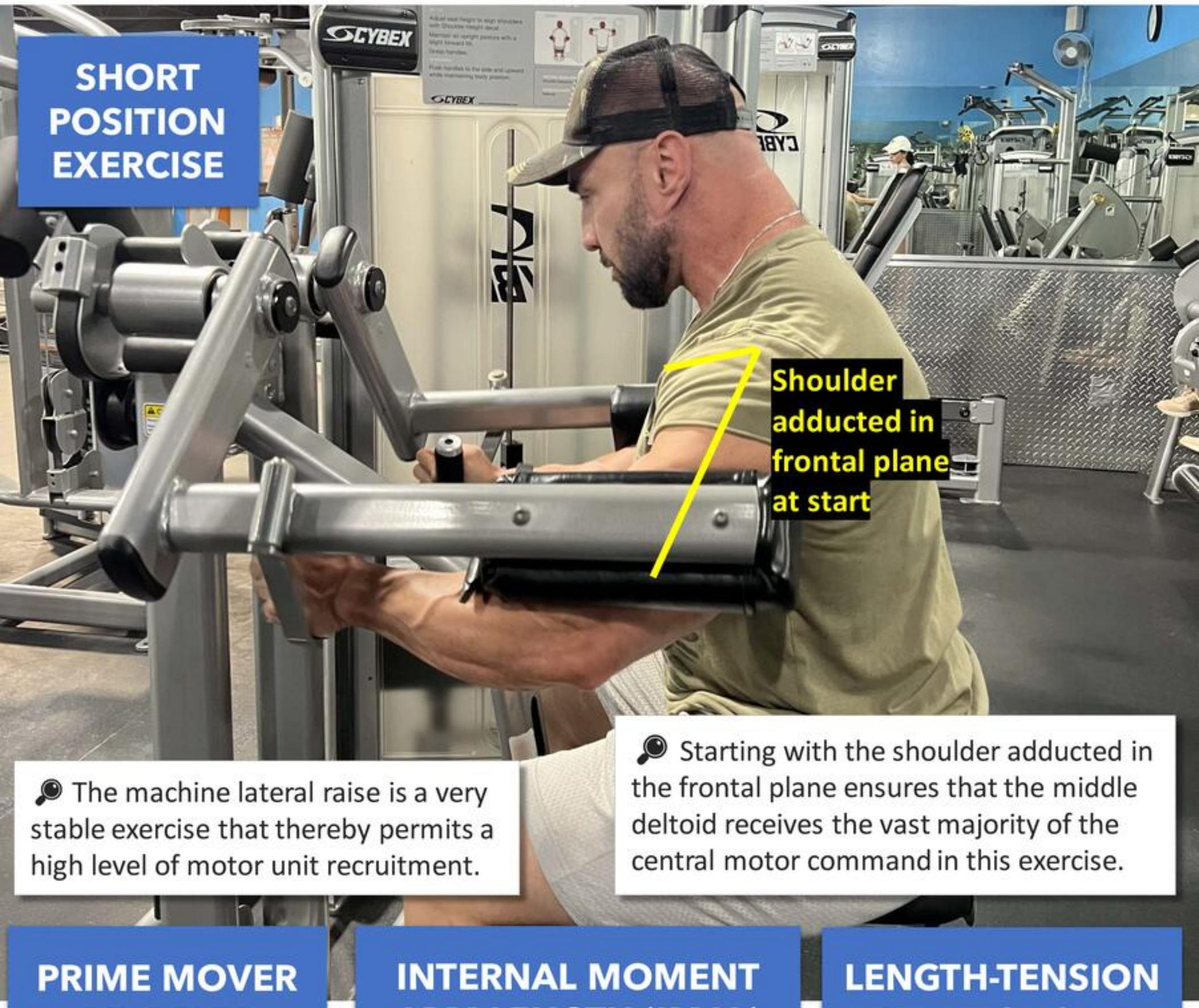
LOWERING PHASE

Lower the bar slowly and under control to your chest, aiming for a point on the center or upper part of the pectoralis major muscles (whatever is most comfortable)

LIFTING PHASE

Push the bar towards the ceiling throughout the whole exercise range of motion

Machine lateral raise



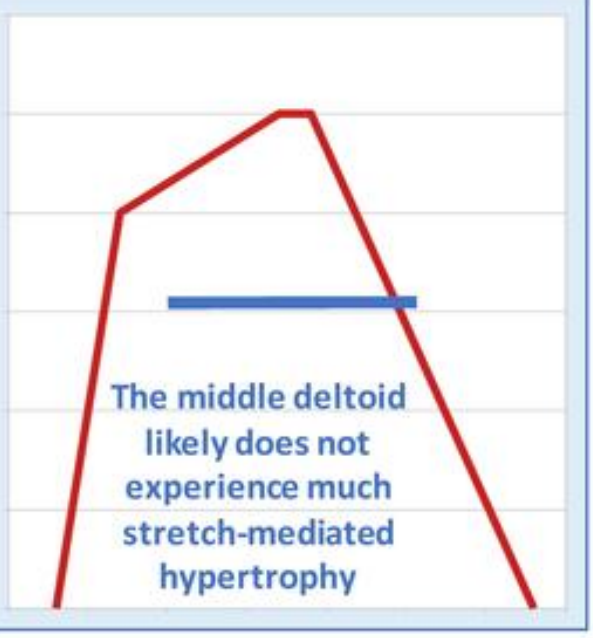
PRIME MOVER MUSCLES

Middle deltoids (also called lateral deltoids, since they are further from the midline of the body than the other deltoid muscles)

INTERNAL MOMENT ARM LENGTH (IMAL)

