

# BK Training Series

## Advanced Gait Training For Below Knee Amputees

Dennis Oehler



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# Dennis Oehler History



- 📄 **In 1984 traumatic accident**
- 📄 **Below Knee Amputation three weeks before signing professional soccer contract**
- 📄 **1988 Paralympic Gold Medalist Seoul, Korea**
- 📄 **World record 100 meters 11.73 seconds**
- 📄 **World record 200 meters 24.37 seconds**
- 📄 **World record 400 meters 56.25 seconds**
- 📄 **First to break 12 second barrier**
- 📄 **1992 Long Jump World Record Barcelona, Spain**



# 1990 World Championships



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# Prevention of Contractures

- ❏ A contracture is the development of soft-tissue tightness that limits joint motion.
- ❏ The condition occurs when muscles and soft tissues become stiff and fibrous from lack of movement.
- ❏ The most common contracture following BKA occurs at the knee when it becomes flexed and unable to straighten.
- ❏ It is important to prevent contractures early.
- ❏ Contractures can become permanent if not addressed following surgery, throughout recovery, and after rehabilitation is completed.
- ❏ Contractures can make it difficult to wear your prosthesis, and make walking more difficult, increasing the need for an assistive device like a walker.



# Strengthening Targets

- Gluteus Medius
- Gluteus Maximus
- Quadriceps
- Hamstrings
- Hip Flexors
- Hip Extensors
- Adductors
- Abductors



# BKTS

- ☞ Proper Weight Shifting
- ☞ Squats
- ☞ Lateral Band Walk
- ☞ Lateral Band Baby Steps
- ☞ Ascending Stairs
- ☞ Descending Stairs
- ☞ Power Walking
- ☞ Loop Band Lunges
- ☞ Reebok Core Board
- ☞ Balance Beam
- ☞ Balance Pad
- ☞ Ladder Drills

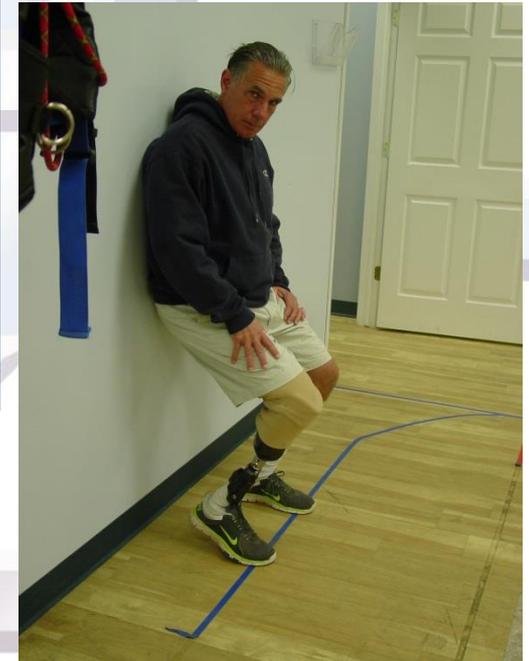


# SQUATS

## WALL SQUATS

One key point to remember:

- ☞ Socket should be in **bench alignment**;
- ☞ Heel should remain on the floor
- ☞ Avoid rising up onto the toe, which adds **tremendous pressure** on the tibia bone (front of socket)
- ☞ **ALWAYS** have a chair/stool behind for safety before attempting this exercise



