



Mitochondrion in a rhesus hepatocyte is partially surrounded by a profile of rough endoplasmic reticulum. The membranes of the reticulum which terminates in a bulbous sac appear to be continuous with the outer mitochondrial membranes (arrow).  $\times 92,000$ .

endoplasmic reticulum<sup>11</sup> and then transported to their site of activity, the mitochondrion.

Juxtaposition of the membranes of rough endoplasmic reticulum and mitochondria lends itself to transport of materials between these organelles. This may take the form of active transport of molecules out of the reticulum, diffusion across the cytoplasmic gap, and then active absorption of the protein into the mitochondrion.

We are presenting evidence suggesting the existence of a direct connection between rough endoplasmic reticulum and mitochondria in rhesus hepatocytes. In this instance it may be pathologic alteration in an irradiated cell, although the data can hardly be interpreted as suggesting that the connection is secondary to the irradiation. It is also possible that the connection may be a transient one or one which usually does not survive current methods of fixation.

*Zusammenfassung.* Es wird der Zusammenhang von endoplasmatischem Retikulum und Mitochondrien in der Leber bestrahlter Rhesusaffen ermittelt.

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<sup>11</sup> P. SIEKEVITZ and G. E. PALADE, *J. biophys. biochem. Cytol.* 7, 619 (1960).

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## A Method for Osseal Radiomicrometric Measurements in Mice Experiments

In an earlier publication, we described a severe bone atrophy in mice, resulting from wasting syndrome following neonatal thymectomy<sup>1-3</sup>.

The purpose of this present communication is to discover how to measure radiologically this osseal atrophy on X-ray photographic sheets in mice experiments.

*Materials and methods.* Experiments were performed on inbred C3H mice. The animals were thymectomized within the first 24 h after delivery. The control litter mates were sham-operated. Evidence of wasting syndrome, other than the clinical symptoms, was characterized by the decline in body weight and the decrease of the peripheral lymphocyte counts (Figure 1).

Radiographs of 10-10 animals with wasting syndrome and 10-10 control mice were taken during the 3rd and 6th-7th postoperative weeks respectively. After the radiographs, the animals were sacrificed and dissected. Successful thymectomy and atrophy of the spleen were confirmed macroscopically and by histology as prior. Finest granulated X-ray photographic sheets were used for the radiographs with high sensitivity (Firm of Ferrania) and a Hungarian X-ray set, Diagnostomax-125 (Firm of Medicor). The radiograms were done simultaneously, with the same exposure time, with the controls and operated animals, in a reversed froglike position.

The evaluation of the complete radiograms were made by microscope with an ocularmicrometer. The length of femora was measured on the sheets, then the diameters

and the sum of the thicknesses of the 'medial' and 'lateral' cortices of the midshaft at the thickest point at the same level. The linea aspera of femoral shaft may rarely cause a faint shadow in microscopic magnification, but the distinction of this from the midshaft corticalis can be made without any difficulty.

*Results and discussion.* The measured values are presented on the Figures. A great difference may be seen in the femoral length between the control and operated animals. The femora of the operated animals is shortened proportionally in both postoperative ages and the percentile longitudinal retardation is almost the same. The femoral diameters decreased in equal rate in both groups of operated animals. Among the alterations measured, the most striking and remarkable changes are seen in the decrease of the corticalis thicknesses of the femoral midshaft in the wasted animals, during the 3rd and the 6th-7th postoperative weeks.

<sup>1</sup> L. BEREK, Zs. BÁNOS, I. SZERI, P. ANDERLIK and K. ASZÓDI, *Experientia* 24, 721 (1968).

<sup>2</sup> L. BEREK, Zs. BÁNOS, I. SZERI, P. ANDERLIK and K. ASZÓDI, *Kisér. Orvostud.* 20, 240 (1968).

<sup>3</sup> L. BEREK, Zs. BÁNOS, I. SZERI, P. ANDERLIK, K. ASZÓDI and K. GEFFERTH, *Immunologische Beziehungen von Knochenveränderungen der Säuglingsatrophien im immundepressiven Modellversuch.* Magyar Pédiaiter, 1968. Kongress-Nummer, p. 46.

Together with these measured values an osseal retardation may be seen röntgenologically in the wasted animals, from the 3rd weeks after neonatal thymectomy. But röntgenologically the most severe changes seem to be the decrease of the corticalis thickness and the loss of the bone minerals. These phenomena represent a severe bone atrophy.

Our histological findings may be summarized as follows: in the distal epiphyses of femora there are only 2–3 irregular, very thin fragments of osseal trabeculae. The epiphyseal plate shows minimal or no signs of ossification. An extreme sparseness of osseal trabeculae in the metaphyses may also be seen. The hyalin pillars remain cartilaginous. All diaphyseal cortices are strikingly thin.

