longer enjoys great popularity. Five of the first series of 20 are alive, 17 to 19 years after operation, two of whom are of subnormal intelligence. Thirteen of the second series of 19 are alive 9 to 11 years after operation. Five are severe mental defectives, three are moderately retarded, and five are of normal intellect. Jackson and Snodgrass (1955) followed 62 patients operated on in a four-year period. Only four had drainage-tubes for more than three years, and, of these, only one had infantile hydrocephalus. About 40% of these patients were benefited for over two years, and the authors think that the longer the patients are followed the worse will be the results. This is not in agreement with the experience in this centre, where most of the failures have occurred in the early post-operative months. Of those surviving over two years, only one has had to be operated on again, and that successfully.

It seems likely that only a small percentage of these infants continue to require drainage for ever, because a tube allowing only 2 in. (5 cm.) for growth at either end at the time of its insertion is outgrown some time in the child's third year. What is required of the operation is to supply a safety-valve which will function efficiently for two years. At some time during this period balance between fluid production and absorption will probably be achieved. This is a speculative working hypothesis for use until the pathology of communicating hydrocephalus is understood. The common diagnosis may be cisternal obstruction as mentioned above.

This paper helps only in a negative way in the choosing of patients for operation. It has been suggested that if less than 2 cm. of pallium remains, as judged by ventriculography, operation is not worth while (Scarff, 1952). Only one of the infants described here had a brain thickness of more than 1 cm., and in two it was about 0.5 cm. We have not had cause to regret operating on these children. If there is any criterion for selection it is not pallial thickness. If there is no clinical evidence of gross cerebral damage, and there seldom is, selection should probably be by distillation of the combined experience of the attending paediatricians and neurological surgeons. There is at present no single clinical or laboratory criterion of operability. Babies who "don't look as if they would do well" probably should not be operated on, but these are in a small minority. Most infants with communicating hydrocephalus look well unless they have been vomiting over a long period. Babies with associated myelocoeles or aqueduct stenosis or who have developed obstructive hydrocephalus after meningitis or neonatal haemorrhage, are a different matter, and the operability in each case must be decided on its merits.

At the beginning of this paper it was said that Laurence's (1958) figures for untreated hydrocephalics of mixed aetiology raised the whole question of the surgical treatment of this disorder. If his figures are broken down, it is found that, out of 182, 46% survived, 30% had I.Q.s of over 50 and were presumed educable, and only 6.5% had I.Q.s over 100. In so far as the present small series gives any guide to surgical treatment, it would suggest that the cisternal obstruction or communicating group should almost always be treated surgically and that the outcome is likely to be favourable if the early complications of operation are avoided.

Summary

A follow-up study has been made of five children surviving out of eight operated on for communicating

hydrocephalus in 1952. Their physical, emotional, and intellectual status was reviewed and found to lie within the normal range.

The aim of operation for communicating hydrocephalus is discussed. If the early complications of operation are avoided and the infant is protected against high intracranial pressure for about two to three years the prognosis for normal survival appears to be good. There is still no definite criterion of operability. Thickness of surviving brain is not a reliable prognostic guide to the intellectual or emotional status of the survivors.

We are grateful to Professor F. M. B. Allen and other paediatricians in Belfast who referred these patients and helped in their care; to Dr. W. H. T. Shepherd, who did the ventricular studies; and to Mr. R. G. Woods, who took the photographs.

REFERENCES

- Cushing, H. (1905). *Cleveland med. J.*, 4, 1.
Heile, B. (1925). *Zbl. Chir.*, 52, 2229.
Jackson, I. J., and Snodgrass, S. R. (1955). *J. Neurosurg.*, 12, 216.
Laurence, K. M. (1958). *Lancet*, 2, 1152.
— (1959). *Ann. roy. Coll. Surg. Engl.*, 24, 388.
Parkin, A. (1893). *Lancet*, 2, 1244.
Quincke, H. (1891). *Berl. klin. Wschr.*, 28, 929.
Scarff, J. E. (1952). *J. Neurosurg.*, 9, 164.
— (1959). *Acta psychiat. scand.*, 34, 354.

SEMINAL ANALYSIS IN 22 HOMOSEXUALS

BY

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The concept of male homosexuality as a form of constitutional deviation has given rise to a variety of somatic, anthropometric, and genetical studies directed to the discovery of physical correlates of the deviation. Particular attention has been paid to body build, hormone balance, and the structure of cell nuclei, but little work has been done on primary gonadal function in this connexion. Raboch and Nedoma (1958) reported that of 194 homosexuals examined at the Sexological Institute, Prague, only nine had hypoplastic testes (measuring less than 3.4 cm. in the long axis). We have been unable to trace any reference to seminological studies in homosexuals. It is well known that homosexuals who marry often prove themselves fertile, but they may be unrepresentative of homosexuals as a whole: for example, a much higher proportion of the married group may be bisexual.

To test the hypothesis that homosexuality is correlated with testicular inadequacy, seminal analysis was carried out in 22 homosexual men of whom 20 were single and none had more than a very small conscious heterosexual component in his make-up.

