An Evaluation of Micropaque Barium Sulphate as a Radiographic Marker for Cerebral Abscess

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In 1962 Clarke et al. introduced micropaque barium sulphate, a sterile suspension of barium sulphate, the particles varying in size between 0.5 µ to below 0.1 µ, as a substitute for thorium dioxide in the radiographic marking of cerebral abscesses. They used this material in 8 patients with cerebral abscesses and reported that micobarium was superior to thorium dioxide. They believed that because micobarium was inert chemically it would be a safe material in brain tissue as well as in the ventricular system or subarachnoidal spaces.

The purpose of the present investigation was to determine the reactivity of micropaque barium sulphate in brain tissue, the cerebral ventricles, the subarachnoidal spaces, and in artificially induced cerebral abscesses.

Method

Microbarium was evaluated for reactivity of tissue by introducing it into the parenchyma of the brain in animals intraventricularly and in the subarachnoidal spaces and into artificially made abscesses. These experiments are summarized in Table 1.

**Table 1**

<table>
<thead>
<tr>
<th>Number of animals used in each experiment</th>
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<tr>
<td>Parenchymatous</td>
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<tr>
<td>Intraventricular and subarachnoidal</td>
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<td>Abscess cavity</td>
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 Died at 18–24 hrs. The third dog received 3 separate injections of the material, 0.75 cc. each at 4-day intervals, and was sacrificed 11 days after the initial injection.

Cavity of Cerebral Abscess. Sterile abscesses were created in 4 cats (approximate weight 3 kg.) and 1 monkey (cynomolgus, 4.3 kg. in weight) by the method of Sperl and associates by placing psyllium seeds subcortically. After a 3-week interval the area was re-explored and the cavity was aspirated. An amount of microbarium sulphate just sufficient to fill the cavity (approximately 0.5 cc.) was then introduced.

In the group of cerebral abscesses radiographs of the area were made immediately after the instillation of the barium and at 7 to 10 days later. All animals were then sacrificed and the brains were examined histologically.

Results

Direct Intraparenchymatous Injection. By 3 weeks after the introduction of microbarium sulphate into the brain tissue a prominent zone of macrophages had developed around the foreign material (Fig. 1). Many of the macrophages had ingested the barium and a sharp line of separation was established from the minimally reactive brain. The brain tissue adjacent to the zone of macrophages showed a definite glial reaction (Fig. 2). There was no evidence of migration of the barium-laden macrophages.

Intraventricular and Subarachnoidal Injection. After the introduction of the micro-
FIG. 1. Intraparenchymatous microbarium. (A) Free microbarium. (B) Zone of microbarium-laden macrophages. (C) Minimally reactive brain tissue. (Hematoxylin and eosin, X148)

FIG. 2. Intraparenchymatous microbarium. Higher power view of area marked in Fig. 1. The glial reaction is entrapping the microbarium-laden macrophages. (Phosphotungstic acid hematoxylin, X210)