

Measures to Prevent Cervical Spinal Cord Damage Without Bone Damage for Mature Age Workers and Establishing an Early Treatment System

— Increase in Cervical Spinal Column Stenosis and Deterioration in Movement Function of the Extremities in Mature Age Workers —

Field name "Spinal cord injury"

In order to develop measures to prevent cervical spinal cord damage in cases without bone damage in mature age workers, we examined the cervical vertebrae of 1200 healthy individuals and performed an age-categorized investigation of the degree of change in the spine and spinal cord due to ageing based on MRI (Fig. 5). The results show that the anteroposterior of the spinal column, dural tube anteroposterior (Fig. 6), anteroposterior spinal cord (Fig. 7), and spinal area (Fig. 8) decrease with age, while the intradural occupancy rate of the spinal cord (Fig. 9) increases with age. Furthermore, from a neurological viewpoint, we clarified based on the "ten second hand test" (Fig. 10) and "ten second step test" (Fig. 11) that the cervical spinal cord deteriorates with age.

Based on these results, we clarified that for mature age workers the rate of occurrence of cervical spinal column stenosis increases, that the movement function of the extremities decreases, and that the probability that hyperextension of the cervical vertebrae in job-related cervical spinal cord damage without bone damage is high ^{1, 2, 3, 4}.

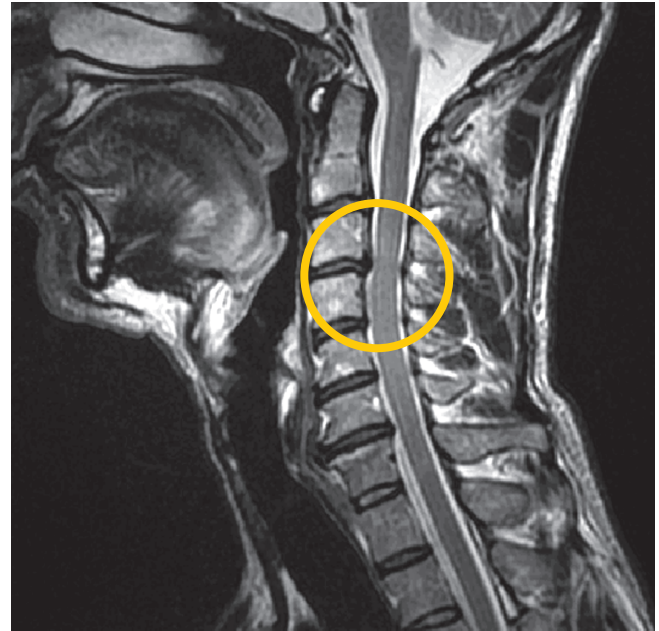


Fig. 5. MRI of cervical vertebrae and cervical spinal cord

Diagnoses of the spinal canal, endocranial tube, and spinal cord are possible.

This T2 weighted sagittal MRI image highlights spinal canal stenosis at the C3/4 vertebrae in a 46 yr. old male. The endocranial tube at the C3/4 vertebrae is very constricted.

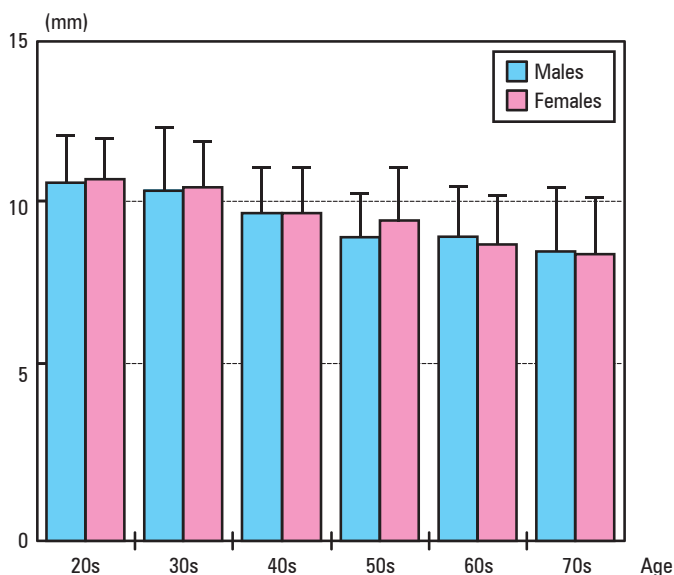


Fig. 6. Change in anteroposterior diameter of the endocranial tube due to ageing

C5/6 intervertebral spacing (sagittal plane) based on the anteroposterior diameter of the endocranial tube (Mean \pm SD)

