Schwann cells transfer ribosomes and mRNA to axons

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It is a textbook notion that mature vertebrate axons do not synthesize proteins and rely on their somata for protein supply. The main reason for this view is that the ultrastructural evidence for the presence of ribosomes is lacking. We report here the occurrence of ribosomes and polyribosomes in peripheral nerve axons of the Wallerian degeneration slow (Wld^s) mouse strain, as shown with electron microscopy, immunocytochemistry, a nucleic-acid specific fluorescent dye, in situ hybridization, and autoradiography. Ribosomes are scarce in intact axons and become ubiquitous after 7-14 days of denucleation. We furthermore provide evidence that Schwann cells are the source of the ribosomes. Upregulation of the number of ribosomes, and hence regulation of protein synthesis in axons, and its dependence from supporting cells open a novel avenue in our understanding of the physiology and pathology of the nervous system.

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