Effects on Human Body: Musculoskeletal System
Work, vibration & the musculoskeletal system
Temporary neurosensory effects

- Reduced motor control
- Temporary increase of strength
- Reduced endurance
Permanent musculoskeletal shift

- Shift in muscular function
  - Reduced neuromuscular function
  - Loss of manual dexterity

- Shift in joint and bone function
  - “Pain”

- Osteoarthritis
Musculoskeletal system
Manifestations of musculoskeletal shift

- Symptoms and signs:
  Reduced force and muscular function
  Reduced manual dexterity
  Possible muscular pain or tendonitis
  Symptoms of arthritis from joints
  Joint or tendon degeneration
  Tendon disorders: Dupuytren’s contracture

- Clinical laboratory findings:
  X-ray (osteoarthritis?)
What goes wrong?
Who is at risk for musculoskeletal effects?

- Exposed to work with vibrating machines?
- Intensive vibration exposure of high magnitude, low frequency or percussive character, sustained over long time.
What elicits musculoskeletal symptoms?

- **Muscular**
  - Increased, sustained muscular load

- **Joints**
  - Intensive, percussive vibration exposure
  - Local pressure, increased, sustained load
What modifies musculoskeletal symptoms?

• Ergonomic loads

• Time of day
  - Morning stiffness

• Excitability

- Somatosensory pain system
Possible disability and handicap

- Difficulty in performing manual tasks
- Difficulty in exerting force
- Restrictions due to pain, or loss of function
What will the physician do?

- Assess occupational and medical history
- Assess physical examination status
- Assess laboratory tests
- Care for possible treatment and management
- Inform on:
  - prognosis
  - contributory factors
  - factors affecting improvement of symptoms
  - preventive measures
  - workers compensation and litigation.
Assessment of the occupational history

1. With reference to vibration exposure

2. With reference to other ergonomic load factors

3. With reference to other exposures with possible influence the neurological system (Neurotoxic agents)
Assessment of the medical history

- Symptom description
- Times and durations
- Aggravating and relieving activities
Staging of musculoskeletal symptoms

• Assessment of medical history.

• As yet, there is no present staging of musculoskeletal symptoms
Assessment of physical status

The physical examination is specifically focused on:

• The locomotor system
  - muscles, tendons
  - joints
  - bone structures

• Signs of other diseases
Assessment with laboratory tests

- Imaging
  - Radiographic imaging
  - Magnetic resonance imaging

- Electro-diagnostic methods
  - Electromyography

- Chemical screening
  - Chemical laboratory screening for inflammatory diseases
Other causes of “musculoskeletal” disorders

- Work related neuromusculoskeletal disorders
- Stress related muscular strain
- Inflammatory diseases
Clinical evaluation of musculoskeletal effects

• Are the symptoms consistent with arthritis, tendonitis, myopathy?

• Are the vibration exposure characteristics consistent with the hand-arm vibration syndrome?

• Are there any other confounding exposures?

• How can the magnitude of the disorder be classified?
Management and treatment

- Primary prevention by exposure reduction.
- Information on personal prevention actions that could modify load (e.g. posture, ergonomic work technique)
- Possible surgical intervention or medical treatment
- Possible documentation for workers compensation or litigation
Prognosis of musculoskeletal effects

• If discontinued exposure to work with vibration

• The chance for improvement is inconsiderable in severe cases where structural changes has appeared

• If continued work with vibration exposure