Action of MRF lesions and CPZ administration on ascorbic acid content in adrenals of rats

| | No. of animals | Initial weight (g ± s.e.) | Final weight (g ± s.e.) | Adrenals (mg ± s.e.) | Ascorbic acid content (mg% ± s.e.) |
|---|---|---|---|---|---|
| Control group | 33 | 201 ± 2.2 | 210 ± 3.3 | 40.0 ± 4.5 | 375 ± 9.8 |
| CPZ | 20 | 200 ± 2.0 | 206 ± 3.5 | 49.5 ± 2.4 | 416 ± 13.5[a] |
| MRF lesions | 20 | 222 ± 5.7 | 247 ± 7.8 | 46.0 ± 1.8 | 271 ± 22.0[a] |
| MRF lesion + CPZ | 14 | 219 ± 5.4 | 244 ± 8.2 | 42.0 ± 1.6 | 288 ± 21.8[a] |

s.e., standard error; [a], $P < 0.01$.

influence on adrenal function, although apparently acting in opposite directions.

The changes observed on the ascorbic acid content of the adrenals after the MRF lesions cannot be related to unspecific stress because animals of groups III and IV were sacrificed 30 days after performing the lesions. Further, lesions in other areas of the mesencephalon close to the MRF did not modify the ascorbic acid content of the adrenals, tending to corroborate the role of this area in the control of pituitary ACTH secretion, as had been shown in previous works[2,3].

The fact that CPZ administration during a long period of time was unable to increase the ascorbic acid in adrenals depleted as a result of strictly localized MRF lesions tends to indicate that the action of CPZ on adrenal function is not a direct one but conveyed through MRF inhibition.

*Resumen.* Lesiones de la formación reticulada mesencefálica (FRM) provocan una caída significativa del ácido ascórbico supprarrenal (AAS). La clorpromazine (CPZ) provoca un aumento significativo del AAS. La administración de CPZ a ratas con lesión en FRM es incapaz de restablecer los niveles de AAS.

R. Dominguez[8], J. Monti, E. Balea, O. Maslenikov and E. Puppo

*Laboratory of Neuroendocrinology and Department of Pharmacology, School of Medicine, Montevideo (Uruguay), 11th April 1967.*

[8] Present address: Department of Histology and Embriology, School of Medicine, Montevideo (Uruguay).

## Isotope Scanning of Subdural Effusions in Infancy

Subdural effusion in infancy is infrequent; its diagnosis is, however, important since lack of adequate treatment may cause neurological complications and mental retardation[1]. Subdural effusion may be caused by natal or postnatal trauma[2], meningitis[3,4], diarrhoea[5], malnutrition[6] or excessive CSF-taps[5], or without specific cause[2].

The principal clinical method of detection of subdural effusion is subdural puncture at the extreme lateral angle of the fontanel. Although positive subdural puncture is diagnostic it provides little information on the size, exact location and shape of the effusion, and of its connections, if any, to the contralateral side. Radiological examination, with air injected into the effusion space, provides additional information on the cavity[7]. On the other hand, fluid mixes with fluid more readily than air. Following this principle, investigations were carried out to develop a new method for the determination of the space of subdural effusion, using radioisotopes.

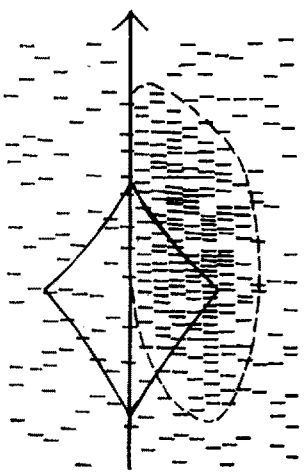

Fig. 1. The scan of the right-side effusion space. 1 $\mu$C $I^{131}$-Hippuran, with subdural puncture 13 ml, 'isotope dilution volume' 39 ml (see text, case 1).

*Method.* The isotope used was $I^{131}$-Hippuran, absorbed from the cerebrospinal fluid and eliminated from the organism definitely more rapidly than radio-iodinated human serum albumin. The dose used, 1–4 $\mu$C, is absolutely safe[8], and considerably smaller than that used in isotope ventriculography[9].

The isotope scanning of subdural effusion was performed as follows. When subdural effusion was suspected,

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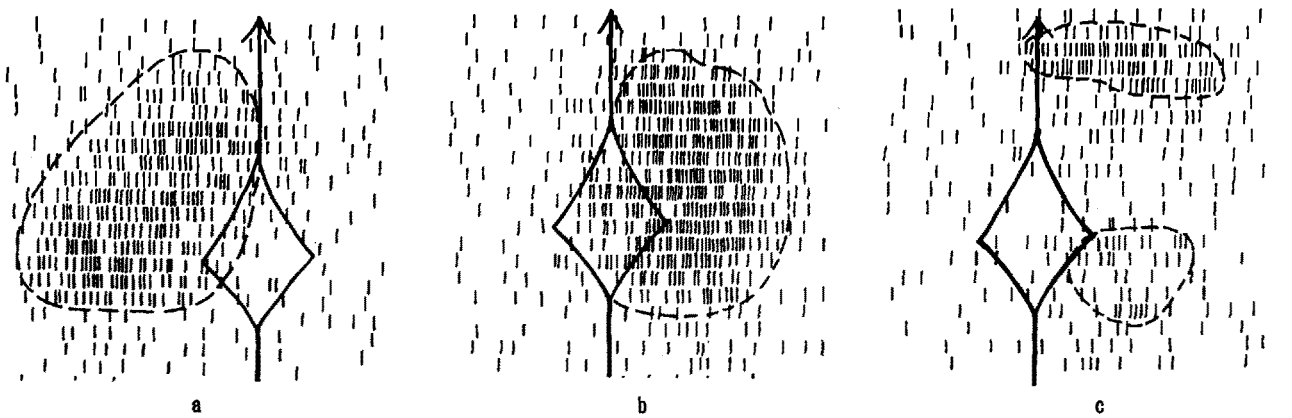


