

# Drumsticks in the Leucocytes of Primates

In the course of the search for structures corresponding to the Barr body in various tissues, DAVIDSON et al.<sup>1</sup> observed in polymorphonucleated neutrophil leucocytes of woman a peculiar appendix which they called 'drumstick'; MITTWOCH<sup>2</sup> has recently analysed the frequency of this structure in normal women.

The relationship of this structure with sex chromatin has not been established as yet, although it has been demonstrated in the female sex only.

The presence of drumstick in female primate leucocytes has been demonstrated so far only in *Oedipomidas oedipus* (BEATH et al.<sup>3</sup>).

The leucocytes of some species of primates have been investigated and the following preliminary results have

been reached: (1) the drumstick is present only in the female individuals; (2) the relative frequencies of the structure is about the same as that observed in man (see Table); (3) the drumstick morphology (see Figure) varies within the different species (especially in the way of attachment to the nucleus); this variability appears at present not to be higher than that observed in man (KOSENOW<sup>4</sup>)<sup>5</sup>.

Drumstick in primate leucocytes

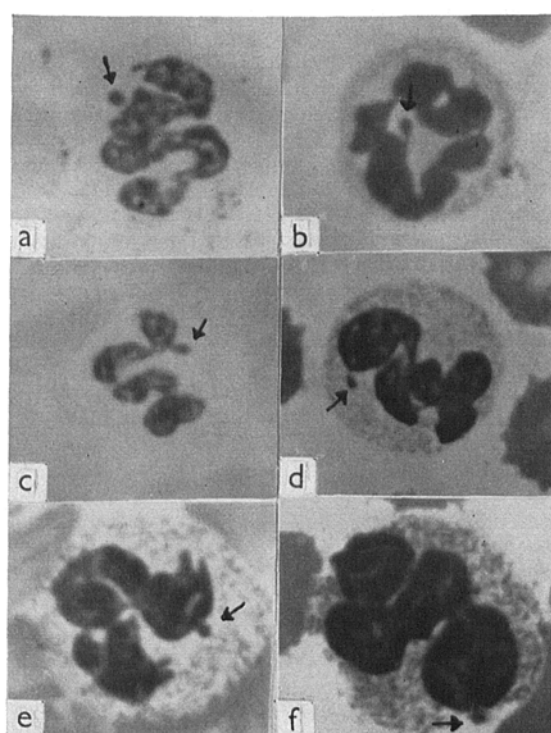
Species (♀)	No. of animals studied	%	References
<i>Lemur fulvus</i>	1	2.0 <sup>a</sup>	Present data
<i>Hapalemur griseus</i>	1	2.9 <sup>a</sup>	" "
<i>Ateles aracnoides</i>	1	2.3 <sup>a</sup>	" "
<i>Oedipomidas oedipus</i>	7	2.0	BEATH et al. <sup>3</sup>
<i>Cebus apella</i>	1	3.4 <sup>a</sup>	Present data
<i>Macaca irus</i>	1	2.01 <sup>a</sup>	" "
<i>Macaca mulatta</i>	1	1.6 <sup>a</sup>	" "
<i>Macaca nemestrina</i>	1	2.3 <sup>a</sup>	" "
<i>Papio hamadryas</i>	1	2.0 <sup>a</sup>	" "
<i>Papio leucophaeus</i>	1	2.0 <sup>a</sup>	" "
<i>Cercopithecus monas</i>	1	2.6 <sup>a</sup>	" "
<i>Pongo pygmaeus</i>	1	3.0 <sup>a</sup>	" "
<i>Homo sapiens</i>	12	3.66 (1.58-7.21)	MITTWOCH <sup>2</sup>

<sup>a</sup> Percentages have been based on observations of 500 nuclei.

**Riassunto.** La frequenza del «drumstick» nei nuclei dei leucociti polimorfonucleati di diverse specie di Primati è stato riscontrato pressochè simile a quella dell'Uomo.

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Microphotograph of female monkey leucocytes ( $\times 1000$ ). a, *Cebus apella*, b, *Cercopithecus mona*, c, *Papio leucophaeus*, d, *Papio hamadryas*, e and f, *Macaca irus*.

# Rate of Depletion of Noradrenaline in some Peripheral Tissues Induced by a Reserpine Injection<sup>1</sup>

Reserpine depletes the monoamine stores in the nervous system<sup>2</sup>. In the brain, some systems of synaptic terminals containing noradrenaline (NA) are affected rapidly, while others are depleted only 6 to 8 h after the administration of the drug<sup>3</sup>. With the use of a histochemical fluorescence reaction<sup>4,5</sup>, it has now been found that in the peripheral tissues still more marked differences in respect to the

time course of the depletion of the transmitter substances may exist.

Seven groups of rabbits (each with 3 animals) were given a single i.v. injection of reserpine and killed after various periods of time through air embolism (doses and times are found in the Tables). Tissue pieces (uterine horn, oviduct, ovary, kidney, submandibular gland, skin) were treated mainly according to the technique of FALCK<sup>5</sup>. During the histochemical treatment, the NA stored in the adrenergic nerves is converted to a strongly fluorescent 3,4-dihydroisoquinoline<sup>4</sup>. On account of this,

<sup>1</sup> W. M. DAVIDSON and D. R. SMITH, Brit. Med. J. 2, 6 (1954).

<sup>2</sup> U. MITTWOCH, Nature 201, 317 (1964).

<sup>3</sup> M. M. BEATH and K. BENIRSCHKE, Cytologia 27, 1 (1961).