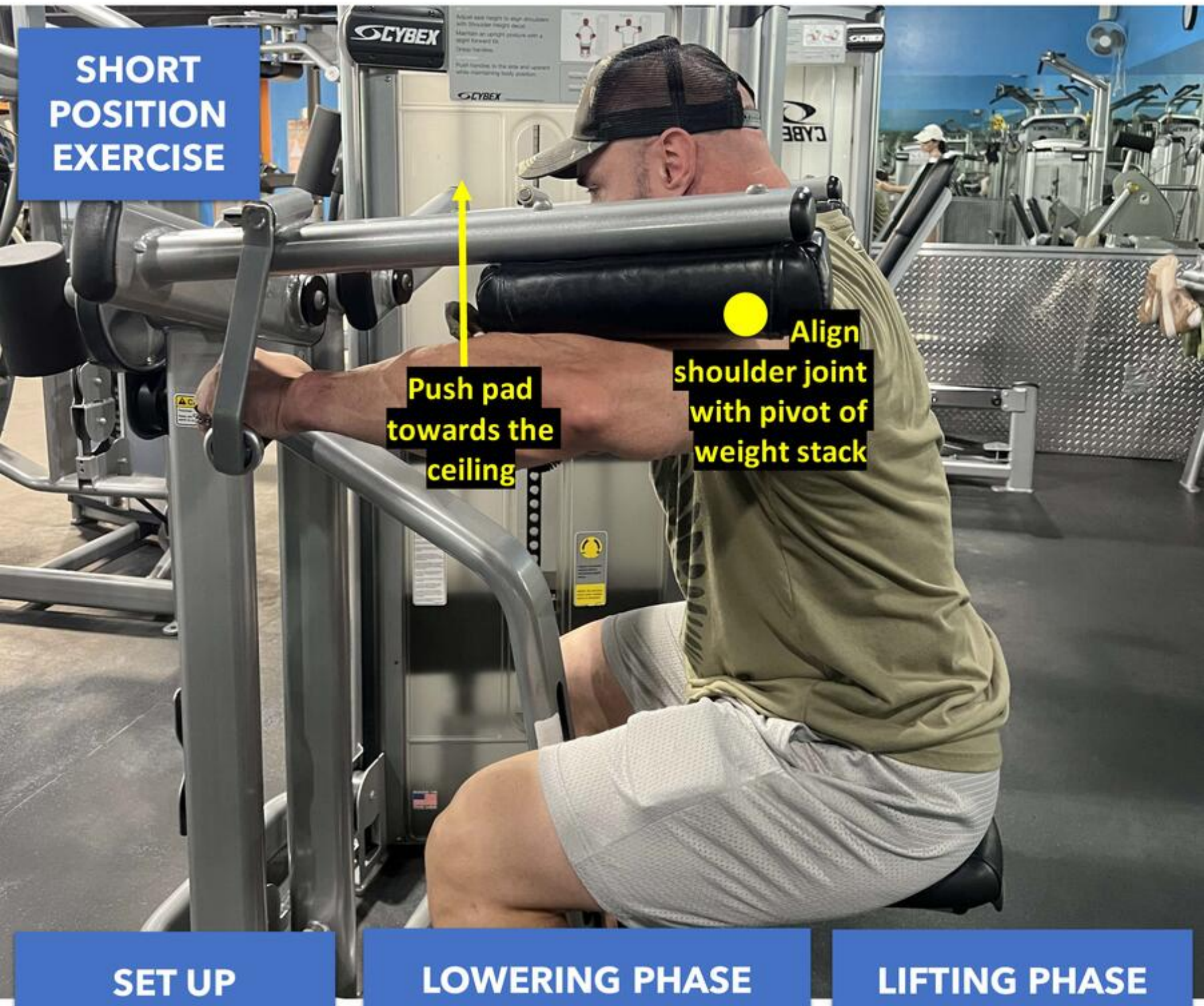
The middle deltoid has great leverage for frontal plane abduction at all joint angles. However, once the shoulder reaches the horizontal position, the anterior deltoid develops similar leverage. Thus, working below this joint angle is best for targeting the middle deltoid

LENGTH-TENSION RELATIONSHIP



Beginners, intermediates, and **advanced lifters** can program this exercise for the listed prime mover. Complete beginners may actually not require this exercise if they are also performing either [1] any wide grip pressing exercise, or [2] any steep incline or overhead pressing exercise, since both off these exercise variations will involve the middle deltoids to a reasonably large extent. Even so, where individuals have particularly good or poor leverage for the middle deltoids in those exercises, their specific responses may vary.

Machine lateral raise



SET UP	LOWERING PHASE	LIFTING PHASE
Set the seat height so that the pivot point of the weight stack is at the same height as your shoulder joint	Lower the weight slowly and under control back to the starting position	Push the pad of the machine towards the ceiling throughout the whole exercise range of motion

Steep incline machine press

LONG POSITION EXERCISE

🔎 The machine steep incline press is a stable exercise that thereby permits a high level of motor unit recruitment.

Shoulder adducted in frontal plane at start

Steep incline

🔎 Producing peak forces close to the frontal plane below shoulder height at the start of the movement means that the middle deltoids are substantially involved in the exercise.

🔎 The steep bench incline allows more anterior deltoid involvement (relative to the clavicular pectoralis major).

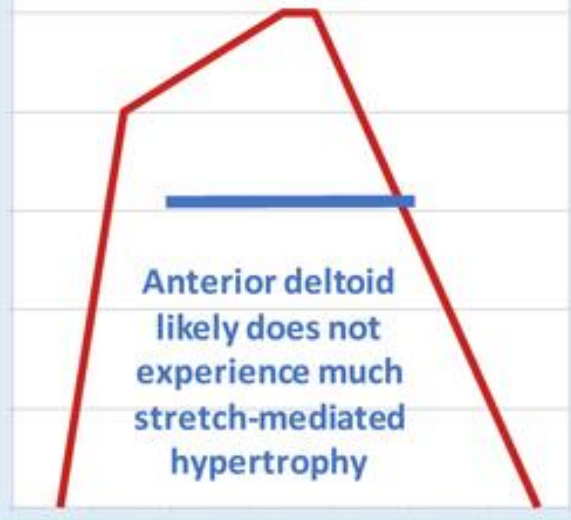
PRIME MOVER MUSCLES

Anterior and middle deltoids
Pectoralis major (clavicular and sternal heads)
Triceps brachii (both medial and lateral heads)

INTERNAL MOMENT ARM LENGTH (IMAL)

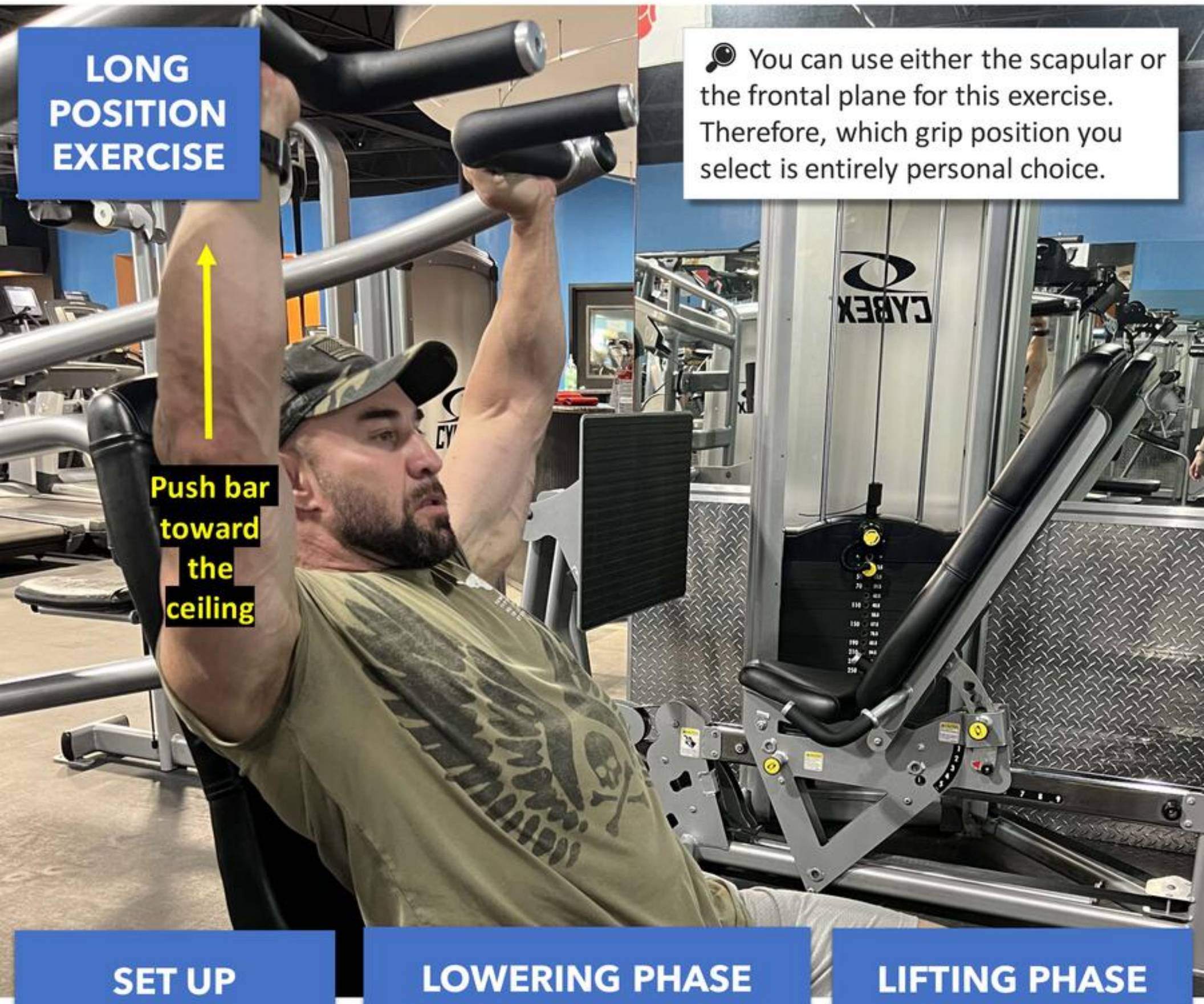
The pectoralis major has a longer IMAL at lower degrees of shoulder elevation while the anterior deltoid has a longer IMAL at higher degrees. By using a steeper incline and therefore a higher degree of shoulder elevation, the exercise targets the anterior deltoid

