incubated in the presence of $2\times10^{-2}M$ $NaIO_4$, $0.005M$ phosphate buffer pH 6.8 and 2 mg of tetrasodium EDTA in a volume of 9 ml for 1 h at 37 °C. Following this, 1 ml of $0.025M$ glucose was added and the mixture reincubated at 37 °C for 1 h to destroy the excess periodate. This solution was then dialyzed as solutions A and B. In some experiments the test solutions were preincubated with pronase and trypsin to insure the removal of trace amounts of protein. The proteases were subsequently destroyed by heating at 100 °C, a procedure which has no effect on the integrity of the polysaccharide. 1 ml of all of the test solutions was then incubated with 1 ml of ascites fluid at 37 °C for 30 min. 1 ml portions of these mixtures were then injected into the various groups of animals. The animals not receiving seminal plasma were injected with ascites fluid preincubated with saline.

Results and discussion. The Table shows that transplantation of the Novikoff ascites hepatoma was totally inhibited if the ascites cells were preincubated with a deproteinized and nucleic acid-free, dialyzed extract of seminal plasma. In these experiments, a 1:200 dilution of seminal plasma was employed as described in the section on methods. In further studies, it was also possible to completely inhibit the transplantation of the tumor by a 1:500 dilution of the seminal plasma in ascites fluid. A 1:1000 dilution resulted in a slower growing hepatoma in which the survival time of the rats (3 subjects) increased from 9–10 days to 33–35 days. Rats administered a 1:2500 dilution of the seminal plasma survived for 15–20 days. A 1:5000 dilution had no effect on the viability of the tumor or the survival time of the rats. It may be inferred from this data, and the fact that periodate oxidation destroyed the inhibitory effect of the seminal plasma, that the antitransplantation factor is a polysaccharide(s). The polysaccharide may function in vivo by penetrating the ascites cells and reacting chemically with the cellular RNA as demonstrated in vitro[2,3]. Another possibility is that the polysaccharide may bind to the ascites cell membranes to prevent multiplication of the cells in the host animals. Rats injected with ascites fluid preincubated with untreated seminal plasma survived 2.5 times longer (20 to 27 days) than rats injected with just ascites fluid (9–10 days). However, on autopsy, there was no evidence of any tumorous ascites cells in the animals injected with ascites cells plus seminal plasma. The demise of these animals, and of animals treated with untreated seminal plasma alone (20–25 days) may have been due to the toxic effects of substances which were excluded by precipitation with trichloroacetic acid.

Survival time of rats injected with Novikoff ascites cells preincubated with various preparations of bull semen seminal plasma

Animal No.	Addition to ascites fluid[a]	Presence of ascites hepatoma cells[b]	Days of survival[c]
1	None	+	9
2	None	+	9
3	None	+	10
4	Seminal plasma	—	20
5	Seminal plasma	—	23
6	Seminal plasma	—	27
7	TCA treated seminal plasma	—	>42
8	TCA treated seminal plasma	—	>42
9	TCA treated seminal plasma	—	>42
10	Periodate and TCA treated seminal plasma	+	8
11	Periodate and TCA treated seminal plasma	+	12
12	Periodate and TCA treated seminal plasma	+	12

[a] TCA is the abbreviation for trichloroacetic acid. [b] (+) signifies the presence of ascites hepatoma cells. (—) signifies the absence of the cancer cells. [c] The experiment was of 42 days' duration were the results were communicated.

Once the transplantation of the ascites cells was completed, it was not possible to inhibit the growth of the tumor, or to increase the survival time of the rats with injections of seminal plasma extracts. Various concentrations of the extract at different times after the transplantation were tried without success. In these cases, the polysaccharide preparation may have been diluted out in the whole animal, or there was a lack of sufficient contact between the ascites cells and the inhibitory substance. Also, the animals may have a metabolic mechanism to inactivate the polysaccharide.

