



## EXERCISE PRESCRIPTION PART 2

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Orthopaedic Manual Physical Therapy Series  
Charlottesville 2017-2018



Orthopaedic Manual Physical Therapy Series 2017-2018

## Exercise Prescription

- Consult CPR/Literature
- Force
  - Direction & Task Specific
- Dosage
  - Task Specific
- Progressions



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## CLINICAL GUIDELINES

JOHN D. CHILDS, PT, PhD • JOSHUA A. CLELAND, PT, PhD • JAMES M. ELLIOTT, PT, PhD • DEYDRE S. TEYHEN, PT, PhD  
ROBERT S. WAINNER, PT, PhD • JULIE M. WHITMAN, PT, DSc • BERNARD J. SOPKY, MD  
JOSEPH J. GODGES, DPT • TIMOTHY W. FLYNN, PT, PhD

## Neck Pain:

*Clinical Practice Guidelines Linked to  
the International Classification of  
Functioning, Disability, and Health From  
the Orthopaedic Section of the American  
Physical Therapy Association*

J Orthop Sports Phys Ther 2008;38(9):A1-A34. doi:10.2519/jespt.2008.0303



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## Recommendations

- Interventions
    - Cervical Mobilization/Manipulation=A
    - **Coordination, Strengthening, Endurance= A**
    - Thoracic Mobilization/Manipulation = C
    - Stretching Exercises = C
    - Centralization procedures and exercises = C
- A=Strong Evidence- Preponderance of Level I and/or Level II studies support the recommendation. Must include at least one Level I study  
C=Weak Evidence- A single Level II study or preponderance of Level III and IV studies including statements of consensus by context experts support the recommendation



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Recommendation: Clinicians should consider the use of coordination, strengthening, and endurance exercises to reduce neck pain and headache.

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**Exercises for mechanical neck disorders (Review)**

Gross A, Kay TM, Paquin JP, Blanchette S, Lalonde P, Christie T, Dupont G, Graham N, Burnie SJ, Gelley G, Goldsmith CH, Forget M, Hoving JL, Bronfort G, Santaguida PL, Cervical Overview Group  
*Cochrane Database of Systematic Reviews* 2015, Issue 1. Art. No.: CD004250.

- Exercise is beneficial for the treatment of chronic neck pain, cervicogenic headaches and cervical radiculopathy
  - Exercise directed at neck, shoulder and scapular regions

**Effect of Therapeutic Exercise on Pain and Disability in the Management of Chronic Nonspecific Neck Pain: Systematic Review and Meta-Analysis of Randomized Trials**

*Physical Therapy* Volume 93 Number 8 August 2013

Lucia Bertozzi, Ivan Gardenghi, Francesca Turoni, Jorge Hugo Villafañe, Francesco Capra, Andrew A. Guccione, Paolo Pillastrini

- Significant effect size of therex on pain
- Medium, non significant effect size of therex on disability
- Supports use of therex in management of chronic nonspecific neck pain

**The Effect of Different Exercise Programs on Size and Function of Deep Cervical Flexor Muscles in Patients With Chronic Nonspecific Neck Pain**

*A Systematic Review of Randomized Controlled Trials*

Somayeh Amiri Arimi, PT, Mohammad Ali Mohseni Bandpei, PT, PhD, Khodabakhsh Javanshir, PT, PhD, Asghar Rezasoltani, PT, PhD, and Akbar Biglarian, PhD

- 268 studies evaluated, 9 included in review
- All RCTs
- Exercise interventions included cervical flexor exercise, general strengthening, stretching exercises
- Deep cervical flexor exercise groups showed reduced pain, improved function, increased longus colli diameter, improved performance of CCF test

**THE EFFECT OF 3 DIFFERENT EXERCISE APPROACHES ON NECK MUSCLE ENDURANCE, KINESIOPHOBIA, EXERCISE COMPLIANCE, AND PATIENT SATISFACTION IN CHRONIC WHIPLASH**

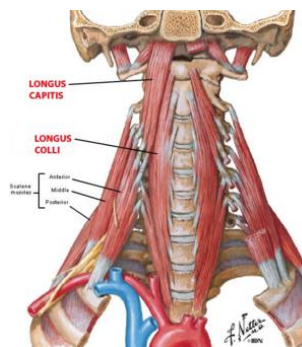
Gunnel E. Peterson, MSc, PT,<sup>1,2</sup> Maria H. Landén Ludvigsson, MSc, PT,<sup>1,2</sup> Shaun P. O'Leary, PhD, PT, Åsa M. Dederig, PT,<sup>3,4</sup> Thorne Wallman, PhD, MD,<sup>1,2</sup> Margaretha IN. Jönsson, MSc, PT,<sup>5</sup> and Annell I. C. Persson, PT,<sup>1,2</sup>

