Cramping My Style

An overview of muscle cramps

Lisa Tsugios M.D. C.C.F.P.
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Disclosures

I have none.

Learning Objectives

- Differentiate between different types of muscle cramps and their respective etiologies
- Form a differential diagnosis for the patient who presents with muscle cramps
- Describe evidence based therapies to address muscle cramping

Definition

- Painful contraction of a muscle or muscle group, relieved by contraction of antagonist muscle
- Typically posterior calf, can also involve the foot and thigh
- Average of 9 min per episode
- Typical manifestations
  - May occur at night or with exercise
  - Visible muscle tightening
  - Sudden, intense pain

Pathophysiology

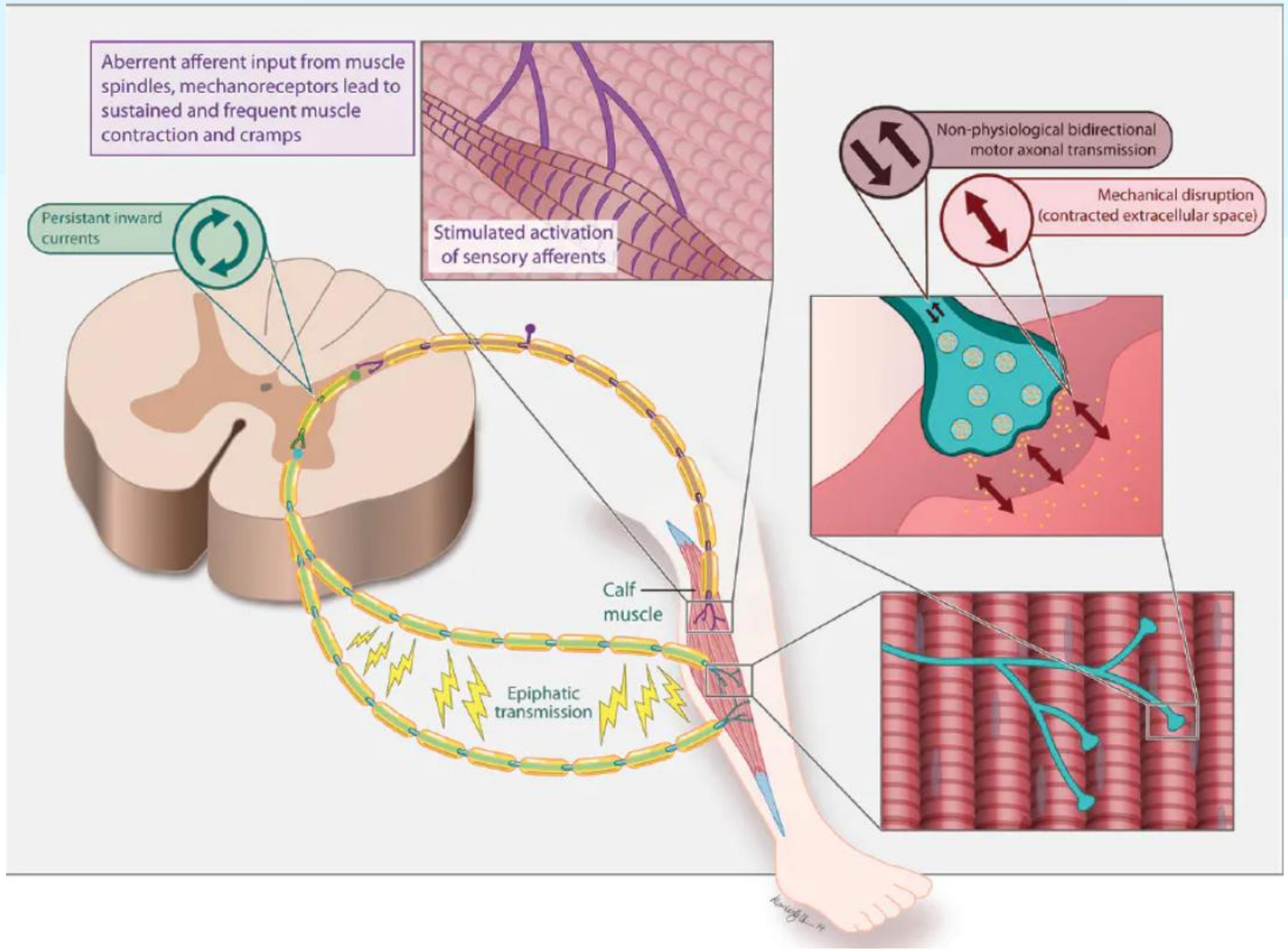
Suggested causes

- Nerve dysfunction or damage
  - High prevalence in patients with neurologic conditions
- Exercise-associated
  - Localized muscle fatigue in a sedentary person
  - In active people with change in intensity of exercise routine
  - Dehydration
- Metabolic causes
  - High prevalence in patients with hyperphosphatemia on dialysis
- Thought to occur more frequently in older/less active individuals due to shortened muscle length

