Influence of impure and purified ara-ATP and ara-CTP on different RNA polymerases. For kinetic studies to determine the Michaelis constants, concentrations of the labelled triphosphate in the range between 1.6 and 15 μM were added to the assays. The inhibitor constants were calculated[11] using 2 different normal substrate concentrations.

Enzyme	Source of the enzyme	Michaelis constant (μM)		Inhibitor constant (μM)			
		ATP	CTP	Impure ara-ATP	Purified ara-ATP	Impure ara-CTP	Purified ara-CTP
DNA-dependent	Quail oviduct	3.4±0.7	2.6±0.7	64.6±10.3	no inhibition	21.3±7.1	no inhibition
RNA polymerase II	RSV-induced sarcoma	5.1±0.9	4.9±0.8	74.0±12.1	no inhibition	35.8±7.5	no inhibition
DNA-dependent RNA polymerase	*E. coli*	8.7±1.3	2.1±0.6	93.7±14.8	no inhibition	27.3±7.6	no inhibition

each of the unlabelled ribonucleoside triphosphates and varying amounts of [^{3}H] CTP (150 cpm/pmol) in the case of the ara-CTP studies and [^{3}H] ATP (250 cpm/pmol) (The Radiochemical Centre, Amersham) in the case of the ara-ATP studies, 100 µg native herring sperm DNA/ml and 20 µl enzyme preparation. The mixture was incubated for 20 min at 37 °C; the acid-insoluble radioactivity was collected on GF/C filters as described[10].

The sensitivity of the different RNA polymerases toward impure and purified ara-ATP and ara-CTP was determined, and the results are summarized in the table. It was found that, if impure ara-ATP or ara-CTP is used, the different enzymes are inhibited; the inhibition is of the competitive type. However, if purified ara-ATP or ara-CTP is used in the enzyme assays, no inhibition is observed. The reason for this would appear to be in the contaminations present in the purchased material. This conclusion can be seen in an example of the 'ara-ATP inhibition' of oviduct RNA polymerase II as follows: Using the equation $V = V_{\max}: \left[1 + \frac{K_m}{S}(1 + \frac{i}{K_i})\right]$[12] and taking $V_{\max} = 100\%$, $K_m = 3.4$ μM, $S = 5$ μM, $K_i = 64.6$ μM and $i = 30$ μM ATP (as impurity in 83 μM 'ara-ATP') and calculating V, a value of 50% is obtained; this means that the ATP contamination in the ara-ATP preparation provokes a 50% inhibition.

Thus, at present, we see no experimental evidence for an inhibition of RNA polymerases by ara-CTP or ara-ATP.

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Intracisternal A Type Particles of the Extraocular Muscle of Hereditary Muscular Dystrophy Mouse

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Summary. Intracisternal A type virus (IA) particles were observed in the extraocular muscle fiber of hereditary muscular dystrophy mouse. The particles appeared approximately 65–75 mµ in diameter, with electron lucent cores.

Recent studies on the cytoplasm of normal and neoplastic tissue in various strains of mice, such as C3H, BALB/c, C57BL, PBR and their hybrids, have reported the ultrastructural observation of IA particles and also include an unique description of the presence of the IA particle in skeletal muscle tissue of the normal BALB/c mouse[1]. In skeletal or extraocular muscle tissue of the hereditary muscular dystrophy (HDM) mouse, however, electron microscopic investigations have not confirmed the presence of this particle[2,3]. This paper reports the initial finding of the IA particle in the extraocular muscle of the HMD mouse.

HMD mice of the C57BL/j-dy (dy-dy homotype) strains were originally obtained from the Jackson Institute, Maine, USA. Dr. H. Matushita of the Department of Physiology, Wakayama Medical College, kindly provided two mice of this strain for the experiment. This strain of mouse develops a disorder of the fine structure of muscle similar to progressive muscular dystrophy seen in humans[2,4]. The two of HDM mice were 12 weeks of age, male and weighed 12.5 and 13.0 g, respectively. The tibialis anterior, intercostalis, diaphragm and extraocular

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(rectus ocular) muscles were selected. Fresh samples were fixed in 0.1 *M* cacodyrate buffered 2% OsO_4 at pH 7.4 for 1 h. Samples were then dehydrated in a graded ethanol series and embedded in Epoxy resin. Ultrathin sections were double stained with uranyl acetate and lead citrate and examined in a HU-11A electron microscope.