It would be of interest to isolate and purify the antitransplantation factor and test its potential in more concentrated amounts as an antitumor agent on different types of tumors of both chemical and viral etiology. A number of neutral polysaccharides have been described which possess antitumor properties[4].

Resumen. Un extracto desproteinizado preparado a partir de plasma seminal de toro, inhibió completamente la transplantación del hepatoma ascítico de Novikoff de rápido crecimiento. Se sugiere a partir de los experimentos realizados que el factor activo antitransplantación es un polisacárido.

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[4] G. CHIHARA, Y. MAEDA, J. HAMURO, T. SASAKI and F. FUKUOKA, Nature, Lond. *222*, 687 (1969).

Neuron in the Gracile Nucleus with Myelinated Axon Hillock

The initial axon segment and the axon hillock is the part of the multipolar nerve cell, where the action potential is thought to originate[1]. It has been recognized and described ultrastructurally[2]. The studies have shown the same basic structural features: After the transition of the cell body to the axon proper known as the axon hillock the unmyelinated axon known as the initial axon segment starts. The last part of the hillock and the initial axon segment are characterized by an irregular undercoating on the cytoplasmic side. The axon hillock but usually not the initial axon segment is contacted by boutons.

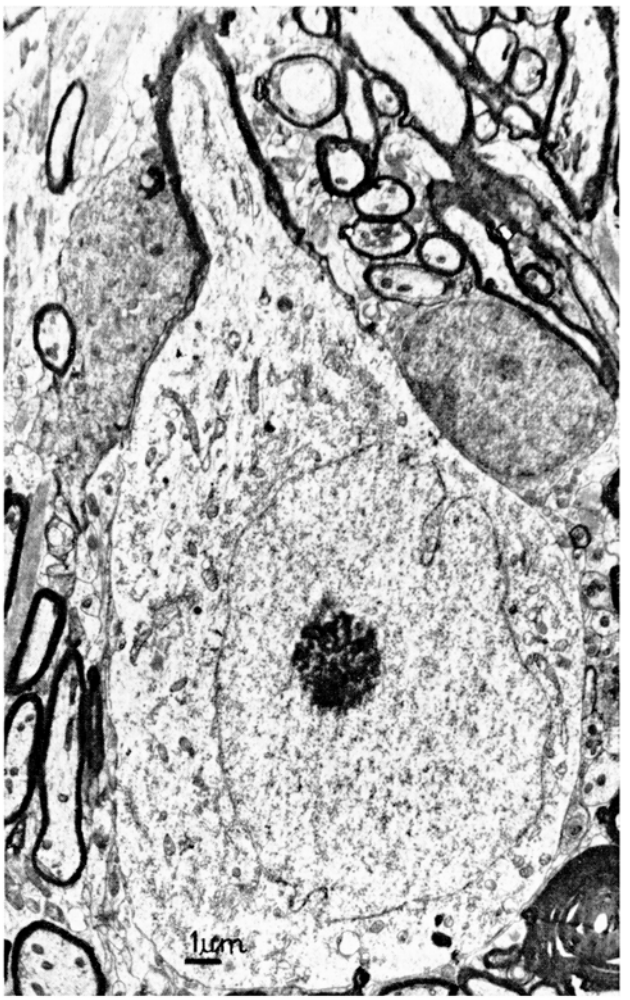

Fig. 1. Nerve cell from the middle part of the gracile nucleus in a cat perfused with a mixture of aldehyde. The axon projects from cell at upper left and the axon hillock is myelinated. ×4800.