Pathophysiology

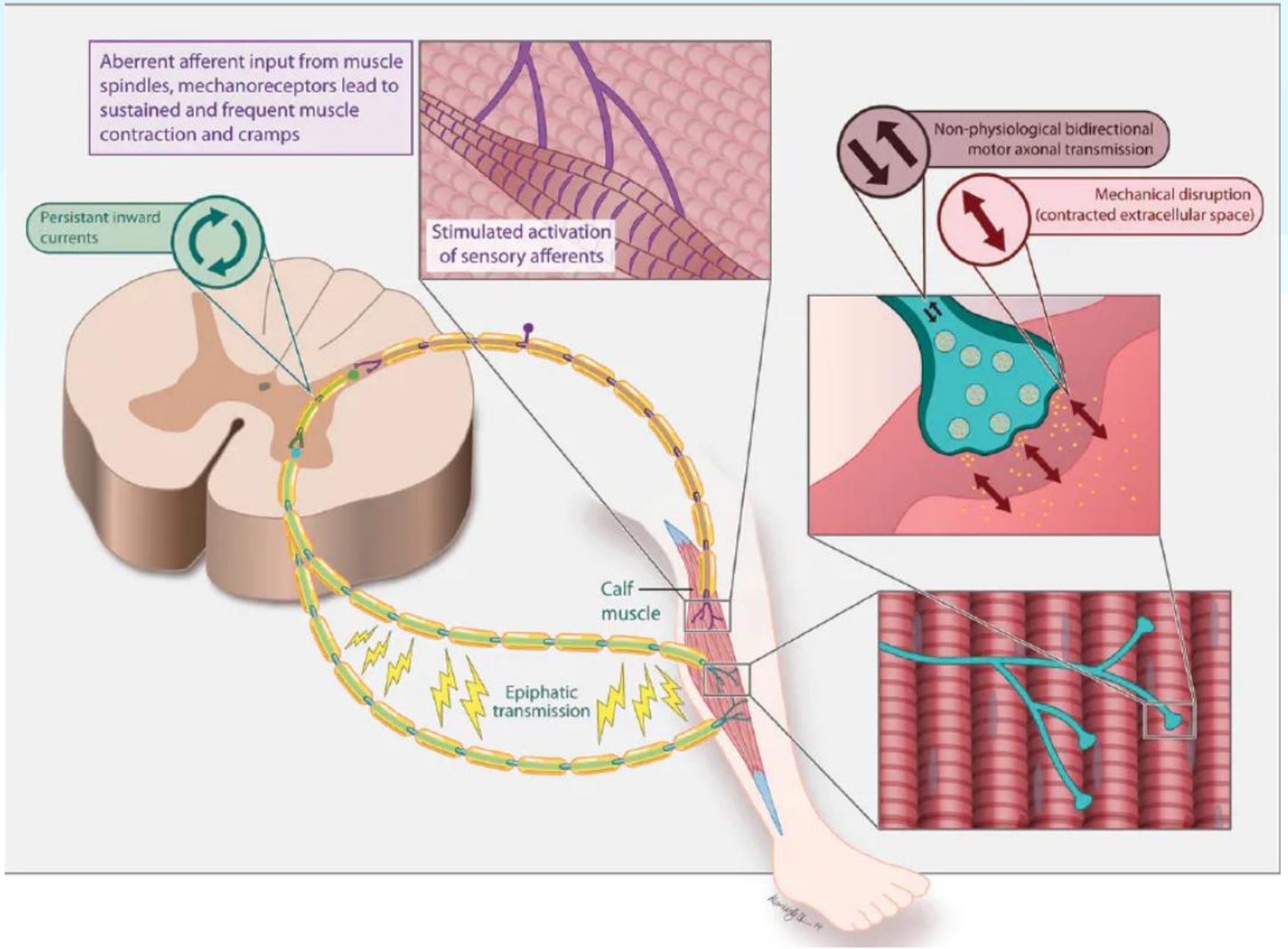
Neurogenic muscle cramps

- Mechanical disruption/electrolyte disturbances can influence hyperexcitability and cramp generation
- Injury to peripheral nerve components
- Injury to motor neuron cell bodies/axons
- Dysfunctional intramuscular small fiber sensory afferents (e.g. mechanoreceptors, spindles