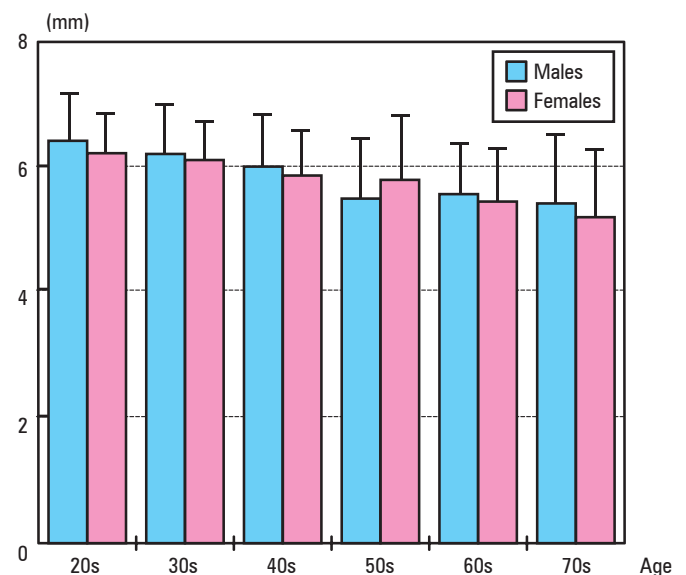


Fig. 7. Change in anteroposterior diameter of the spinal cord due to ageing

C5/6 intervertebral spacing (sagittal plane) based on anteroposterior diameter of the spinal cord (Mean \pm SD)

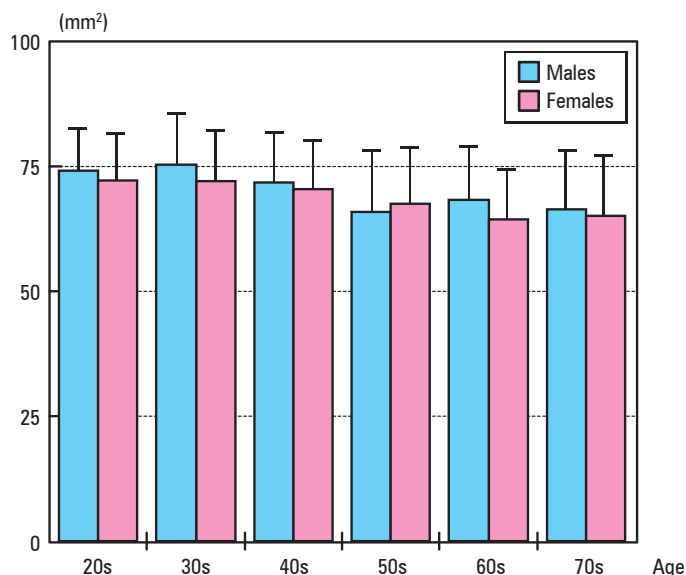


Fig. 8. Change in spinal cord area due to ageing
C5/6 intervertebral spacing (sagittal plane) based on spinal cord area (Mean ± SD)

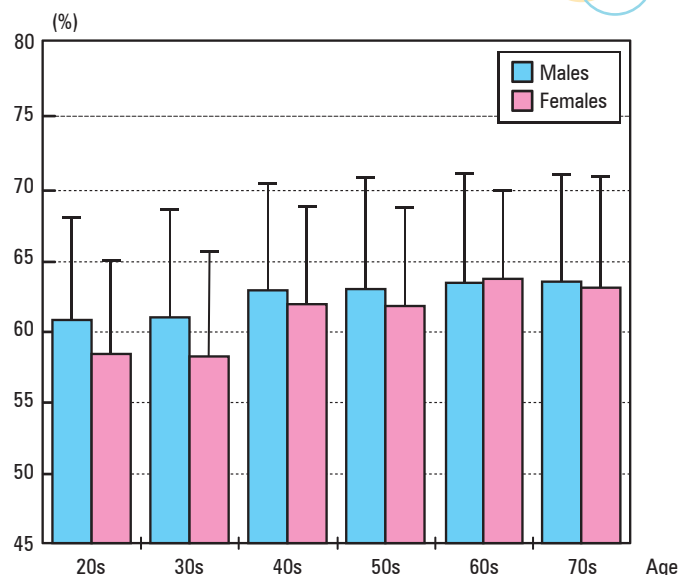


Fig. 9. Change in intradural occupancy rate of the spinal cord due to ageing
C5/6 intervertebral spacing (sagittal plane) based on the intradural occupancy rate of the spinal cord (Mean ± SD)