The IA particles were detected in both normal and pathological muscle fibers in extraocular muscles of the experimental animals but not in the other muscles of this study. IA particles of the extraocular muscle were most numerous in the pathological fibers. In a portion of pathological fiber of extraocular muscle (Figure 1), many IA particles can be seen in single form with a relative scarcity of sarcoplasmic reticulum, and cluster formation is rarely seen. In Figure 2, a portion of normal extraocular muscle fiber structure also shows the IA particle. The IA particles ranged from 65 to 75 mμ in size with electron lucent cores. Such IA particles of this study show morphological similarities to a particle in normal skeletal muscle tissue of BALB/c mouse reported by WIVEL and SMITH[1]. The unique distribution of a single particle within the intramitochondrial space is seen in Figure 1. Although light-cored dense particles in mitochondria of a patient with skeletal and myocardial muscle disease were described, and it was assumed that the appearance of light-cored particles related to calcium accumulation in the diseased muscle[5], the IA particle in this study shows no morphological similarity to those of the light-cored particle which are observed to be numerous in mitochondria in the diseased fibers. First reported by YASUZUMI and HIGASHIZAWA[6] and by FRIEDLANDER and MORE[7] in Ehrlich mouse ascites tumor cells, the IA particle has since been detected in most tissues and cells

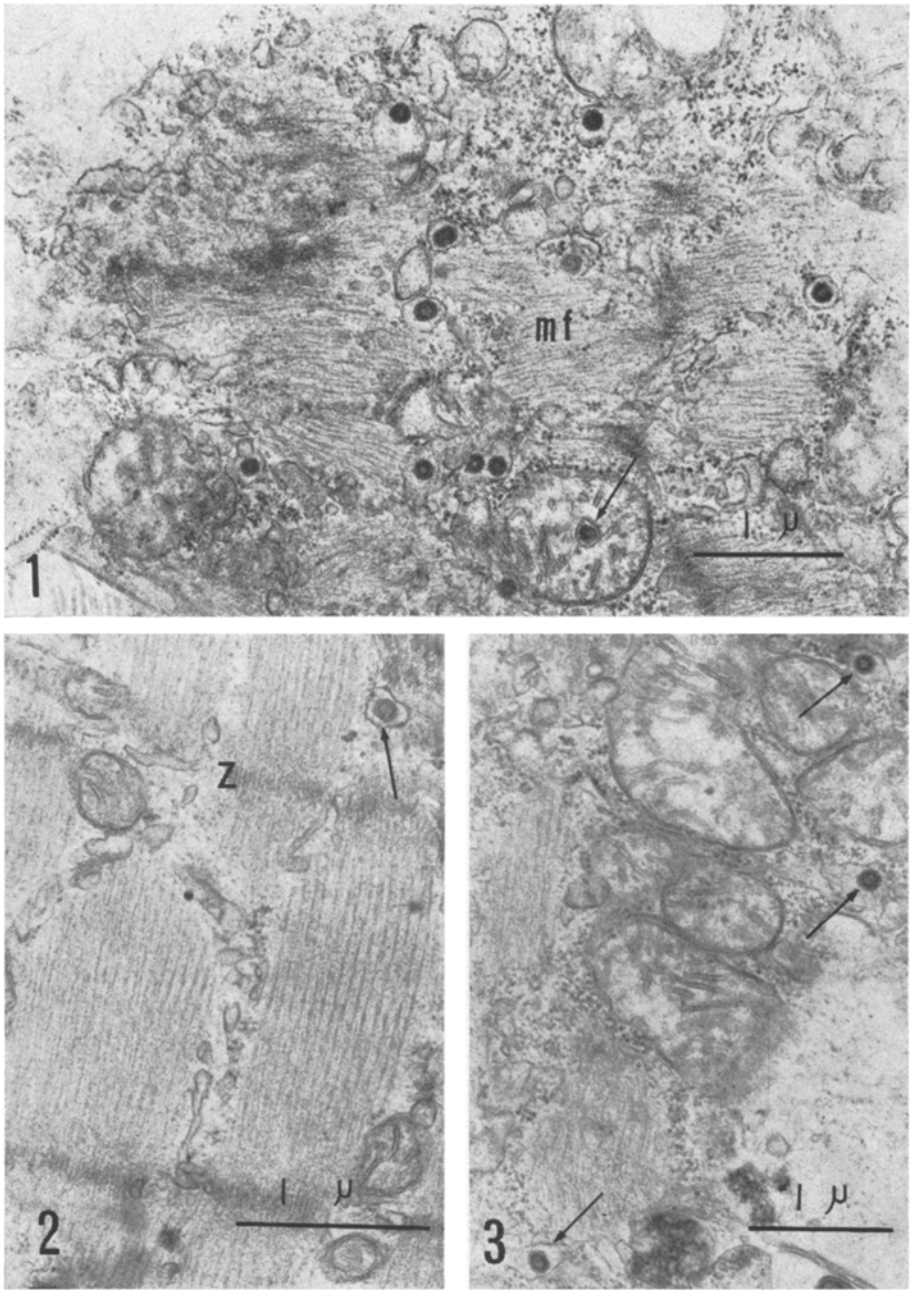

Fig. 1. Rectus ocular muscle. Numerous IA particles are seen in sarcoplasmic reticulum. Arrow shows the IA particle in intramitochondrial space. Myofilament (mf). × 23,000.