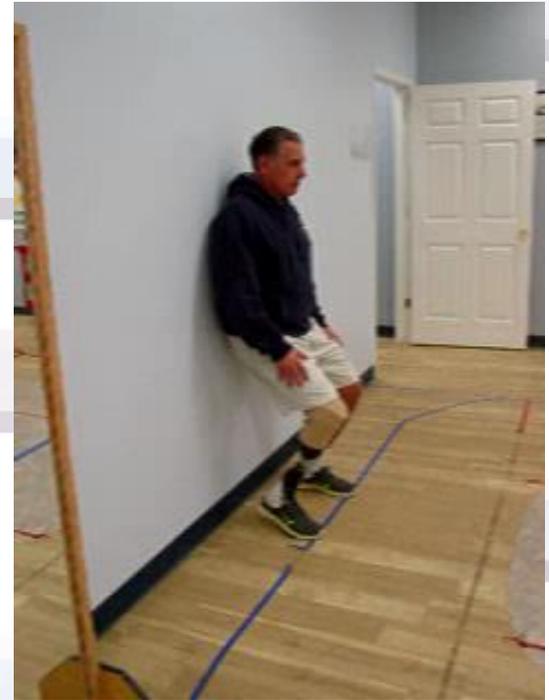
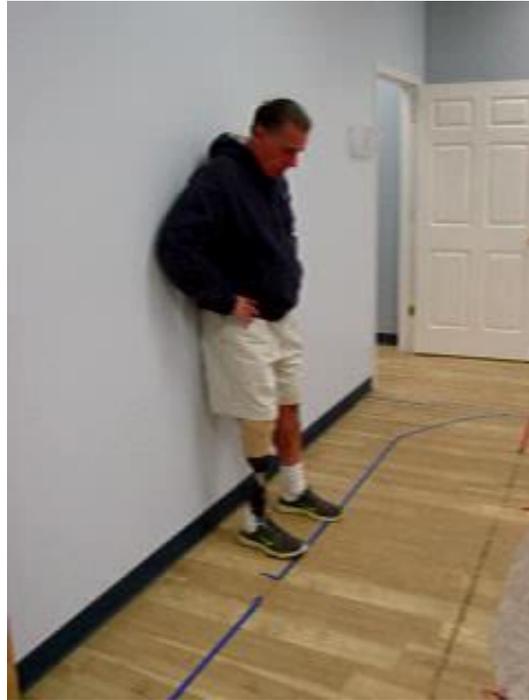
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# SQUATS

- ☞ Taking a step out with the prosthetic side **onto the heel** allows you to get into proper bench alignment
- ☞ Slide down wall into 90 degree angle
- ☞ **ALWAYS** have a chair/stool behind for safety before attempting this exercise



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# Squats At Parallel Bars

Sitting back is a common mistake



Leaning forward raises heel up



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# Squats Correct Positioning



- ☞ Heel stays on the ground
- ☞ Back is straight
- ☞ Arms are fully extended



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# Parallel Bars Squats

You do not need to squat all the way down to feel your muscles working.

Try holding for counts 2-4-6-8 when down in the squat position.



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# Partner Assisted Bodyweight Squats

- ☞ Always have a chair behind for safety
- ☞ Each partner lowers themselves shifting hips back and down
- ☞ Try to prevent knees from shifting too far forward



- ☞ Avoid lifting heel off the ground
- ☞ Maintain a straight trunk with a head-up position
- ☞ Press the feet into the floor through the heels.



# Loop Bands



**We use loop bands for lateral band resistance walking:**

-  **Parallel Bars**
-  **Walker**
-  **Side stepping with a squat**



# Lateral Band Walk

Putting on the Loop Band



Beginners start in parallel bars



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# Walker LB Training

**Spotter standing behind amputee in guard position:**

- ☞ Move the walker sideways till the outer leg is midline with your body.
- ☞ Step sideways and you should now be back **centered** with the walker.
- ☞ Repeat to the end of your side stepping distance
- ☞ **Ten feet for beginners.**