Pathophysiology

- Nocturnal cramps
- Fluid shifts
- Dehydration
- Myogenic muscle cramps
- EMG: hyperactive, high-frequency, involuntary nerve discharges



Question

- Exercise-associated leg cramps have been demonstrated in clinical trials to be associated with:
  - a) hypovolemia
  - b) disturbances of electrolytes such as potassium, sodium and magnesium
  - c) none of the above

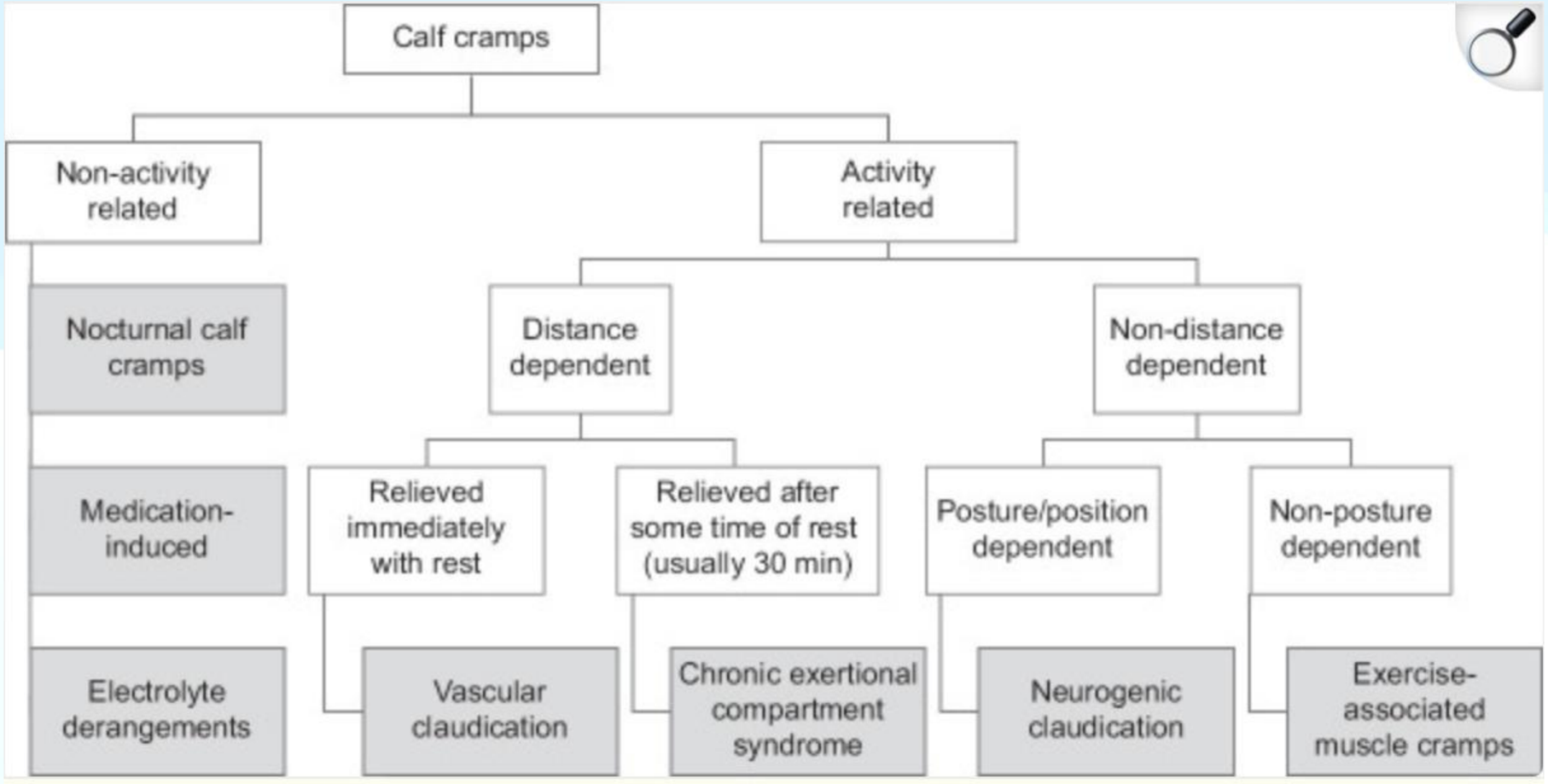
Common Causes

Diseases associated with muscle cramping

TABLE 1. COMMON CAUSES OF MUSCLE CRAMPS	
Physiologic	Dehydration
	Exercise-induced
	Idiopathic
	Nocturnal leg cramps of the elderly
	Pregnancy
Metabolic	Cirrhosis
	Hypothyroidism
	Malnutrition (vitamin B, D, Mg^{2+} deficiencies)
	Uremia/hemodialysis
Medications	Beta-agonists
	Diuretics
	Statins
Neuromuscular disorders	Amyotrophic lateral sclerosis
	Charcot–Marie–Tooth disease
	Cramp-fasciculation syndrome
	Acquired neuropathy
	Radiculopathy