- 3 groups
  - Neck specific exercise
  - Neck specific exercise with behavioral approach
  - General exercise
- Neck specific exercise groups displayed improved DCF strength, reduced pain and increased satisfaction with treatment compared to general exercise group
- Supports neck specific exercise as a treatment for chronic whiplash

Does increased superficial neck flexor activity in the craniocervical flexion test reflect reduced deep flexor activity in people with neck pain? Gwendolen Jull <sup>a,\*</sup>, Deborah Falla <sup>b</sup> *Manual Therapy 25 (2016) 43–47*

- EMG was recorded from the sternocleidomastoid, anterior scalene and deep cervical flexor
- Support interpretation that increased activity of superficial flexors indicate less activation of deep flexors
  - Primarily SCM

## Deep Cervical Flexors



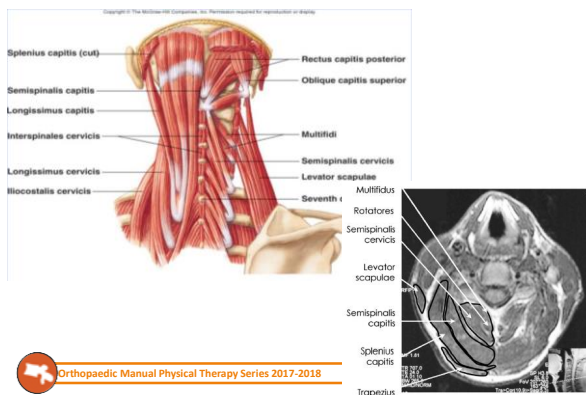
- Longus Capitis
- Longus Colli
- Function
  - Craniocervical flexion
  - Feed forward mechanism for cervical stabilization

## The Change in Deep Cervical Flexor Activity After Training Is Associated With the Degree of Pain Reduction in Patients With Chronic Neck Pain

Deborah Falla, Ph.D.<sup>a,\*</sup> Sham O’Leary, Ph.D.<sup>b</sup> Dario Farina, Ph.D.<sup>c</sup> and Gwendolen Jull, Ph.D.<sup>d</sup> *Clin J Pain* • Volume 28, Number 7, September 2012

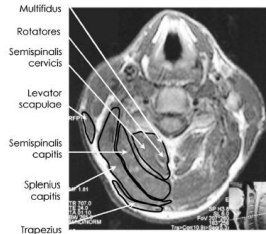
- Specific training of deep cervical flexors resulted in reduced pain in patients with chronic neck pain
- Correlated with increased EMG activity of longus colli and longus capitus

## Cervical Extensors



## Cervical Extensors

- Four Layers
  - Superficial
    - UT, Levator
  - Second Layer
    - Splenius Capitus
      - Extension, Ipsilateral rotation, Ipsilateral SB
  - Third Layer
    - Semispinalis Capitus
  - Deep Layer
    - Multifidus, Semispinalis Cervicis, Rectus Capitus Superior Major/Minor, Obliquus Capitus Superior/Inferior



Function and structure of the deep cervical extensor muscles in patients with neck pain

Jochen Schomacher<sup>a</sup>, Deborah Falla<sup>b,c,\*</sup> *Manual Therapy* 18 (2013) 360–366

- Reduced activation of multifidus and semispinalis cervicis in patients with neck pain
  - via EMG and functional MRI
- Altered response during isometric contractions
  - Typically extensor with small ipsilateral component
  - With neck pain even activation into all planes

## The Effect of g



## What Do We Do In Treatment?



### The Effect of g



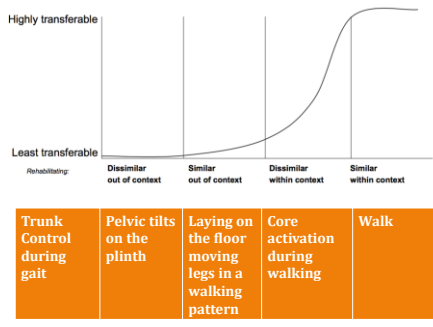
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### What Do We Do In Treatment?



