suggested that the herpes infection during her illness was not primary but a reactivation of a latent virus. The precise association of this herpes simplex infection to her cardiomyopathy is uncertain. As herpes simplex is an "opportunistic" virus it may well have been a secondary manifestation. Moreover, herpes simplex infection has not been found in association with myocardial involvement, either in our own laboratory experience or to my knowledge by other workers. However, it seems possible that primary infection or reactivation of a latent herpes simplex infection during pregnancy may cause cardiomyopathy. This possibility seems worth investigating by serological tests in other cases of cardiomyopathy of pregnancy.

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Infusion of Liver Tumours
Sir,—We read with interest the leading article on infusion of liver tumours (10 August, p. 329), as well as the article by Mr. J. L. Provan and others (10 August, p. 346). We agree that the choice of a method for treating hepatic tumours must be answerable more readily in countries where malignant hepatoma is commoner. . . ." We have now treated 20 patients in this way.

Controlled therapeutic trials on the treatment of primary hepatic tumours in the Bantu have been in progress at the City Deep Mine Hospital in Johannesburg for several years.1-4 One hundred and ninety patients with hepatoma have been studied. Systemic cancer chemotherapy using many well-prepared radiosensitizers, radiotherapy, and chemotherapy plus chemotherapy have been disappointing. There has, however, been extended survival time in all treatment groups as compared with vitamin C-treated randomized controls. One of us (G.F.) treated an additional 183 patients with primary liver cancer with various cytotoxic drugs with equally poor results. Our technique of liver infusion has been based on that of Sullivan and Watkins.5-7 We use the Watkins technique as the first choice in the many available accurate infusion apparatus available. Heath Robbins methods such as suspending a Vacutainer by a hook from the ceiling, besides being dangerous to the air embolism, are a trial to patients, doctors, and nursing staff. Even the Bowman pump is not without danger, and the patient must have an arm and the Perfusion pump is better, since all air can be expelled from the plastic bag when filling it with infusion, and it is light and portable and although rather bulky. But the patient certainly cannot go to work wearing apparatus such as this.

Since surgery has its limitations, hepatic artery infusion is the logical route to try next. An angiogram is a prerequisite. Even with a voided CHA angiogram, and even when the hepatic artery is catheterized selectively, there is a lack of specific regional infusion in the liver. In Bantu patients with malignant hepatoma the liver is hard and friable, and its size obstructs surgical approach to the artery through the lesser omentum. Catheterizing the right gastro-epiploic artery is, however, a simple matter. The right gastric artery is ligated to prevent infusion reaching the stomach. Disulphine blue dye injected through the catheter shows where the infusion will go. Brachial artery and femoral artery catheterization do not provide the essential information. A Teflon catheter can be left in for many months. Many repeat courses of treatment can be given, alternating with sterile water, or the end of the catheter may be occluded and reopened at will, simply by forcible injection of saline in a syringe. Regarding the question of choice of drug, the answer will be forthcoming from careful documentation of all data. At the present time methotrexate given intra-arterially gives the best response in our series. Dosage schedules and duration of treatment must be compared and correlated against results in terms of useful life. From such data the best schedule for adequate trial of therapy for malignant hepatoma can be worked out. The time has passed when a single case report or reports on groups of two or three patients are adequate.—We are, etc.,

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REFERENCES
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Streptomycin and C.S.F. Sugar
Sir,—In the bacterial meningitides the cerebrospinal fluid cell count and sugar concentration are the most useful indices of the effectiveness of therapy. However, Brain8 observed that measurements of C.S.F. sugar were unreliable in tuberculous meningitis treated with streptomycin. This observation was made before the glucose oxidase method for measuring glucose became available. We have investigated therefore the effect of streptomycin on the level of C.S.F. sugar estimated by glucose oxidase and ferricyanide methods. Preliminary experiments showed that in 18 specimens of C.S.F. the addition of streptomycin to a con-

* P < 0.005. † Not significant.

<table>
<thead>
<tr>
<th>C.S.F. Mean sugar concentration, mg./100 ml.</th>
<th>Manual Ferricyanide Method</th>
<th>Glucose Oxidase Method</th>
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<tbody>
<tr>
<td>71 ± 5 ± *1</td>
<td>838 ± 10 ± 2</td>
<td>687 ± 10 ± 3</td>
</tr>
<tr>
<td>82 ± 12</td>
<td>792 ± 13 ± 0</td>
<td>625 ± 10 ± 8</td>
</tr>
<tr>
<td>C.S.F. and Strept. Corrected for dilution, Mean sugar concentration, mg./100 ml.</td>
<td>879 ± 13 ± 2</td>
<td>696 ± 11 ± 3</td>
</tr>
<tr>
<td>Change due to streptomycin</td>
<td>+20 ± 5</td>
<td>+0 ± 3</td>
</tr>
</tbody>
</table>

† Not significant. S. C. F. sugar concentration of 100 mg./100 ml. caused an apparent rise of 22% of C.S.F. sugar measured by an AutoAnalyzer modification of the Hoffman3 ferricyanide method, while in 10 specimens assayed by a glucose oxidase method4 the addition of streptomycin did not alter the C.S.F. sugar concentration.

Samples of C.S.F. from 15 patients were collected into fluoride-oxalate tubes in the course of routine investigations for a variety of neurological diseases. No patient had a meningitic illness. Two aliquots of 2 ml. were taken from each specimen, and to one was added 2 mg. of streptomycin sulphate in 0.2 ml. of solution. After allowing for dilution, the mean C.S.F. sugar concentration by the AutoAnalyzer method was 25% higher in the streptomycin-containing aliquots than in the controls, and this difference was statistically highly significant. Though streptomycin produced a small rise of 4.9% in the mean sugar concentration measured by the manual ferricyanide method, neither with this nor with a glucose oxidase method was the change statistically significant.

Streptomycin is a compound of streptidine and a disaccharide, streptobiosamine.* How-

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