	Isaac's syndrome (neuromyotonia)
	Metabolic myopathies (McArdle's)
Other neurologic conditions	Parkinson's disease
	Dystonia
	Multiple sclerosis
	Stroke

- In addition: cancer treatment, coronary artery disease, peripheral vascular disease, venous insufficiency, diabetes, menopause
- Opportunity for diagnosis of conditions
- Idiopathic: diagnosis of exclusion
- No data to suggest that treatment of these conditions improves symptoms of leg cramps

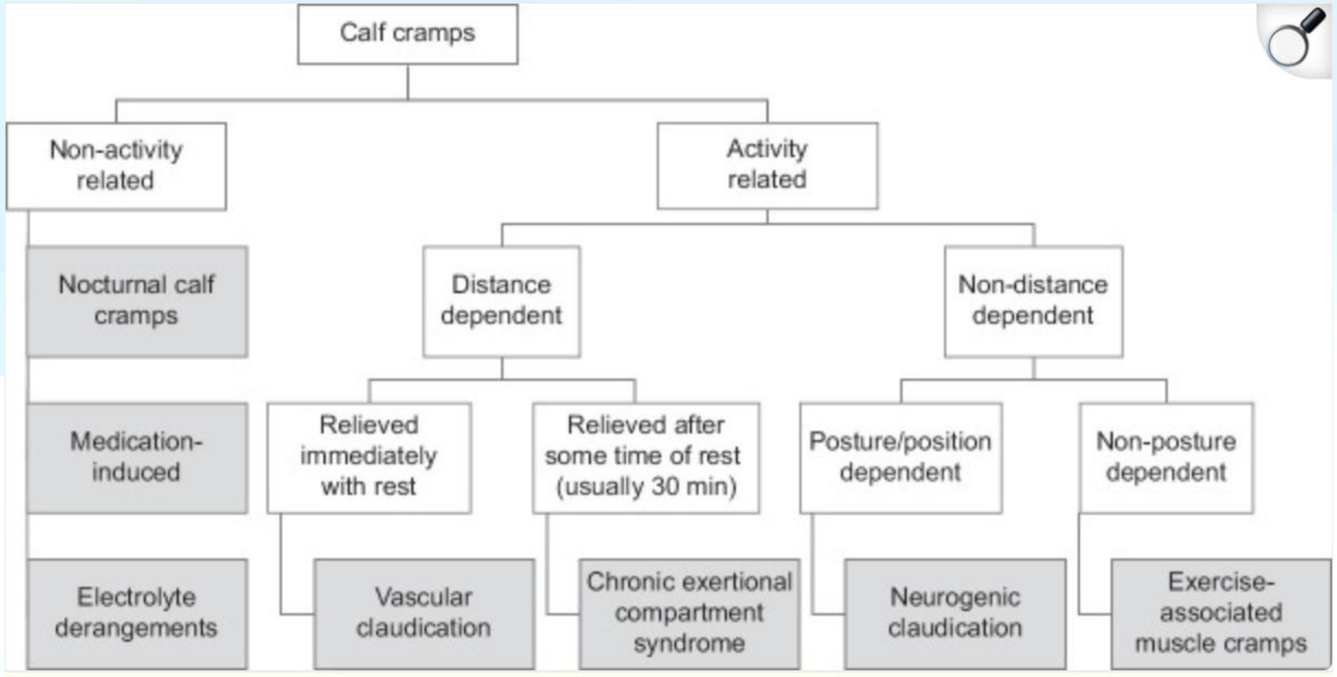
Differential Diagnosis



Common Causes

- Nocturnal leg cramps
  - Diagnostic criteria
    - Painful sensation in the leg associated with sudden, involuntary muscle contraction
    - Occur while one is in bed
    - Relieved by forceful stretching of the affected muscles
  - No investigations are necessary unless history & physical suggest underlying cause
  - Most are idiopathic
  - May be associated with any other causes of cramps

