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Changes in Some Myelin Protein Markers and in Cytoskeletal Components During Wallerian Degeneration of Mouse Sciatic Nerve

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Abstract: After transection of the mouse sciatic nerve, the sequence of events occurring in the distal degenerating segment was followed by the biochemical changes related to the cytoskeletal components and to the myelin protein markers. The components of the intermediate filaments and of the microtubules undergo early changes. Within 3 days, the neurofilament triplet and the peripherin disappear whereas many peptides bearing the antigenic determinant common to all classes of intermediate filaments accumulate. Several of them persist after 1 month. The tubulin pattern changes from a high level of microheterogeneity—reflecting mostly the axonal contribution—to a lower level displayed by the predominant Schwann cells. A decrease in the amount of the myelin markers is also observed. However, a month after transection, immunoreactive basic protein is still present in the degenerated segment homogenate. **Key Words:** Myelin —Neurofilament —Peripherin —Tubulin —Vimentin. de Néchaud B. et al. Changes in some myelin protein markers and in cytoskeletal components during Wallerian degeneration of mouse sciatic nerve. *J. Neurochem.* **46**, 708–716 (1986).

After transection of the sciatic nerve, the distal part undergoes disorganization, the axonal components disappear, and demyelination takes place. Next the Schwann cells proliferate and reorganize (Bungner bands) at the same time as other supporting endoneurial cells (Schlaepfer and Micko, 1978). The aim of the present study is to analyze in such transected mouse sciatic nerves the modification of the cytoskeletal components and of some myelin markers by comparing the distal degenerating part to the proximal segment and to the contralateral undamaged nerve. We chose to use two-dimensional gel electrophoresis for the separation of the cytoskeletal and myelin protein components, combined to a sensitive silver gel staining (Morrissey, 1981) or to the visualisation by appropriate immunoreagents after protein transfer (Towbin et al., 1979).

The partition of cytoskeletal components of the whole nerve homogenates between axonal and endoneurial cell compartments has been approached. A few days following transection, the distribution of the components from the intermediate filaments and the microtubules is disturbed. Some specific markers of the axonal cytoskeleton are missing, such as the neurofilament (NF) triplet (Hoffman and Lasek, 1975), peripherin (Portier et al., 1984), and the neurospecific isotubulins (Denoulet et al., 1982).

Lastly, several weeks after transection, the Schwann cells—although presumed "functionally naive" (Spencer et al., 1979)—still maintain low levels of myelin basic protein (our present results) as well as of P_0 glycoprotein (Poduslo, 1984).

MATERIALS AND METHODS

Materials

Chemicals and their sources are as follows: acrylamide, bisacrylamide, Ampholytes, LKB; Ponceau Red, Coomassie Blue (Serva blue R), Serva; Tris, sodium dodecyl sulfate (SDS), Tween-20, trichloroacetic acid, Merck; cytochrome *c* (indicator protein), Boehringer; bovine serum albumin (BSA), Industrie Biologique Française; ultrapure urea, Schwarz-Mann; *p*-chloromercuribenzoate, Aldrich;

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Abbreviations used: BP, basic protein of myelin; BSA, bovine serum albumin; D, day of nerve transection; IEF, isoelectric focusing; K, kilodalton; NEPHGE, nonequilibrium pH gradient electrophoresis; NF, neurofilament; PAGE, polyacrylamide gel electrophoresis; PBS, phosphate-buffered saline; SDS, sodium dodecyl sulfate.