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### Task Specificity



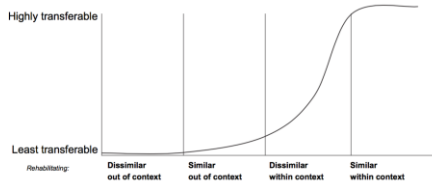
Lederman 2010

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## Task Specificity



Neck stabilization during changing tires	Supine chin tucks	Supine chops with medicine ball	Standing chin tuck with theraband resisted shoulder flexion	Heavy floor to shoulder box lifts
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Lederman 2010



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## Dosage

- Exercise must be dosed specifically for the injured tissue and healing state.
  - Too aggressive will be destructive
  - Too conservative will have no effect
- Must match the patient's health state and pathology
- Can be for the purpose of pain inhibition, decreasing muscle guarding, reducing edema, increasing tissue tolerance to tension/compression and improving joint mobility
- Specific to task or goals



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## Progression: RAMS

- **R**etrain
  - Control of Muscles
- **A**ttain
  - Available Range for Task
- **M**aintain
  - Maintain/control position against gravity
- **S**ustain
  - Maintain control during activity

A. Russell Smith Jr. PT, EdD, OCS, FAAOMPT

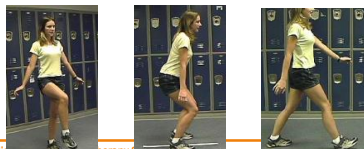


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## Progression

- Preparation Phase
- Phase I: **Static** Stabilization
- Phase II: **Transitional** Stabilization
- Phase III: **Dynamic** Stabilization
- Function

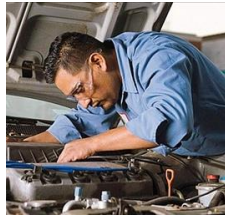


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- 50 yom mechanic gradual insidious onset of neck pain worsening over the past 6 months
- Dull pain midline CTJ area, sharp at times
- Aggs: work: leaning over cars, does ok if under or beside car; prolonged sitting
- Eases: head support, laying down
- Negative neuro exam
- ROM: pain at end range extension, flexion WNL tight, B Rotation tight at end ranges
- Strength: Shoulder girdle grossly 4-/5
- DCF endurance test 20 sec (normal=46 sec)
- Cervical extension MMT weak/painful

## Case Example



## Progression

- **R**etrain
  - Control of Muscles
- **A**ttain
  - Available Range for Task
- **M**aintain
  - Maintain/control position against gravity
- **S**ustain
  - Maintain control during activity

Phase I: **Static** Stabilization

Phase II: **Transitional** Stabilization

Phase III: **Dynamic** Stabilization



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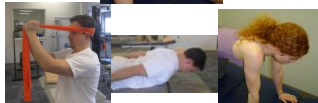
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- **R**etrain
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## Cervicothoracic MET



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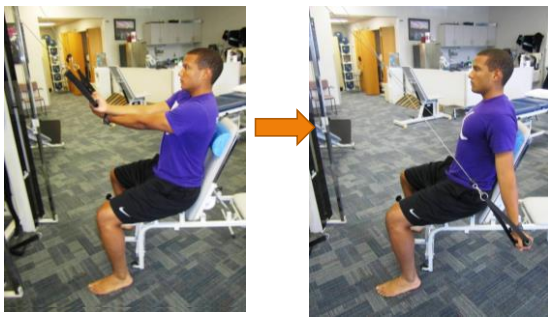
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### Cervical Stabilization: Postural Emphasis



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### Cervical Stabilization with Postural Emphasis



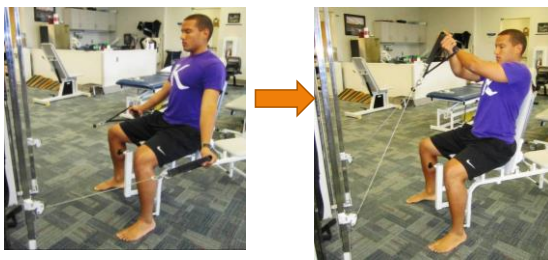
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### Cervical Stabilization: Postural Emphasis



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### Cervical Stabilization: Postural Emphasis



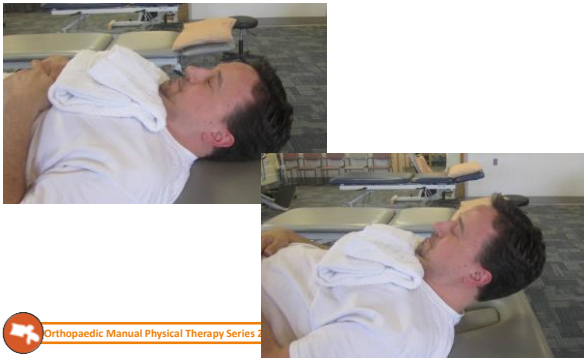
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### Motor Control: DCF/Rotation Emphasis