<sup>4</sup> W. KOSENOW, Triangolo 2, 309 (1956).

<sup>5</sup> The technical cooperation of Miss P. MONACI and Mr. V. PUEL has been very valuable. - The present research was partially carried out under a grant from the Italian National Council of Research (n.7854/F).

the adrenergic terminals show an intense fluorescence and can be easily studied everywhere in the tissues. Depletion experiments in this laboratory have shown that the sensitivity of the method is so high that the transmitter can be demonstrated even after a reduction of more than 80%<sup>6</sup>.

Experiments with different doses (Table I) showed that the fluorescence of the adrenergic nerves had disappeared completely 24 h after the injection of 1 and 5 mg/kg, and was markedly reduced at the dose level of 0.2 mg/kg. The highest dose was then used to examine the time course of the NA depletion. As seen in Table II, the uterine nerves were quite exceptional. They still contained a demonstrable – although reduced – NA content at 12 h, while no transmitter could be observed at 4 h in the other tissues examined.

A possible species specificity was tested by examining the uterus and the submandibular gland in different animals 4 h after a reserpine injection. Four untreated controls and 4 injected animals of each of the following species were used. The animals and doses used were: mouse, 25 mg/kg; rat, 10 mg/kg; hamster, 10 mg/kg; and guinea-pig 20 mg/kg. Among these animals only the uteri of guinea-pigs showed a weak fluorescence after the reserpine injection.

Table I. Influence of dose of reserpine on noradrenaline depletion in the rabbit, 24 h after the injection

Dose in mg/kg	Noradrenaline in uterine adrenergic nerves
5	0
1	0
0.2	++
0.02	++++

Table II. Influence of time on noradrenaline depletion after reserpine injection, 5 mg/kg rabbit

h after injection	Noradrenaline in adrenergic nerves:	
	Uterus	Other tissues
0	++++	++++
4	++	0
12	+	0
24	0	0

All the uterine nerves, which were found to be almost exclusively vasomotors (confirming unpublished observations by FALCK) seemed to react similarly; the intensity of the fluorescence of the adrenergic nerves decreased but remained 4 and 12 h after the injection of reserpine.

The results show that the adrenergic vasomotors of the rabbit and, possibly, guinea-pig uterus react to reserpine much more slowly than both the vascular and other nerves in several other tissues. The difference might be at least partly explained if the uterine nerves – in contrast to the others – had no or a very low impulse flow during the experiments (FUXE and SEDVALL<sup>6</sup>). A diminished impulse flow, obtained by a decentralization of the left superior cervical ganglion in 2 rabbits, did not prevent the complete depletion of the monoamine in different tissues (skin, tongue, submandibular gland) observed 4 h after the injection of 5 mg/kg. It can thus be concluded that adrenergic terminals with the same general function can differ (at least quantitatively) with respect to basic properties. This is now explored further.

**Zusammenfassung.** Nor-Adrenalin (NA) verschwindet nach einer Reserpininjektion im Uterus des Kaninchens langsamer als in anderen Organen: nach 12 h noch Nachweis von Amin in den vasomotorischen Uterusnerven, nicht aber zum Beispiel in der *Gl. submandibularis*. Tendenz zu gleicher Reaktion zeigt der Uterus des Meerschweinchens, nicht aber der Ratte, der Maus oder des Hamsters. Es wird der Schluss gezogen, dass verschiedene sympathische Nervenendigungen gleicher Aufgabe variierende Grundeigenschaften zeigen.

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Department of Histology, Karolinska Institutet, Stockholm (Sweden), May 8, 1964.

<sup>1</sup> This study was aided by grant NB 02854-04 from the United States Public Health Service.

<sup>2</sup> A. CARLSSON, in *Handbuch der experimentellen Pharmakologie* (Ed., V. ERSFAMER, Springer Verlag, Berlin 1964).

<sup>3</sup> A. CARLSSON, B. FALCK, and N.-Å. HILLARP, *Acta physiol. scand.* 56, Suppl. 196 (1962). – Å. DAHLSTRÖM and K. FUXE, *Acta physiol. scand.*, in press (1964).

<sup>4</sup> B. FALCK, N.-Å. HILLARP, G. THIEME, and A. TORP, *J. Histochem. Cytochem.* 10, 348 (1962). – H. CORRODI and N.-Å. HILLARP, *Helv. chim. Acta* 20, 2425 (1963); in press (1964).

<sup>5</sup> B. FALCK, *Acta physiol. scand.* 56, Suppl. 197 (1962).

<sup>6</sup> K. FUXE and G. SEDVALL, *Acta physiol. scand.*, in press (1964).

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## Reproduction of Irradiated Monkey Kidney Cells: Observations on Fixed Stained Cultures and by Phase Contrast Cinematography

Tissue culture cells are used today largely in the study of the biological effects of radiation. For reasons already expressed in a previous publication<sup>1</sup>, we prefer to use primary monkey kidney cell cultures (*M. rhesus*). In the course of the research mentioned, we have noted that irradiation with X-rays causes the appearance of giant cells which contain one or more micronuclei. We have also

shown how, under the experimental conditions which we adopted and for exposition doses comprising between 300 and 1500 R, the number of cells with micronuclei and the number of micronuclei per cell were proportional to the irradiation dose used. This phenomenon must be included among the modifications that occur in the reproduction of the irradiated cells.

<sup>1</sup> P. VERANI, D. BALDUCCI, and M. CHIOZZOTTO, *Exp. Cell Res.* 32, 333 (1963).