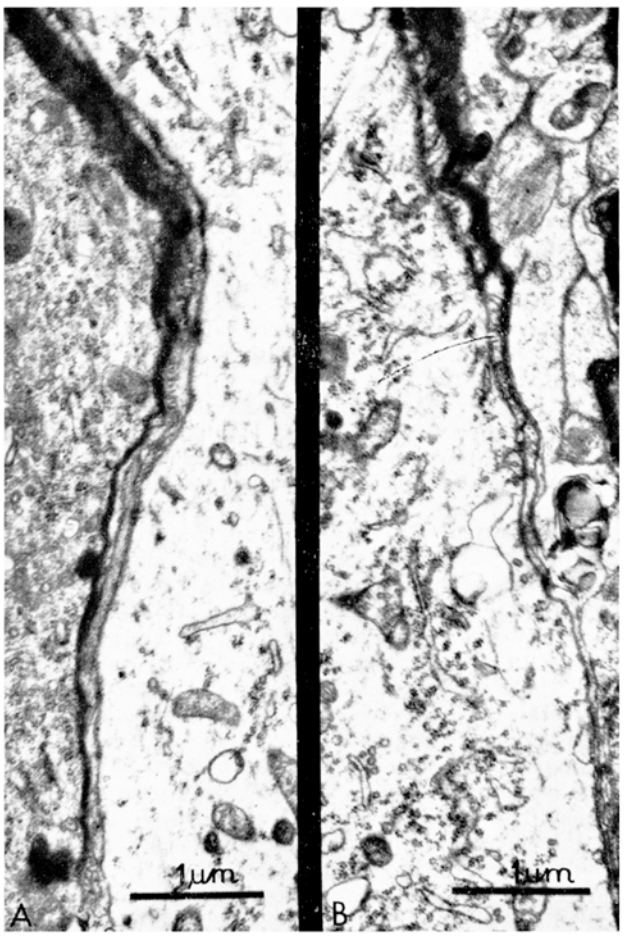

Fig. 2. A) Shows the left part of the axon hillock and B) the right part. The beginning of the myelin sheath is seen in higher magnification. To the left the dense cytoplasm of an oligodendrocyte. ×17,500.

In a study[3] on the gracile nucleus in cats both in normal conditions and after different kinds of deafferentations we found one neuron (Figure 1) lacking the initial unmyelinated axon segment. Instead the myelin sheath started on the axon hillock (Figure 2). The nerve cell which was situated in the nucleus 6–8 mm below obex had a mean diameter in the nucleolar plane of 15 µm and a proportionally large cell nucleus. Investigation of serial sections revealed a very low bouton covering on the cell body. The proximal part of the 2 µm thick myelinated axon contained mitochondria, neurotubuli, ribosomes and small parts of the endoplasmic reticulum. No irregular undercoating of the same type as has been described before was found on the cell membrane proximal to the myelin sheath.

The findings described in the present report should be of certain neurophysiological interest as an action potential is commonly believed to arise in the initial, unmyelinated segment.

The function of this type of nerve cell remains obscure but it is interesting to note that the cell described in the present report is similar to the small cells in the lateral cervical nucleus which seem to be internuncial neurons[4].

Zusammenfassung. Die Ultrastruktur des unmyelinisierten Initialsegments des Ursprungskegels von Achsenzylindern ist bekannt. Im Gegensatz dazu wurde im Nucleus gracilis ein kleines Neuron gefunden, dessen Achsenzylinder kein unmyelinisiertes Initialsegment aufweist: die Myelinscheide beginnt schon auf dem Ursprungskegel und es wird auf die neurophysiologischen Gesichtspunkte, die sich aus diesen Fakten ergeben, hingewiesen.

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[1] J. S. Coombs, D. R. Curtis and J. C. Eccles, J. Physiol., Lond. *139*, 232 (1957). – C. A. Terzuolo and T. Araki, Ann. N. Y. Acad. Sci. *94*, 547 (1961).

[2] S. Conradi, Acta Soc. Med. upsal. *71*, 281 (1966). – S. L. Palay, C. Sotelo, A. Peters and P. M. Orkand, J. Cell. Biol. *38*, 193 (1968).

[3] A. Blomqvist and J. Westman, Acta Soc. Med. upsal. *75*, (1970).

[4] J. Westman, Z. Zellforsch. *115*, 377 (1971).