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Age-related structural changes of the peripheral nervous system in mice: a morphological study

Paola Lorena Marmiroli - Annalisa Canta - Valentina Carozzi - Cristina Meregalli - Norberto Oggioni - Mario Bossi - Virginia Rodriguez Menendez - Guido Cavaletti - Alessia Chiorazzi

Dipartimento di Medicina e Chirurgia, Università di Milano-Bicocca, Monza, Italia

In animal models age-related changes occurring in the peripheral nervous system (PNS) have not been so far extensively investigated. In particular there are no studies evaluating the entire PNS sensory pathway, more frequently compromised in aged persons. In this study we describe the morphological modifications taking place in the different parts of PNS sensory pathway: intraepidermal nerve fibers (IENF), peripheral nerves and dorsal root ganglia (DRG) were examined in the same cohort of C57BL/6 mice over a period of 25 months. Estimate of IENF density is a diagnostic procedure that is gaining increasing interest, but its long-term time-course has not been so far described in relationship with other PNS changes. Sixty-six female mice aged 4 weeks at the beginning of the study were used. Every 2 months sciatic and ventral caudal nerve, L4-5 DRG and hind paw skin specimens were collected and processed for morphological and morphometric analysis from 3 randomly sacrificed mice. Morphological observations were performed at light and electron microscope. In all the samples morphological changes were evident in aged animals: diminished density and degenerative aspects were observed in myelinated fibers both in sciatic and caudal nerves; progressive reduction in IENF density, more striking in the last months of observation; vacuolation and polymorphic inclusions in neurons and satellite cells in DRG, with a significant increase in the nucleolar size. These morphological observations were corroborated also by neurophysiological evaluation. Our study describes changes occurring in healthy aging mice and they reflect the expected course of PNS aging in humans. Therefore, our data might provide the background for mechanistic studies designed to investigate on possible pathophysiological events at the basis of the observed age-related changes in healthy mice PNS allowing the selection of the most appropriate time points according to the investigation aims.

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Keywords

Peripheral nervous system; aging; animal model.

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