LENGTH-TENSION RELATIONSHIP



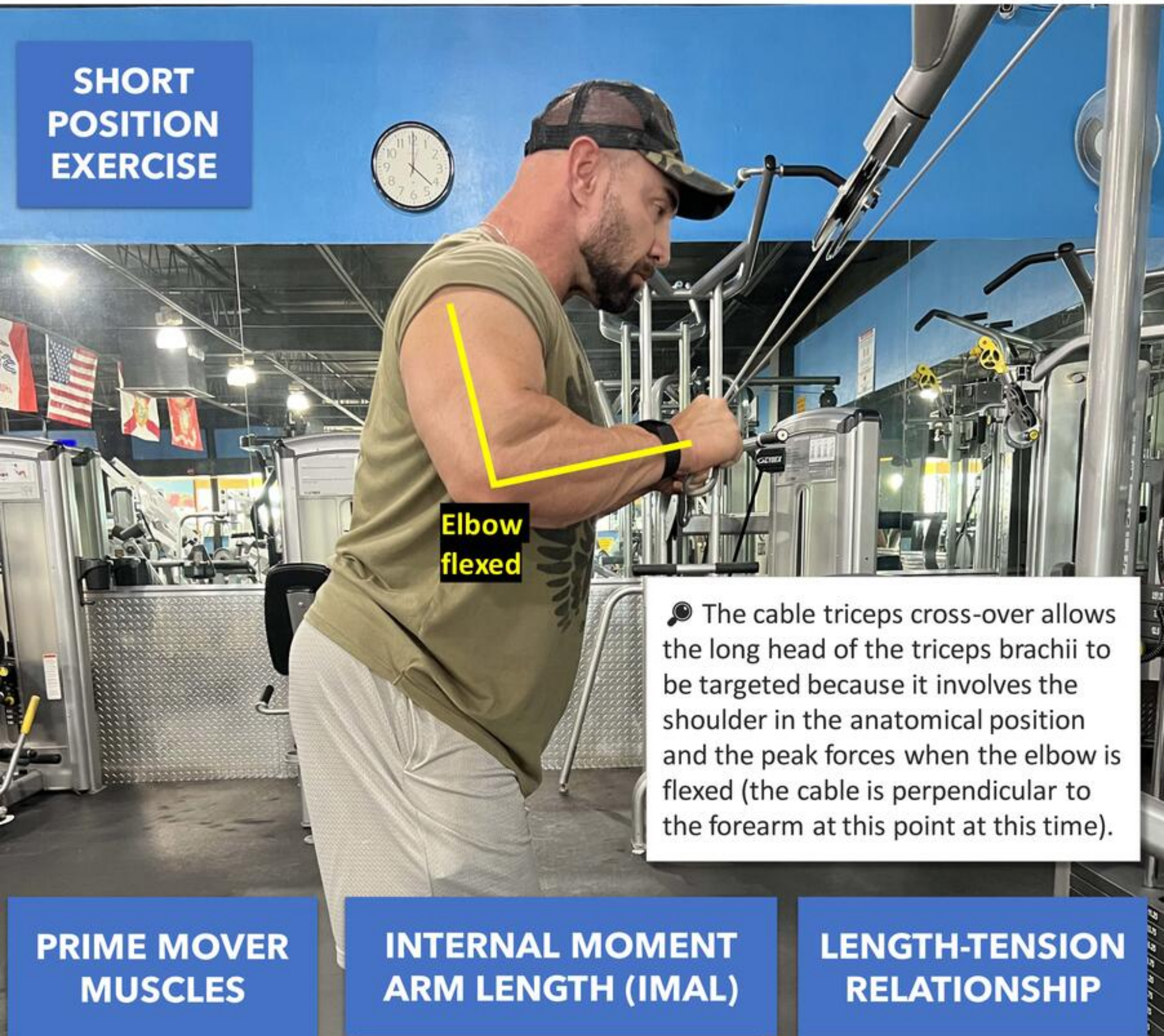
Beginners, intermediate lifters, and **advanced lifters** can program this exercise for all of the listed prime movers. Yet, it should be noted that given the large inter-individual variation in the moment arm lengths of the prime movers, the exact extent to which each muscle will be developed will vary considerably. Some lifters may find that they can develop the anterior deltoids very effectively, others may find that the pectoralis major clavicular head is surprisingly involved, and still others may find that the triceps brachii contribute most.

Steep incline machine press



SET UP	LOWERING PHASE	LIFTING PHASE
Sit on the seat and position yourself such that your elbows are directly below your hands on the handles of the machine	Lower the weight slowly and under control back to the starting position. Maintain the correct sitting position so that your elbows are directly beneath the handles	Push the handles of the machine towards the ceiling throughout the entire exercise range of motion

Cable triceps cross-over



🔎 The cable triceps cross-over allows the long head of the triceps brachii to be targeted because it involves the shoulder in the anatomical position and the peak forces when the elbow is flexed (the cable is perpendicular to the forearm at this point at this time).