Fig. 2. Rectus ocular muscle. This fiber preserves normal fine structure. Arrow shows IA particle. Z band (Z). × 30,000.

Fig. 3. Rectus ocular muscle of the other mouse. Arrows show IA particles. × 22,000.

of various strains of mice. With the exception of the one report of the IA particle in normal BALB/c mouse skeletal muscle tissue[1], investigations to date have not confirmed the presence such a particle in other normal skeletal and extraocular muscles or diseased muscles. PERK et al.[8] described IA particles in myoblasts of murine rabdomyosarcoma transplanted from bat to the BALB/c mouse, and suggested that possibly this type of tumor was not transplantable in the C57BL mouse. Although the appearance of IA particles in the HMD mouse may casually result from the virus infection from other source, the appearance of IA particles in pathological fibers of the two HMD mice emphasizes the need to confirm a possible involvement of the IA particle in the development of muscular dystrophy in the HMD mouse.

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Cilia in Human Fetal Schwann Cells[1]

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Summary. Cilia are present in Schwann cells during myelinogenesis which suggest that these cells could migrate by ciliary movement.

The presence of cilia in Schwann cells has been previously reported in the autonomic nervous system of the adult rat[3], and in cultures of dorsal root ganglia from fetal rats[4]. This report concerns the presence of cilia in Schwann cells during myelinogenesis in the human fetal sciatic nerve. It had been suggested that Schwann cells migrate by amoeboid movement during myelinogenesis[5–7]. However, the present observations suggest that Schwann cells may also migrate by ciliary movement.

Materials and methods. The 7 fetuses studied here ranged from 7–210 mm crown-rump length, or 11–23 weeks estimated fetal age[8]. These specimens were obtained from therapeutic abortions performed for psychiatric reasons. All appeared to be normal for their size and age.

Specimen No.	Crown-rump measurement (mm)	Crown-heel measurement (mm)	Weight (g)	Estimated age (weeks)
DF 156	70	10	36	11
DF 174	100	140	65	13
DF 172	110	150	103	14
DF 150	140	200	148	16
DF 152	150	210	160	17
DF 120	160	250	303	18
DF 122	210	330	357	23

The fetal sciatic nerves were fixed in 2% gluteraldehyde (4 °C) buffered with 0.1 *M* sodium cacodylate for 1 h, washed in the buffer alone for 1 h, fixed in 1% osmic acid buffered with 0.1 veronal acetate for 30 min, and then washed in this buffer for 1 h. Tissue specimens taken at different points of the nerves were dehydrated in graded alcohols, and embedded in Epon 812. The sections were stained with 1% alcoholic uranyl acetate for 5 min, followed by 1% aqueous lead citrate for 10 min, and examined with an RCA EMU 4.

Observations. Cilia, with 9 evenly-spaced triplet tubules, 1 or 2 axial tubules, and centrioles (paired, hollow cylinders whose walls also consist of 9 evenly-spaced triplet tubules (Figures a and b)), were present in the cytoplasm of Schwann cells of myelinated and unmyelinated nerve fibres of the sciatic nerves of 14–23 week fetuses. Centrioles were present, but cilia were not seen in the sciatic nerves of the 11 and 13 week fetuses. Centrioles were more commonly seen than cilia. Only one cilia/cell was the rule. In some Schwann cells (Figures a and b), a centriole was the basal body of the cilium[9]. When the statistics from tissue and grid samplings, and thin sectioning are taken into account, the probability of finding isolated structures, i.e., cilia or centrioles in the cytoplasm of Schwann cells is small.

GRILLO and PALAY[3], reported that the cilia in Schwann cells of the autonomic nervous system of the adult rat consisted of 9 double-fibres, arrayed peripherally in a circle about a cylindrical axial structure. They suggested that this type of cilia could have resulted from arrested development, or could have served a specialized role such as sensory function or motility. BUNGE et al.[4] described as a cilia what appeared to be a 9 triplet tubule arranged concentrically as a cylinder. They showed a large, central vesicle inside the cilia cylinder, similar to that described by GRILLO and PALAY. These findings differed with those reported by GRILLO and PALAY, and BUNGE on the following 2 points: 1. There were 2 axial tubules present in the cilia of the Schwann cells, and 2. cilia were present in Schwann cells associated with myelinated fibres.

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