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Method

Patients for this study were derived from two sources: 13 were seen by one of us as psychiatric out-patients (12 at hospital and one privately) undergoing clinical investigation and treatment, and nine were referred by Mr. Gordon Westwood from his research series of male homosexuals belonging to a normal—that is, non-penal and non-psychiatric—population. The criteria of selection were (a) exclusive or very predominant homosexuality (all but two rating 5 or 6 on the Kinsey scale), and (b) readiness to take a seminal specimen to University College Hospital for testing after a minimum of three days' continence. Although anonymity was assured by the use of code numbers instead of names, a large (unrecorded) number of men who were asked to take part declined to do so because of the inconvenience involved, and the series represents only a minority of those approached. One case (No. 13) was tested elsewhere.

Findings

In the accompanying Table the following items are included:

Age.—Range 18–56; mean 29.8; median 28.

Marital Status.—20 single, 1 married, 1 previously married.

Kinsey Rating.—Subjects were rated on the 7-point Kinsey scale of heterosexuality–homosexuality, ratings 4, 5, and 6 having the following meanings: 4, predominantly homosexual in activity and/or psychic reactions; 5, almost exclusively homosexual in orientation; and 6, exclusively homosexual in orientation.

Details of Cases

Case No.	Age	Marital Status	Clinical					Seminal Analysis				
			Kinsey Rating	Homosexual Experience	Heterosexual Experience	Active or Passive	Effeminate Manners	Volume (ml.)	Density (millions/ml.)	% Abnormal Forms	Motility	Fertility Rating
Psychiatric												
1	23	S	6	+	+	—	±	3.7	27	25	G	B
2	35	M	5	+	+	P	—	1.7	144	23	G	HF
3	26	S	5	+	+	P	—	3.7	50	23	M	B
4	56	(M)	5	+	+	P	—	0.9	195	22	G	B
5	28	S	6	+	+	P	—	1.5	76	12	G	HF
6	18	S	5	+	+	—	—	1.8	52	30	G	HF
7	22	S	5	+	0	—	—	4.0	115	28	G	F
8	48	S	5	+	0	—	—	2.6	50	16	G	HF
9	33	S	5	+	+	—	—	2.6	66	26	G	F
10	28	S	4	+	—	—	0	4.0	125	18	G	HF
11	27	S	5	+	0	—	0	4.3	60	33	M	F
12	29	S	6	+	+	P	—	3.0	41	46	P	B
13	33	S	5	+	+	—	0	5.0	95	?	?	HF
Non-psychiatric												
14	38	S	6	+	0	—	0	3.7	55	18	P	B
15	33	S	5	+	0	A	0	3.0	1	—	P	S
16	27	S	6	+	0	A	0	2.4	65	27	G	HF
17	33	S	6	+	0	—	—	2.4	1	—	Nil	S
18	22	S	5	+	0	—	±	2.0	16	13	G	SubF
19	23	S	5	+	0	P	—	1.5	39	26	P	SubF
20	29	S	4	+	+	P	—	3.2	24	15	G	B
21	29	S	6	+	+	P	—	4.3	46	16	G	F
22	25	S	6	+	0	—	0	2.3	10	20	G	SubF

Homosexual Experience and Heterosexual Experience.—These items refer to the history of acts with others at genital level. 21 had had homosexual experience, 7 heterosexual experience.

Active or Passive.—A pronounced preference for one or other role is shown by A (4 cases) or P (6 cases).

Effeminate Manners.—The presence in marked or slight degree of effeminate ("pansy") mannerisms is shown in the Table by a + or ± sign respectively, while their absence is denoted by a 0 sign.

Other Clinical Features.—Three patients (Cases 4, 5, and 12) had trans-sexualist desires—that is, wanted to change sex and to have surgical treatment to this end. One of these (Case 4) had twice, and very briefly, been married for reasons of expediency unconnected with his sex life. Case 6 was a dullard whose general development was immature—that is, he looked and acted much younger than his years—although his genitalia were normal. Case 9, unlike other members of this series, was paedophilic (had impulses directed towards boys). There was no history of genital maldevelopment or damage in Cases 1 to 13, but in Mr. Westwood's series (Cases 14 to 22) no special inquiry had been made about past physical health. Cases 15 and 17, but not the other members of the latter series, agreed, on being told of the abnormal seminal findings, to see one of us, and they then gave histories of an operation for cryptorchidism at the age of 9 (Case 15) and of bilateral orchitis at 20 (Case 17).

Seminal Analysis.—The volume, sperm density, and percentage of abnormal forms are tabulated. In addition, the following ratings have been made:—**Motility:** G=Good. M=Moderate. P=Poor. **Fertility:** HF=Highly fertile. F=Fertile. B=Borderline. SubF=Subfertile. S=Sterile.

Nuclear sexing was carried out at St. George's Hospital on blood smears by Dr. J. L. Stafford and his colleagues in Cases 3, 5, 6, 7, 8, 12, 15, and 17, and the cytological appearances were found to be within the normal limits for genetic males in each case.