Common Causes



- Peripheral vascular disease
  - Symptomatic treatment of claudication
    - Walk-rest x 30-45 min
    - Medications
- Chronic exertional compartment syndrome
- Neurogenic claudication
  - Walking distance more variable
- Exercise-associated muscle cramps

Can’t-Miss Conditions

- Deep vein thrombosis
- Rhabdomyolysis
- Acute compartment syndrome
- Critical limb ischemia

Associated Medications

Table 1. Drugs Associated with Leg Cramps

Drug	*Percentage of patients reporting leg cramps*
Intravenous iron sucrose	23
Raloxifene (Evista)	5.9 to 12.1
Conjugated estrogens	3.5 to 14
Naproxen (Naprosyn)	3
Teriparatide (Forteo)	2.6
Daclizumab (not available in the United States)	2
Levalbuterol (Xopenex)	2
Albuterol/ipratropium (Combivent)	1.4
Pregabalin (Lyrica)	> 1
Bromocriptine (Parlodel), bupropion (Wellbutrin), celecoxib (Celebrex), cetirizine (Zyrtec), chromium, cinacalcet (Sensipar), ciprofloxacin (Cipro), citalopram (Celexa), clonazepam (Klonopin), donepezil (Aricept), eszopiclone (Lunesta), fluoxetine (Prozac), gabapentin (Neurontin), lansoprazole (Prevacid), rivastigmine (Exelon), sertraline (Zoloft), telmisartan (Micardis), zolpidem (Ambien)	< 1

Differential Diagnosis

- Restless leg syndrome
- Claudication
- Hypnic myoclonus
- Periodic limb movement disorder
- Myalgias/myositis

History

- Where do the cramps occur?
- When do the cramps occur?
- Are they associated with activity?
- Any association between times of day?
- Describe the nature of the cramp
- Aggravating/alleviating factors
- Associated symptoms

Physical Examination

- Inspection of legs and feet
- Palpation of pulses
- Evaluation of touch and pinprick sensation
- Muscle strength
- Deep tendon reflexes
- Tremor
- Gait
- Blood pressure

Investigations

- Evaluation directed toward potential etiology
- Lab tests
  - May be used to assist in identifying underlying medical conditions
  - Liver enzymes
  - Cholesterol
  - Vitamin B12
- Other diagnostic tests as indicated to confirm specific medical conditions

True or False?

Stretching helps to prevent muscle cramps

Nonpharmacological Management

- No current treatments for leg cramps have been proven both safe and effective
- Passive stretching and deep tissue massage are harmless and may be suggested as a therapeutic trial despite limited proof of effectiveness

Table 2. Mean (SD) of groups, mean (SD) difference within groups, and mean (95% CI) difference between groups for both outcomes.

Outcome	Groups				Difference within groups		Difference between groups
	Week 0		Week 6		Week 6 minus Week 0		Week 6 minus Week 0
	Exp (n = 40)	Con (n = 40)	Exp (n = 40)	Con (n = 40)	Exp	Con	Exp minus Con
Cramp frequency *(cramps/night)*, mean (SD)	3.4 (1.5)	3.2 (1.9)	1.4 (1.4)	2.4 (1.7)	−2.0 (1.3)	−0.8 (1.3)	−1.2 (−0.6 to −1.8)
Cramp severity *(0 to 10)*, mean (SD)	7.2 (1.4)	7.4 (1.3)	5.9 (1.4)	7.5 (1.3)	−1.3 (1.1)	0.0 (0.9)	−1.3 (−0.9 to 1.7)

Exp = experimental group, Con = control group, shaded row = primary outcome

Nonpharmacological Management

The only study that showed benefit to stretching

Box 1. Description of the stretching exercises.

Stretch	Description
Calf stretch in standing	**Starting position.** Standing facing a wall with the elbows extended and both palms on the wall at chest height. One leg is forward with the knee flexed and the other leg is back with the knee extended. Both feet are in full contact with the floor. **Motion to apply stretch.** Flex the front knee so that the trunk moves forward, keeping the trunk straight and the heels in contact with the floor.
Hamstring stretch in standing	**Starting position.** Standing facing a chair that is placed against a wall. Place one heel on the chair with the knee of that leg fully extended. **Motion to apply stretch.** Flex at the hips so that the trunk tilts forward, keeping the trunk straight. The foot on the floor should maintain full contact and the other heel remains in contact with the chair.
Hamstring and calf stretch in sitting	**Starting position.** Sit on the floor or a firm bed with both legs extended. Grasp toes with both hands. **Motion to apply stretch.** Flex at the hips so that the trunk tilts forward, keeping the trunk as straight as possible. Dorsiflex at the ankles.