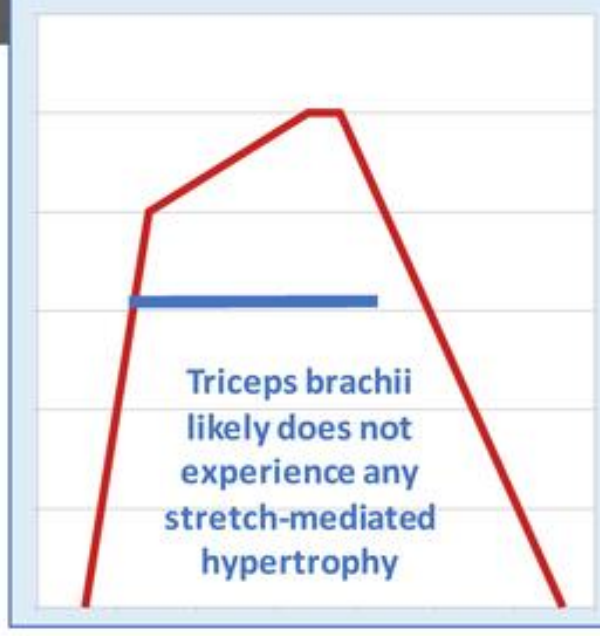
PRIME MOVER MUSCLES

Triceps brachii (long head, medial head and lateral head)

INTERNAL MOMENT ARM LENGTH (IMAL)

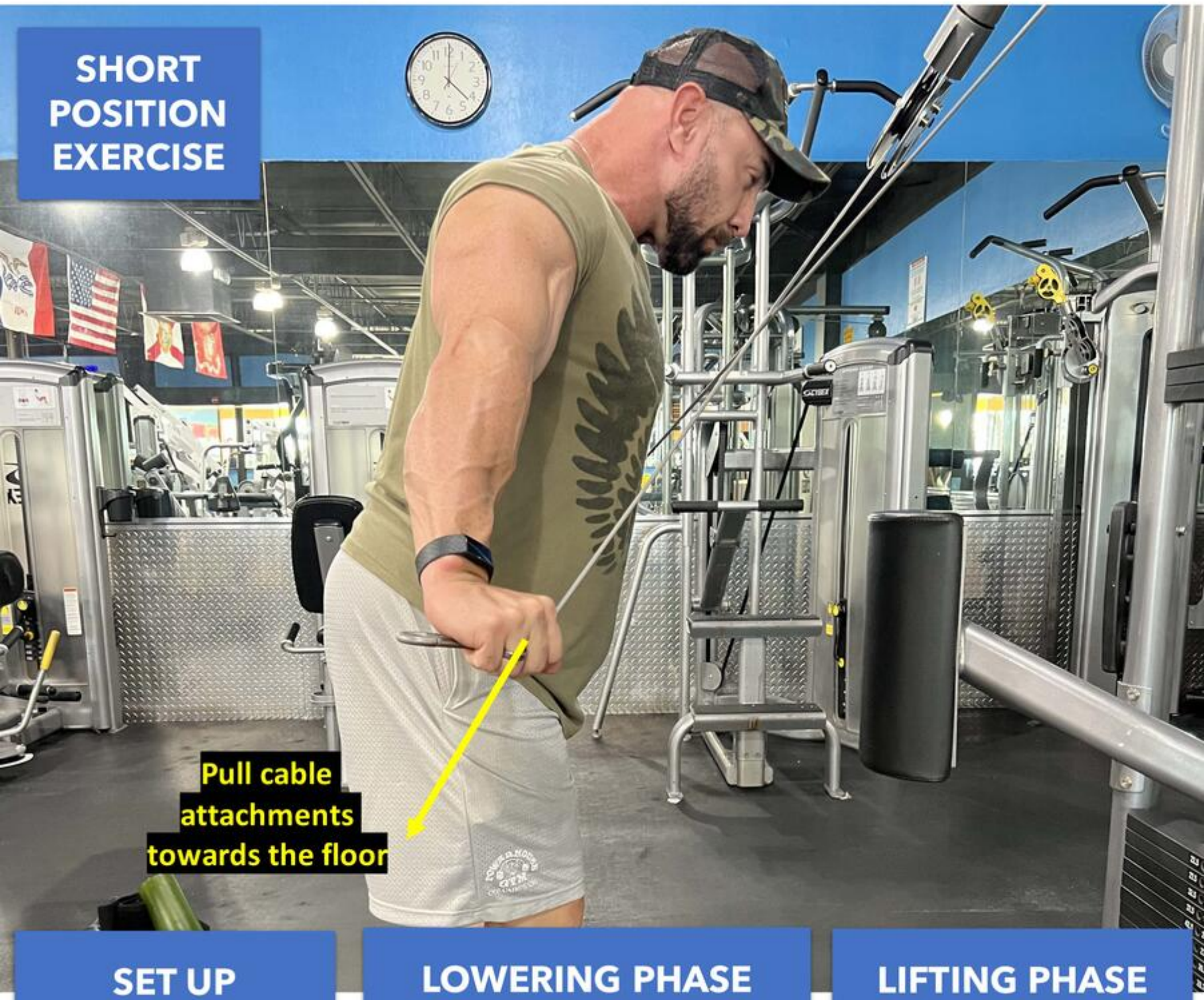
The triceps brachii display different leverages to one another depending on the shoulder angle and the elbow angle. When the shoulder is in the anatomical position, the long head has better leverage. More flexed elbow angles also target the long head

LENGTH-TENSION RELATIONSHIP



Beginners and **intermediates** can program this exercise for developing all of the listed prime mover muscles. **Advanced lifters** may find that while they can maintain the sizes of all of the listed muscles, they may only achieve new growth in the long head because this muscle has better leverage and therefore receives a larger proportion of the neural drive.

Cable triceps cross-over



SET UP

Retract the shoulder blades to stabilize the torso. Hold this same position throughout the movement

LOWERING PHASE

Lower the weight slowly and under control back to the starting position. Maintain the correct torso position and finish with the elbow flexed to at least 90 degrees

LIFTING PHASE

Pull the cable attachments towards the floor throughout the whole exercise range of motion

Wide grip latissimus pull-down

LONG POSITION EXERCISE

🔎 Since the latissimus dorsi likely does not display stretch-mediated hypertrophy and also does not have good leverage far above shoulder height, there is no reason to try and reach high degrees of shoulder abduction at the start of the movement.

🔎 Since the lat pull-down involves a cable instead of lever arms like some other machines, it is important to maximize stability as far as possible. This is important since the latissimus dorsi is a relatively large muscle in the upper body and so likely has a moderate voluntary activation deficit.

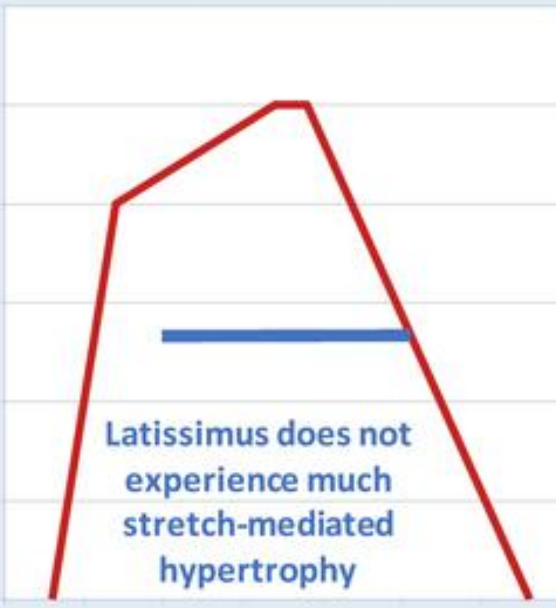
PRIME MOVER MUSCLES

Latissimus dorsi (lumbopelvic and thoracic regions)
Teres major
Elbow flexors

INTERNAL MOMENT ARM LENGTH (IMAL)

