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This Week's Citation Classic®

Lieberman A R. The axon reaction: a review of the principal features of perikaryal responses to axon injury. *Int. Rev. Neurobiol.* 14:49-124, 1971.
[Department of Anatomy and Embryology, University College London, England]

A variety of chemical, metabolic, and structural changes occur in (and around) the cell bodies of neurons whose axons have been interrupted. This paper reviews and analyses these changes ("the axon reaction") and considers their significance in relation to the metabolic requirements for axonal regeneration. [The *SCI*® indicates that this paper has been cited in over 305 publications, making it the most-cited article in this journal.]

A.R. Lieberman
Department of Anatomy
and Embryology
University College London
London WC1E 6BT
England

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I wrote this paper in 1969-1970. It stemmed from work done for a PhD and was carried out under the nominal supervision of E.G. Gray in the Department of Anatomy at University College London, where I had begun as a medical student and still work today. The paper was a critical review of the literature on the axon reaction, incorporating some of my own findings, which I had decided were not worth publishing in the form of research papers.

The manuscript originally submitted was much longer and wider-ranging than the one eventually published, which led to a series of problems. At first the editors offered to publish it as a special supplement to the 1970 *International Review of Neurobiology*, to which I readily agreed. Months later, however, they wrote to propose instead that it be published either in full in a different series, Bourne's *Structure and Function of Nervous Tissue*, to which I could not agree, or in abbreviated form in the 1971 *Review*. After considering and eventually deciding against a further alternative—putting the manuscript out in the form of a monograph—I opted for an abbreviated version the following year, a decision influenced in part by the prestige of the *Review* at that time, and to a greater extent by the consideration that it would be easier to cut chunks out of the manuscript than to puff it and pad it into book form. Furthermore, by that time, I was working in an entirely different area of neuroscience and wanted to get the paper out of the way as quickly as possible. One of the chunks I excised from the original version, a discussion of the effects on the axon reaction of such variables as age, species, cell type, cell size, and the site and nature of the lesion, I was later able to use as a contribution to a festschrift for J.Z. Young.[1] Incidentally, although I declined the offer of UK publishers Chapman and Hall to publish my manuscript in book form, contact with them led to the launch of the *Journal of Neurocytology*, which began publication in 1972.

Another problem arose at the proof stage, when I was working, temporarily, in Czechoslovakia. I corrected the proofs and posted them back to Academic Press only to have the package returned to me by the authorities. They insisted that the entire article would have to be translated into Czech, then read and approved by the local Party Committee before it could be sent to the US. It took several days and the (reluctant) help of the British and American Embassies in Prague to circumvent this piece of bureaucratic nonsense. Curiously, no similar problems arose, during that or other visits, with mail to and from England.

The main reason the paper has been extensively cited is, I suppose, that like most reviews, it was (and apparently continues to be) useful. I hope it also has something to do with the fact that the literature was reviewed selectively, analytically, and critically. And of course, the subject matter is of wide neurobiological interest. The upsurge of interest in CNS regeneration over the last decade has served to highlight the importance of understanding the axon reaction and has formed the backdrop to more recent reviews.[2,3]

1. **Lieberman A R.** Some factors affecting retrograde neuronal responses to axonal lesions. (Bellairs R & Gray E G, eds.) *Essays on the nervous system; a festschrift for Professor J.Z. Young*. Oxford: Clarendon Press, 1974. p. 71-105.
2. **Barron K D.** Axon reaction and central nervous system regeneration. (Seil F J, ed.) *Nerve, organ and tissue regeneration*. New York: Academic Press, 1983. p. 3-36.
3. **Grafstein B.** Chromatolysis reconsidered: a new view of the reaction of the nerve cell body to axon injury. *Ibid.* p. 37-50.

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