## Loop Band Walker Training



Keep toes facing forward



Stretch band keeping resistance



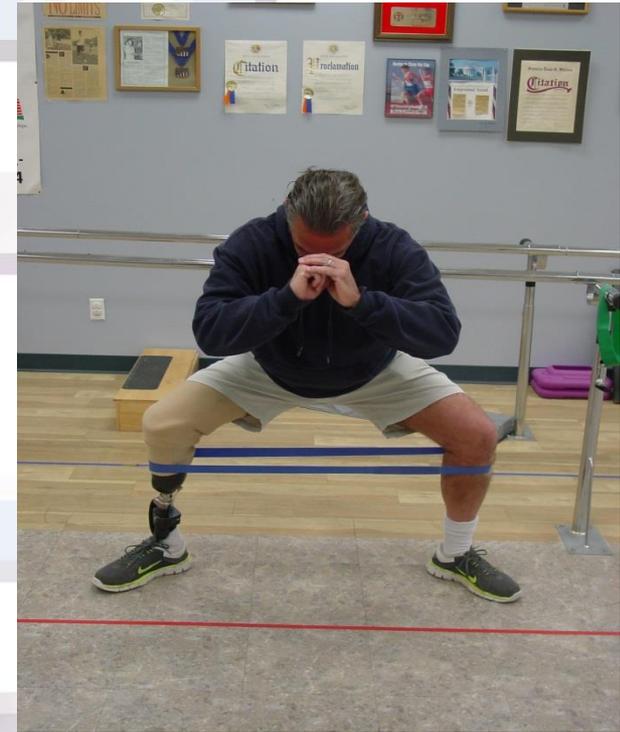
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# Lateral Band Walking: Adding A Squat

Turn feet out sideways



Take side-step to stretch out the band and proceed to squat



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## Lateral Loop Band: Stepping

Keep band stretched with resistance and take very small steps sideways



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# Stairs Ascending

We always teach sound side ascending first



Two stair advanced



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# Stairs Descending

- 🔗 **Hold on to the handrails for safety**
- 🔗 **Prosthetic side goes down first placing the rear of the foot on the step**
- 🔗 **Sound leg meets at the equal step**
- 🔗 **Try to achieve more of the forefoot to rotate over the edge of the step**
- 🔗 **This will allow a better step over step while descending**
- 🔗 **This is to teach the amputee to accept weight onto the prosthesis with the correct timing and alignment**
- 🔗 **Learn correct prosthetic foot placement on each step**
- 🔗 **Learn to trust the knee while it is flexing**
- 🔗 **An upright posture is important to ensure correct alignment & timing**



# Power Walking

- Place Thera-Band below knee joint towards end of the residual limb
- More advanced place Thera-Band around ankle joint area
- Spotter hold from behind as amputee walks 10ft>20ft>up to 50ft
- Add a second band on the sound side for a more aggressive workout

## Progression:

- Parallel Bars
- Walker/Forearm Crutches
- No Assistive Device



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# Loop Band Lunges

Keep Band Fully Stretched



Keep The Prosthetic Heel Down



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# Reebok Core Board is great for balance training



- ☞ The Core Board allows you to dial in resistance
- ☞ Amputee feels more stable compared to traditional wobble board
- ☞ Spotter holds hands as amputee places prosthetic side on first
- ☞ Spreads feet out to the sides
- ☞ Begin shifting side to side
- ☞ Step down prosthetic side first



# Reebok Core Board



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# Core Board Progression

- 👤 Holding on first with two hands for beginners
- 👤 One hand for intermediate
- 👤 No hands for advanced



# Core Board: Advanced

Lift up one leg as you shift



Very advanced exercise for BK



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☞ **Keep knees in bent position as you shift side to side trying to lift up the opposite leg**

☞ **A spotter would be holding your hands at first as a beginner as shown in previous slides**

☞ **A VERY ADVANCED EXERCISE**



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# Balance Beam Training

## Side Stepping



## Side Stepping With A Squat



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# Balance Beam Walking

- 🔗 We start inside parallel bars first
- 🔗 You can combine with Powerwalking exercise
- 🔗 Progress to outside parallel bars with assistive device: 10 ft. > 20 ft.
- 🔗 Advanced outside Parallel bars with no assistive device: 10 ft. > 20 ft.



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## Lunges

A very advanced exercise

Hold for 15 seconds - 60 seconds



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# Ladder Drills

# Ladder Drills

## Plyometric Exercises



Quick Steps

Hop On

Hop On Squats

Side Stepping

Leg Changers



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# Balance Pad

Use Ski Poles for assistance



Forearm crutches assist as well



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# Running!

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