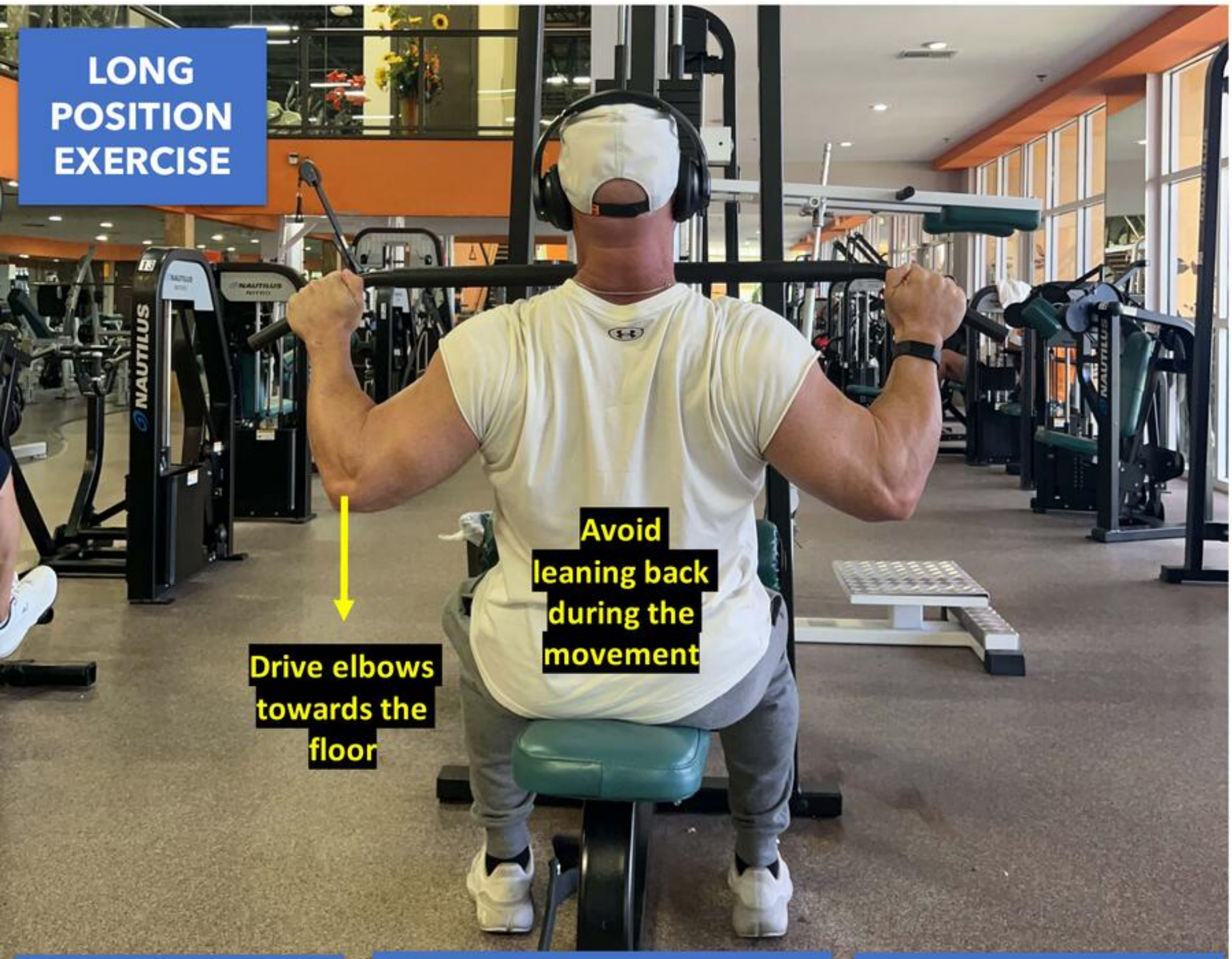
In the frontal plane, the latissimus dorsi develops its best leverage between 60-90 degrees above the anatomical position. The lumbopelvic region of the muscle has better leverage than the thoracic region of the muscle in this range of motion

LENGTH-TENSION RELATIONSHIP



Beginners can program this exercise for developing all of the listed prime mover muscles. **Intermediate lifters** can program it only to develop the latissimus dorsi and teres major but note that it will still help maintain the elbow flexors. **Advanced lifters** may only see growth occurring in the lumbopelvic region of the latissimus dorsi. Even so, when an individual lifter has extremely good leverage any particular prime mover during this exercise, it may still be developed despite their having a more advanced training status.

Wide grip latissimus pull-down



SET UP	LOWERING PHASE	LIFTING PHASE
Use a grip of 1.5 times shoulder width. Adjust the pad so that you can fit your knees under it while holding the bar	Allow the bar to return to the starting position, moving slowly and under control. There is no need to achieve a large muscle stretch at the end of the movement	Drive the elbows towards the floor. Avoid leaning or rocking backwards during the movement

Narrow grip machine seated row

SHORT POSITION EXERCISE

The narrow grip means that the exercise takes place closer to the sagittal plane than to the transverse plane.

Shoulder extended in sagittal plane

During rowing variations, the horizontal direction encourages the trapezius and rhomboids to work to perform scapular retraction.

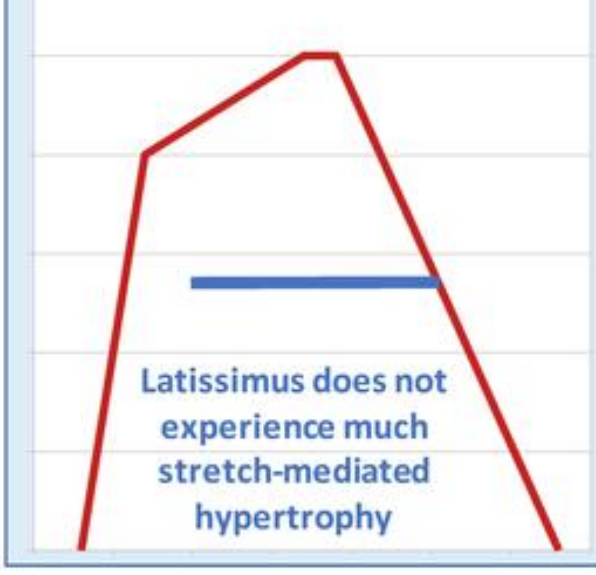
PRIME MOVER MUSCLES

Latissimus dorsi (thoracic and (lumbopelvic regions)
Posterior deltoid
Teres major
Elbow flexors
Trapezius and rhomboids

INTERNAL MOMENT ARM LENGTH (IMAL)