The röntgenological measurements were in close relationship with the histological findings and with this serious clinical condition of the wasting syndrome. The combination of the röntgenological and the micrometric methods represent a useful method for the more exact estimation of the differences of the osseal changes on

X-ray sheets in mice experiments than the visual means allow.

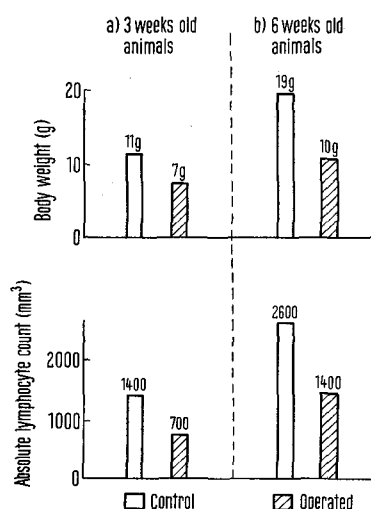


Fig. 1. The average of the body weight and lymphocyte counts of neonatally thymectomized and sham-operated mice.

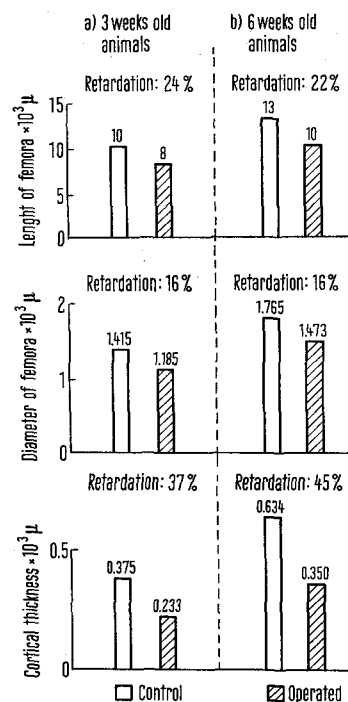


Fig. 2. The average length, diameter and cortical thickness of femora in the wasted and sham-operated animals.

**Zusammenfassung.** Verbesserte röntgenologische Messmethode zur Bestimmung von Knochenatrophien bei unmittelbar nach der Geburt thymektomierten, vom «wasting»-Syndrom befallenen Mäusen.

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## Light and Electron Microscopic Evidence of Complex Synapses (Glomeruli) in Oliva Inferior (Cat)

Previous histological<sup>1–5</sup> and electron microscopic<sup>6–8</sup> studies on the nucleus olivaris inferior of the cat do not mention the existence of complex synapses (glomeruli)<sup>9</sup>.

As described previously by one of us<sup>10</sup>, the Nauta impregnation, modified for staining mitochondria<sup>11</sup> reveals typical aggregates between the neuronal perikarya, which characterize the neuropil of the nucleus olivaris inferior (Figure 1). Using RASMUSSEN's method<sup>12</sup>, which partly suppresses staining of individual mitochondria, similar results may be obtained (Figure 2).

**Topographically** these argyrophilic aggregates are present in all parts of olivary complex, being best distinguished in both lamellae of principal olive, especially in the parafloccular area. On the other hand, the neuropil of the lateral part of dorsal accessory olive appears denser and more homogenous.

Described structures of accumulated mitochondria, being similarly sized and distributed, seem to correspond

<sup>1</sup> S. RAMÓN Y CAJAL, *Histologie du Système Nerveux de l'homme et des Vertébrés* (A. Maloine, Paris 1909).

<sup>2</sup> TH. BLACKSTAD, A. BRODAL and F. WALBERG, *Acta Anat.* 11, 461 (1951).

<sup>3</sup> M. E. SCHEIBEL and A. B. SCHEIBEL, *J. comp. Neurol.* 102, 77 (1955).

<sup>4</sup> M. E. SCHEIBEL, A. B. SCHEIBEL, F. WALBERG and A. BRODAL, *J. comp. Neurol.* 106, 21 (1956).

<sup>5</sup> F. WALBERG, *J. comp. Neurol.* 114, 79 (1960).

<sup>6</sup> F. WALBERG, *J. comp. Neurol.* 120, 1 (1963).

<sup>7</sup> F. WALBERG, *J. comp. Neurol.* 122, 113 (1964).

<sup>8</sup> F. WALBERG, *Progr. Brain Res.* 6, 59 (1964).

<sup>9</sup> J. SZENTÁGOTAI, in *Aus der Werkstatt der Anatomen* (G. Thieme Verlag, Stuttgart 1965), p. 147.

<sup>10</sup> ST. NĚMEČEK, *Sborn. věd. prací Lék. fak. KU in Hradec Králové* (Suppl.) 9, 79 (1966).

<sup>11</sup> ST. NĚMEČEK, *Sborn. věd. prací Lék. fak. KU in Hradec Králové* (Suppl.) 9, 71 (1966).

<sup>12</sup> G. L. RASMUSSEN, in *New Research Techniques of Neuroanatomy* (Ed. W. F. WINDLE; C. Thomas, Illinois, USA 1957), p. 27.