Fig. 2. (a) the scans of the left-side effusion space, 2 $\mu$C $I^{131}$-Hippuran, with subdural puncture 24 ml, 'isotope dilution volume' 71 ml; (b) scans of the right-side effusion space, 2 $\mu$C $I^{131}$-Hippuran, with subdural puncture 8 ml, 'isotope dilution volume' 22 ml. The scan of the right-side (c) after the isotope had been removed by puncture. (See text, case 2).

subdural puncture was performed from the lateral angle of the fontanel, in the normal way. If the puncture was positive, in other words, if yellowish of hemorrhagic effusion fluid dropped from the puncture needle, 2 ml of effusion fluid was removed and 1–4 $\mu$C of $I^{131}$-Hippuran in 2 ml physiological saline injected through the puncture needle into the effusion space. After withdrawal of the needle the dripping of effusion fluid from the puncture hole was prevented by repeated spraying with Nobecutan®. The projection of the effusion space in a horizontal plane through the crown of the head was registered with isotope scanning. Prior to scanning, the positions of the bone margins of sagittal suture and the fontanel were marked on the patient's head, and the corresponding markings were made on effusion scintigram during scanning. The scintigram so obtained shows the sagittal suture and the larger fontanel in life size. After scanning, 10–20 ml of fluid was removed from effusion cavity by another subdural puncture. The radioactivity of the punctate was determined, and the theoretical effusion volume calculated. This volume is not the true volume of effusion space since some of the isotope has evidently been absorbed during scanning in the circulation. Hence the true effusion volume is smaller than the theoretical 'isotope dilution volume'. Two examples are given below.

*Case 1.* Bilateral subdural effusion developed in a girl of 5 months while she was recovering from pneumococcal meningitis. Figure 1 illustrates the scan of the right-side effusion space with the aid of 1 $\mu$C $I^{131}$-Hippuran. Puncture yielded 13 ml effusion fluid. The 'isotope dilution volume' was calculated as 39 ml. Although the girl had a small effusion on the left side also, the scan shows no positive accumulation at the site of the left-side effusion, in other words, the spaces were not connected.

*Case 2.* A boy aged 2 months had bilateral subdural effusion following meningococcal meningitis. Figure 2 shows the scan of (a) the left-side and (b) the right-side effusion space. The cavities were not connected. Figure 2 (c) shows the scan of the right-side effusion after the isotope had been removed by puncture. Two residual cavities are visible.

*Discussion.* Isotope scanning of subdural effusion in infancy provides good information on the exact location, size, shape and possible connections to the contralateral side of the subdural effusion diagnosed. It involves no risk to the patient. When 1 $\mu$C of $I^{131}$-Hippuran is used the dose of irradiation is smaller than that received in roentgenography of the skull. The examination can safely be repeated, which assists the observation of the development of the disease. Effusion scan also provides good information for the surgeon planning exploration or craniotomy.

During the process of preparing this paper, a report was published by MEALEY and CAMPBELL[10], who used 20–30 $\mu$C radio-iodinated human serum albumin for lateral and frontal scans of subdural effusions. The present authors are of the opinion that the horizontal scan with our method is more illustrative.

$I^{131}$-Hippuran can also be injected intrathecally; the isotope subsequently accumulates in the space of subdural effusion to be scanned[9]. In this method the dose of isotope used must be considerably larger, up to 400 $\mu$C[9]. This investigation provides more valuable information than does that of the intraventricular spaces, since the isotope accumulating in the intraventricular space makes it difficult to see the borders of the space in detail during scanning, and the sean gives less detailed information than with the method described above.

The 'isotope dilution volume' gives reasonable information of the volume of the effusion cavity, and re-examination gives good indication of any changes in volume. By re-scanning after the subdural fluid containing $I^{131}$-Hippuran is removed by puncture, any residual cavities that may exist can be detected. By this means, valuable information on the prognosis of the subdural effusion can be obtained in the early phases of the disease. A report will later be published on the experience gained with the method, illustrated by a relatively large series of patients already investigated.

*Zusammenfassung.* Die Methode der Scintigraphie der subduralen Effusion mit dem $I^{131}$-Hippuran wird dargestellt. Bei der Subduralpunktion wird die abgelassene Subduralflüssigkeit durch 1–4 $\mu$C $I^{131}$-Hippuran ersetzt. Mit dieser Isotopenscintigraphie ist es möglich, die horizontale Projektion der subduralen Effusion und die Stellen der sagittalen Naht sowie der grossen Fontanelle in normaler Grösse im Scintigramm zu registrieren.

S. SIMILÄ[11] and O. WASZ-HÖCKERT

*Department of Pediatrics and Isotope Medical Research Laboratory, University of Oulu (Finland),*
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