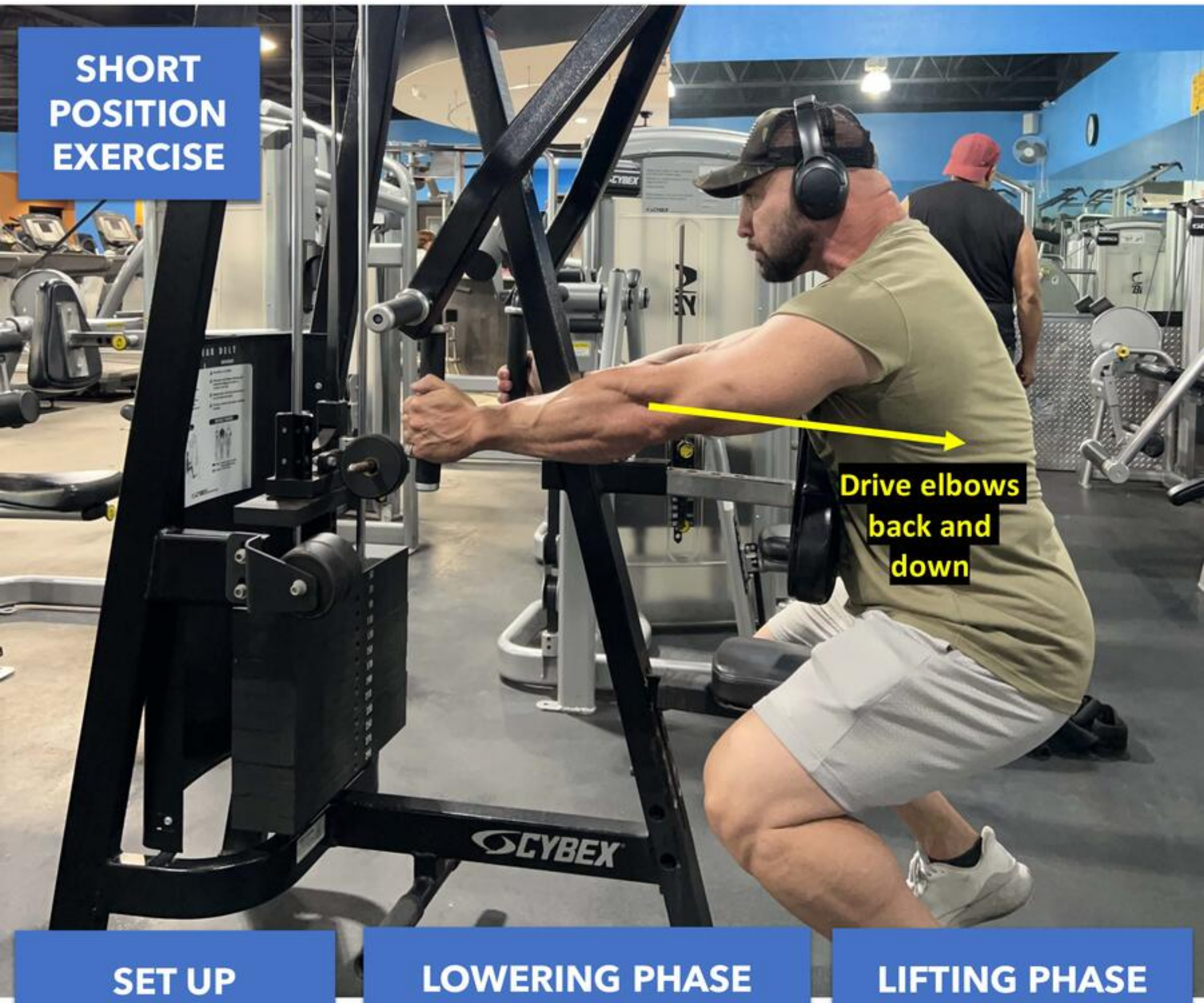
In the sagittal plane, the latissimus dorsi develops its best leverage between 45-60 degrees above the anatomical position. The thoracic region of the muscle has much better leverage than the lumbopelvic region of the muscle in this range of motion

LENGTH-TENSION RELATIONSHIP



Beginners can program this exercise to train all of the listed prime mover muscles. Yet, **intermediate lifters** should probably only program it for the latissimus dorsi (thoracic and lumbopelvic) and teres major muscles, albeit noting that it can help maintain the other prime movers when it is used. **Advanced lifters** may wish to program the exercise solely for developing the latissimus dorsi (thoracic region), but again noting that the exercise will certainly help maintain the other listed prime movers. Naturally, when an advanced lifter has very good leverage for one particular prime mover, this will still be developed.

Narrow grip machine seated row



SET UP

Tuck your chin and use a neutral spine posture, keeping the ribs above the pelvis. Fully extend the elbows

LOWERING PHASE

Allow the machine handles to return to the starting position, while making sure to move slowly and under control throughout the exercise range of motion

LIFTING PHASE

Drive the elbows back and down but do not allow them to go too far behind the body

Wide grip machine seated row

SHORT POSITION EXERCISE

The wide grip means that the exercise takes place closer to the transverse plane than to the sagittal plane.

Shoulder horizontally extended in transverse plane

During rowing variations, the horizontal direction encourages the trapezius and rhomboids to work to perform scapular retraction.

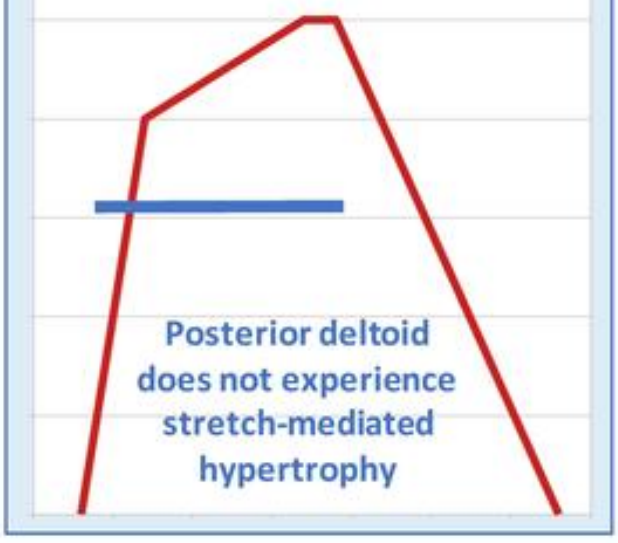
PRIME MOVER MUSCLES

Posterior deltoid
Elbow flexors
Trapezius and rhomboids

INTERNAL MOMENT ARM LENGTH (IMAL)