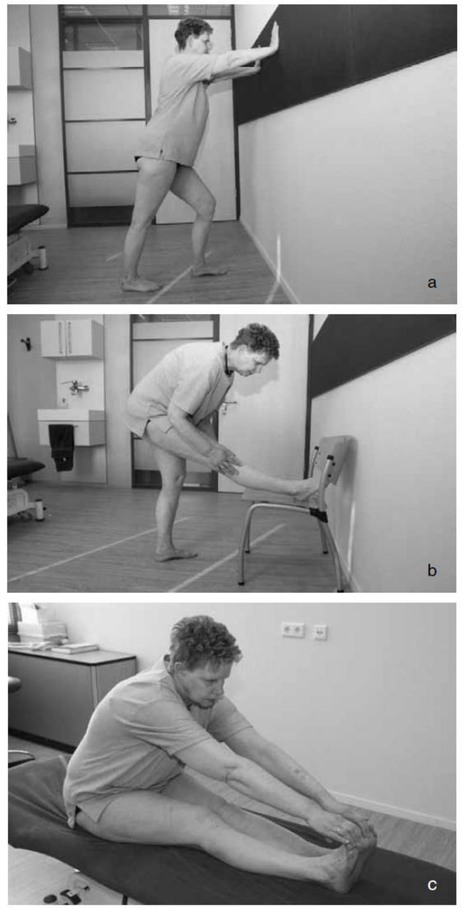
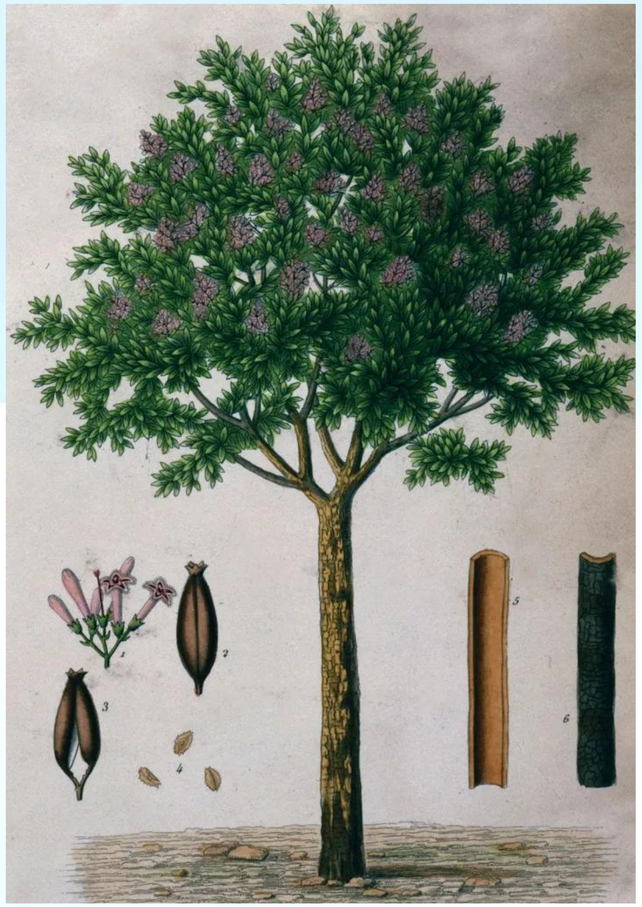


Figure 1. Stretches used in the experimental group: (a) calf stretch in standing, (b) hamstring stretch in standing, (c) hamstring and calf stretch in sitting.

- Adopt the position shown
- Move to the comfortable limit of motion
- Move beyond this until a moderately intense stretch was felt and sustained for 10s
- 10s of relaxation between each stretch
- 3 min total to complete

Medication Management



- Quinine 300 mg po QHS
  - Adverse effects: tinnitus, headache, gastrointestinal effects
  - Fatal hypersensitivity reactions, thrombocytopenia can occur at any dose
  - Toxicity: cardiac arrythmias, hemolytic uremic syndrome, cinchonism
- Vitamin B complex
- Controversial: Ca channel blockers, Mg
- In pregnancy: Mg, multivitamin, sodium supplementation

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