

# Aging complications

Common conditions in older age include hearing loss, cataracts, refractive errors, back and neck pain and osteoarthritis, chronic obstructive pulmonary disease, diabetes, depression, and dementia.

Aging is accompanied by functional loss of many cellular pathways, creating an increased risk of many aging complications (ARC). Aging causes stem cell exhaustion with a concomitant increase in cellular dysfunction.

The term 'physiological motion of the spine' is commonly used although no proper definition exists. Previous work has revealed a consistent sequence of cervical segmental contributions in 80-90% of young healthy individuals. Age has been shown to be associated with a decreased quantity of motion. Therefore, it is of interest to study whether this sequence persists throughout aging. The aim of this prospective cohort study is to investigate if the consistent sequence of cervical segmental contributions in young asymptomatic individuals remains present in elderly asymptomatic individuals.

In this prospective cohort study, dynamic flexion to extension cinematographic recordings of the cervical spine were made in asymptomatic individuals aged 55-70 years old. Individuals without neck pain and without severe degenerative changes were included. Two recordings were made in each individual with a 2-to-4-week interval (T1 and T2). Segmental rotation of each individual segment between C4 and C7 was calculated to determine the sequence of segmental contributions. Secondary outcomes were segmental range of motion (sRoM) and sagittal alignment.

Ten individuals, with an average age of 61 years, were included. The predefined consistent sequence of segmental contributions was found in 10% of the individuals at T1 and 0% at T2. sRoM and total range of motion (tRoM) were low in all participants. There was no statistically significant correlation between sagittal alignment, degeneration and sRoM in the respective segments, nor between cervical lordosis and tRoM.

This study shows that aging is associated with loss of the consistent motion pattern that was observed in young asymptomatic individuals. The altered contribution of the cervical segments during extension did not appear to be correlated to the degree of degeneration or sagittal alignment. Trial registration clinicaltrials.gov NCT04222777, registered 10.01.2020 <sup>1)</sup>

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Schuermans VNE, Smeets AYJM, Breen A, Branney J, Curfs I, van Santbrink H, Boselie TFM. An observational study of quality of motion in the aging cervical spine: sequence of segmental contributions in dynamic fluoroscopy recordings. BMC Musculoskelet Disord. 2024 Apr 25;25(1):330. doi: 10.1186/s12891-024-07423-z. PMID: 38664811.

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