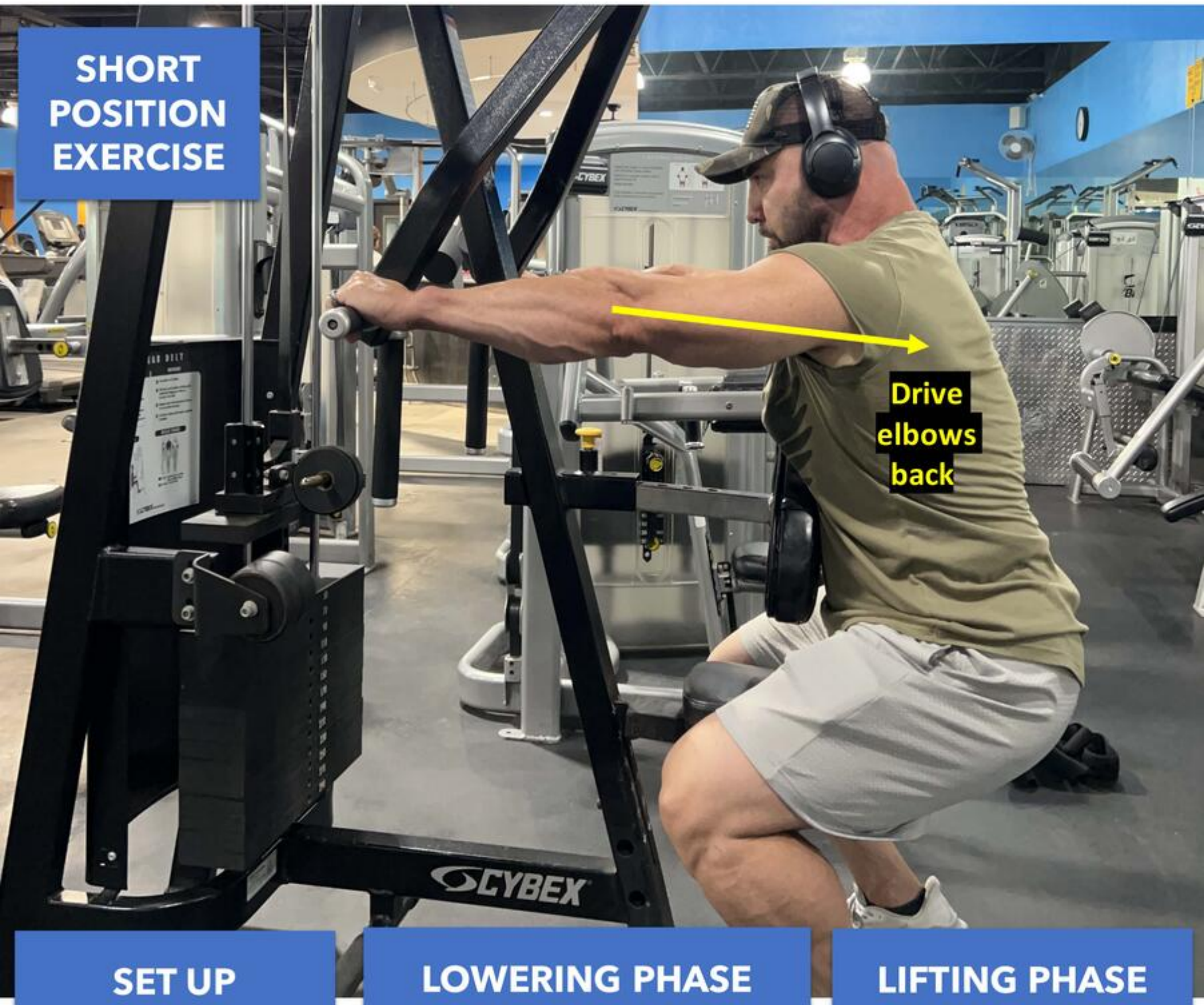
In the transverse plane, the latissimus dorsi does not have good leverage and so the other back muscles are required to contribute to a much greater extent. The posterior deltoid has the best leverage and is therefore likely the most strongly activated

LENGTH-TENSION RELATIONSHIP



Beginners can all program this exercise to train all of the listed prime mover muscles. In contrast, **intermediate lifters** should probably only program the exercise for the posterior deltoid and the scapular retractors (trapezius and rhomboids). **Advanced lifters** may even find that they need to add a more targeted exercise for the scapular retractors and that the exercise primarily only develops the posterior deltoid. Even so, the other muscles can probably still be maintained at a certain level in intermediate and advanced lifters.

Wide grip machine seated row



SET UP

Lift your chest up so that the spine extends naturally. Allow the scapula to protract slightly. Extend the elbows fully

LOWERING PHASE

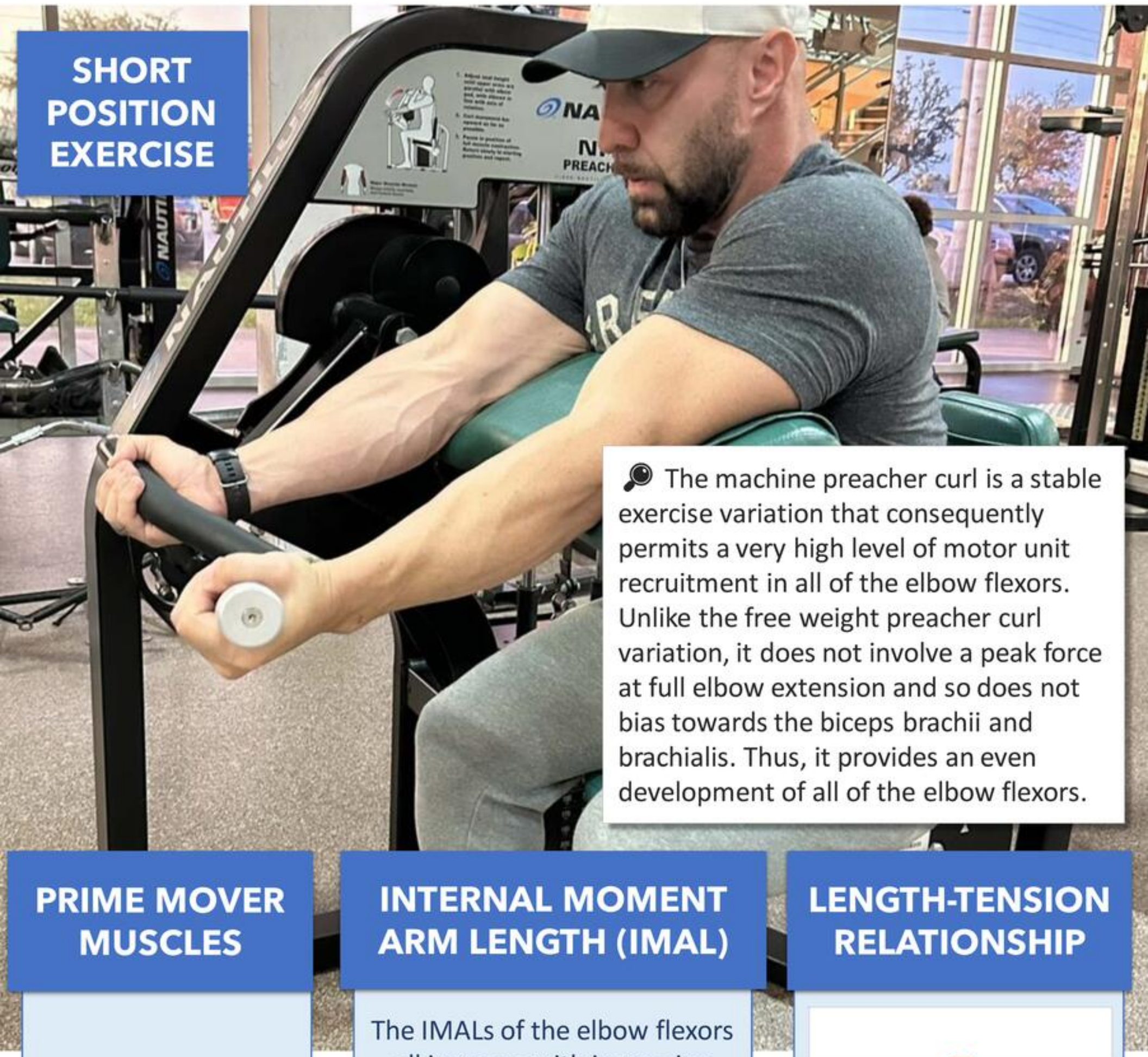
Allow the machine handles to return to the starting position, while making sure to move slowly and under control throughout the exercise range of motion

LIFTING PHASE

Drive the elbows back but do not allow them to go too far behind the body. Allow the scapula to retract naturally

Machine preacher curl

SHORT POSITION EXERCISE



🔎 The machine preacher curl is a stable exercise variation that consequently permits a very high level of motor unit recruitment in all of the elbow flexors. Unlike the free weight preacher curl variation, it does not involve a peak force at full elbow extension and so does not bias towards the biceps brachii and brachialis. Thus, it provides an even development of all of the elbow flexors.