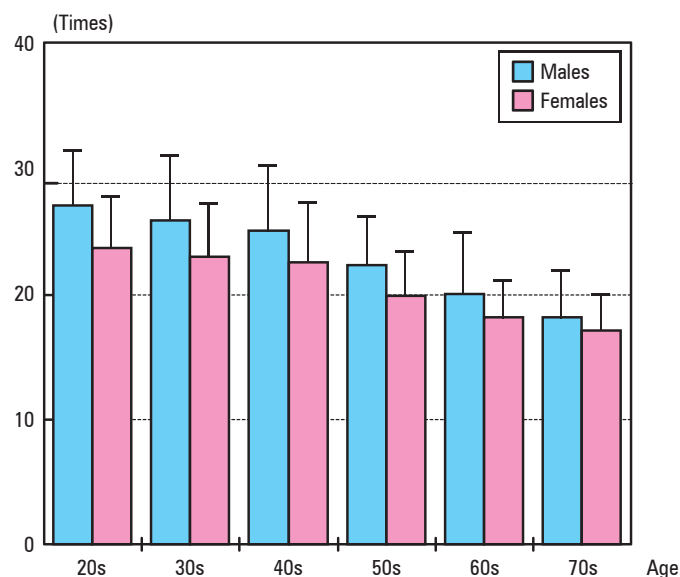


Fig. 10. Change in ten second hand test (right hand) results due to ageing
(Mean ± SD)

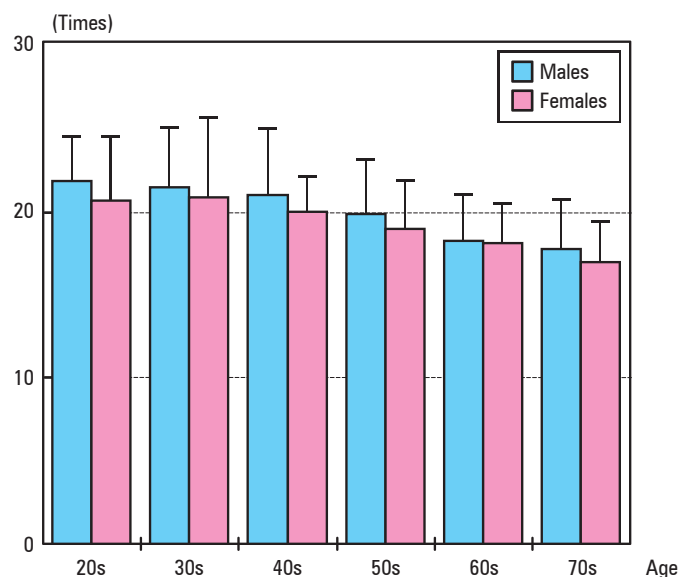


Fig. 11. Change in ten second step test results due to ageing
(Mean ± SD)

References:

- 1) Kato F.: Preventative measures for cervical spinal cord damage without bone damage and establishing an early treatment system – Determining Japanese standard values for cervical vertebrae / cervical spinal cord based on MRI, and new initiatives regarding cervical vertebrae examination. Japan Labour Health and Welfare Organization, Clinical Research Center for Worker's Spinal Injury, 2007.
- 2) Kato F.: Preventative measures for cervical spinal cord damage without bone damage and establishing an early treatment system – Determining Japanese standard values for cervical vertebrae / cervical spinal cord based on MRI, and new initiatives regarding cervical vertebrae examination (Part 2). Japan Labour Health and Welfare Organization, Clinical Research Center for Worker's Spinal Injury, 2008.
- 3) Kato F.: Research, development, and diffusion pertaining to preventative measures for cervical spinal cord damage without bone damage and establishing an early treatment system, Research report. Japan Labour Health and Welfare Organization, Clinical Research Center for Worker's Spinal Injury, 2008.
- 4) Yukawa Y., Kato F., Ito K., Horie Y., Nakashima H., Machino M., Ito Z., and Wakao N.: Ten second step test as a new quantifiable parameter of cervical myelopathy. Spine 34:82-86, 2009.

* Reference 2 can be viewed at <http://www.research12.jp/h13/index.html>, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.

* Reference 3 can be viewed at <http://www.research12.jp/h13/index2.html>, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.