### Motor Control: DCF/Rotation Emphasis



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### Motor Control: DCF/Rotation Emphasis



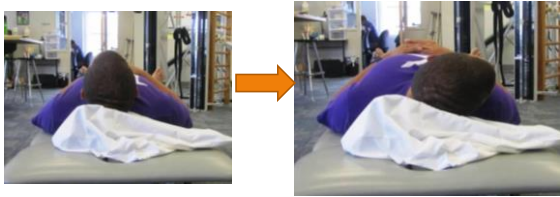
### Motor Control: DCF/Rotation Emphasis

- Band Alternative



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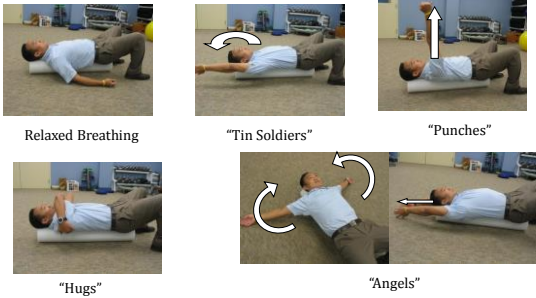
### Motor Control: DCF/Rotation Emphasis



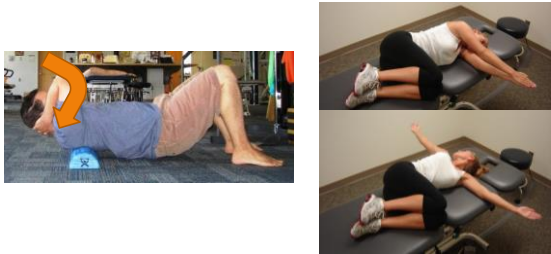
### Motor Control: DCF/Rotation Emphasis



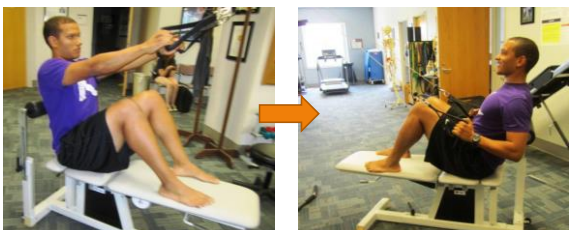
### Thoracic Mobility: Foam Roll



### Thoracic Mobility



### Thoracic Mobility



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### Thoracic Mobility



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### Thoracic Mobility



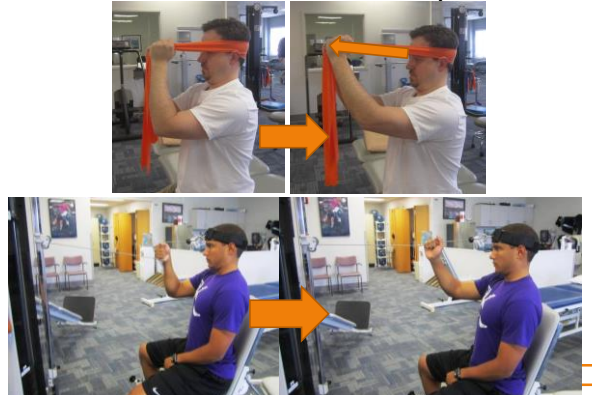
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### Motor Control: DCE Emphasis

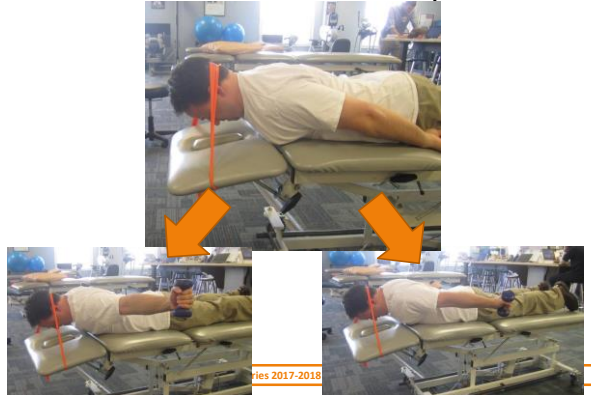


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### Motor Control: DCE Emphasis



### Motor Control: DCE Emphasis



### Advanced Motor Control