PRIME MOVER MUSCLES

Biceps brachii
(long head and short head)
Brachialis
Brachioradialis

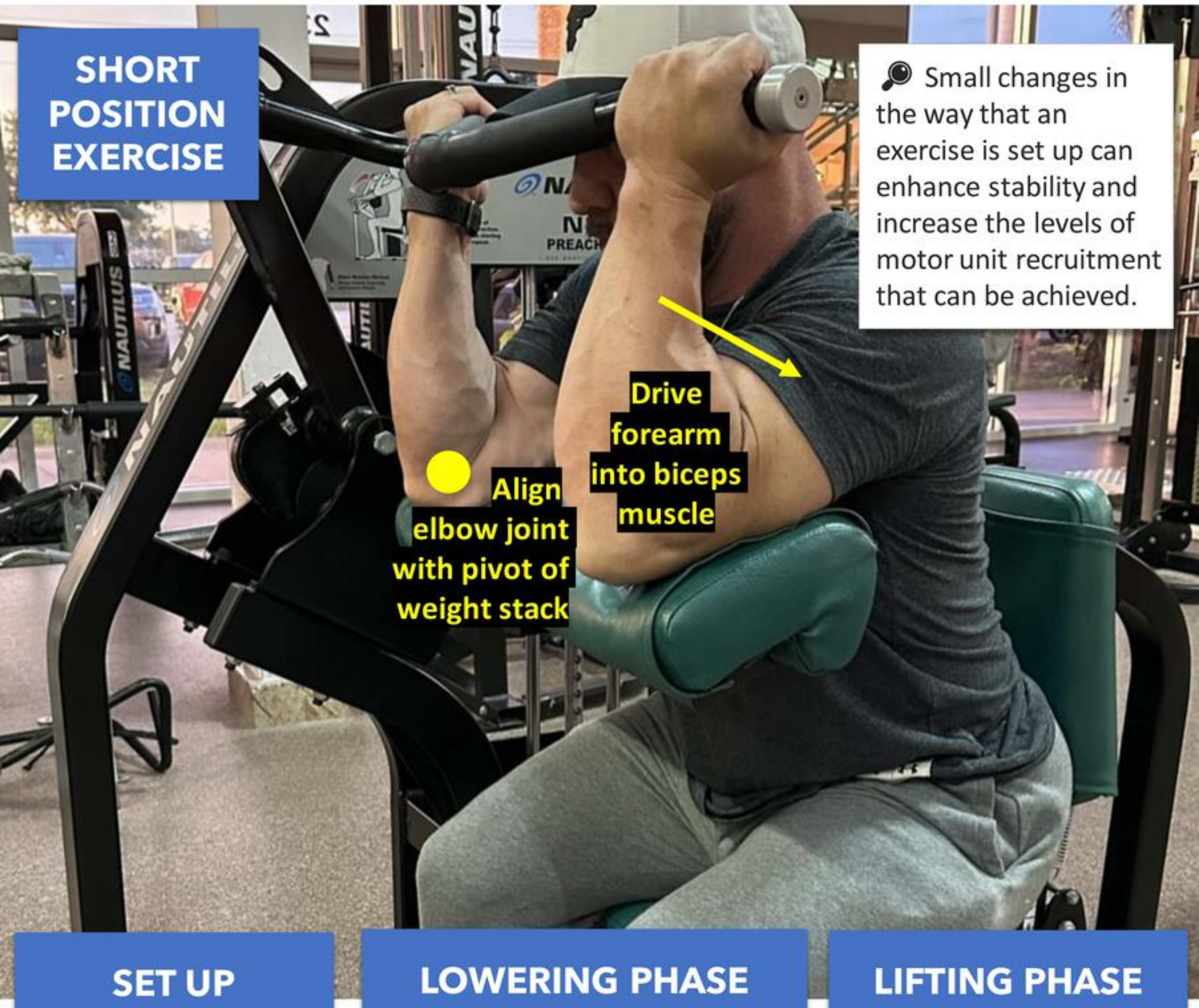
INTERNAL MOMENT ARM LENGTH (IMAL)

The IMALs of the elbow flexors all increase with increasing elbow flexion but the IMALs of the biceps brachii are greater at full elbow extension and the IMALs of the brachioradialis are greater at full elbow flexion. Peak forces in a mid-range target all elbow flexors equally

LENGTH-TENSION RELATIONSHIP

Beginners and **intermediate lifters** can program this exercise for developing all of the listed prime mover muscles. **Advanced lifters** may wish to program alternative exercises in order to bias either the biceps brachii and brachialis (with a curl variation that involves peak forces in the fully extended elbow position) or the brachioradialis (with a curl variation that involves peak forces in the fully flexed elbow position). Even so, individual lifters who have very good leverage for one or other of the elbow flexor muscles may still achieve development in those specific muscles with this exercise as an advanced lifter.

Machine preacher curl



SET UP	LOWERING PHASE	LIFTING PHASE
Adjust the seat and your body position so that the elbow joint is in line with the pivot point of the weight stack	Allow the machine handles to lower back to the starting point, making sure to move slowly and under control throughout the whole exercise range of motion	Pull the machine handle and try to drive your forearm into your biceps muscle

Example programs

Learn how to build training programs using
only the exercises presented in this book

Example program

Full body (3 days/week) program

Workout 1	Workout 2	Workout 3
Knee extension	Barbell glute bridge from floor	Machine hack squat
Seated hamstrings curl	Wide-grip seated machine row	Calf raise in leg press
Smith machine shallow incline press	Machine lateral raise	Steep incline machine press
Wide-grip latissimus pull-down	Machine preacher curl	Narrow grip seated row
	Cable triceps extension	

Rep range	Volume	Tempo	Rest period	Proximity to failure
5-7RM	3 sets per exercise	No specific tempo	3 minutes of rest between sets	2RIR on first set, and then use the same reps and load for the other two sets

Rest days are taken between all workouts

Example program

Split routine (4 days/week) program

Workout 1	Workout 2	Workout 3	Workout 4
Upper (short)	**Lower (long)**	**Lower (short)**	**Upper (long)**
Narrow grip row	Machine hack squat	Barbell glute bridge	Smith machine shallow incline press
Machine lateral raise	Seated hamstrings curl	Knee extension	Wide-grip row
Cable triceps extension	Calf raise in leg press	45 degree back extension [not included in this book]	Steep incline machine press
Machine preacher curl			Wide-grip latissimus pull-down

Rep range	Volume	Tempo	Rest period	Proximity to failure
5-7RM	3 sets per exercise	No specific tempo	3 minutes of rest between sets	2RIR on first set, and then use the same reps and load for the other two sets

Rest days are taken between all workouts

References

Find out where to look for more information about the effects of exercise selection on specific muscle groups

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BACKGROUND

- **Internal moment arm lengths**
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LOWER BODY EXERCISES

- **Machine hack squat**
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- **Seated leg curl**
  - Buford, W. L., Ivey, F. M., Malone, J. D., Patterson, R. M., Pearce, G. L., Nguyen, D. K., & Stewart, A. A. (1997). Muscle balance at the knee-moment arms for the normal knee and the ACL-minus knee. *IEEE Transactions on Rehabilitation Engineering*, *5*(4), 367-379.
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LOWER BODY EXERCISES

- **Barbell glute bridge**
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UPPER BODY EXERCISES

- **Smith machine shallow incline press**
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- **Machine lateral raise**
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UPPER BODY EXERCISES

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