Discussion

On the basis of the seminal findings in this group of patients, it may be concluded that two are virtually sterile (due to cryptorchidism and to post-pubertal orchitis respectively); three are subfertile, with sperm counts of 10, 16, and 39 millions per ml., spermatozoal activity being poor in the last case; five are of borderline fertility, with sperm counts of 24–55 millions per ml., but those with the higher counts showing poor spermatozoal activity; four are of normal fertility, with sperm counts of 46–60 millions per ml. with good activity; and eight are highly fertile with sperm counts of 65–144 millions per ml. with good activity.

For comparison, taking into account sperm counts only, 1,000 men whose semen was examined in the Fertility Clinic at University College Hospital showed the following distribution: with azoospermia, 8.5%; with less than 20 millions per ml., 12%; with 20–49 millions per ml., 18.5%; with 50–100 millions per ml., 24%; with more than 100 millions per ml., 37%.

The numbers of cases in the present study are too small to break down in a comparable way, but if we group both series into less than 50 millions per ml. and more than 50 millions per ml., we obtain 39 and 61% for the 1,000 men and 41 and 59% for the present series. This suggests that the distribution of seminal analyses in this series is not different from that of the 1,000 men. Since those 1,000 men were husbands of couples complaining of infertility, it cannot be assumed that their seminal findings represent those of the population generally, though this is, in fact, probably not far from the truth. The basis for this statement is the belief, generally held, that approximately one-third of all men show some degree of subfertility.

However, there is a very striking difference between the psychiatric patients (Cases 1–13) in the series and

Mr. Westwood's subjects (Cases 14-22), who were not under psychiatric treatment. Thus, of the psychiatric group 11 out of 13 had sperm counts of 50 millions per ml. or more, while of the non-psychiatric group only two out of nine had counts over this level. There was little difference in volume, percentage of abnormal forms, or motility between the two groups, but differences in sperm density were reflected in an overall rating of "highly fertile" or "fertile" in 10 out of 13 psychiatric as against 2 out of 9 non-psychiatric cases.

Confirmation (from larger and more comprehensive surveys) of the striking difference in fertility between the two subgroups in our series would be of considerable importance in relation to theories of aetiology of homosexuality. Hypotheses readily come to mind in this context, but we think it inappropriate to list them at this stage in view of the small size of our study. The difference noted, if not fortuitous, may well be an artifact of the selection procedure. For example, some of the non-psychiatric subjects may have volunteered because they were already conscious or suspicious of genital abnormality, whereas psychiatric patients who chose to take part may have been influenced by quite different motives.

Summary

22 men who were predominantly or exclusively homosexual in orientation provided seminal specimens for analysis.

Of the 22, 8 were rated highly fertile, 4 fertile, 5 borderline, 3 subfertile, and 2 sterile, on the basis of the seminological findings.

The clinical diagnosis of "constitutional type" homosexuality was compatible with a high degree of fertility as judged seminologically.

The distribution of seminal analyses was similar in the group as a whole to that of a control group of 1,000 husbands of couples complaining of infertility.

Within the series there was a conspicuous difference between 13 patients under psychiatric treatment and 9 subjects drawn from a "normal" population. 10 out of 13 of the psychiatric, but 2 out of 9 of the non-psychiatric, group were rated as fertile or highly fertile. This is an interesting finding, but must be interpreted with great caution in view of the small size of the series and the method of selection.

We are indebted to Dr. J. L. Stafford and his colleagues and to Mr. Gordon Westwood for their collaboration. One of us (D. P.) acknowledges with thanks financial support from the Research Funds, St. George's Hospital.

REFERENCE

Raboch, J., and Nedoma, K. (1958). *Psychosom. Med.*, **20**, 55.

"Since the middle of the nineteenth century we have successfully dealt with most of the public-health problems associated with the early industrial revolution. Contaminated water supplies, non-existent or inadequate sewerage, bad housing are no longer the widespread health hazards they once were in our towns. But dirty air is one legacy of the past which is still very much with us, and is still a serious threat to health." (Sir KEITH JOSEPH, Parliamentary Secretary, Ministry of Housing and Local Government, at Harrogate Conference, National Society for Clean Air.)

LACTIC DEHYDROGENASE ACTIVITY IN ACUTE MYOCARDIAL INFARCTION

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The estimation of serum glutamic-oxalacetic transaminase (GO-T) has been used in the diagnosis of cardiac infarction since 1954 (LaDue *et al.*, 1954). Although this aid to diagnosis is now widely accepted, Dewar *et al.* (1958) have shown that false-negative results occur in 8.8% of cases. In those cases where the GO-T activity is raised, the increase is usually confined to a period of three to six days after the onset of pain (Wróblewski and LaDue, 1956).

The procedure for assay of serum GO-T activity by the techniques suited to routine work (Mohun and Cook, 1957; Reitman and Frankel, 1957; King, 1960a) is rather lengthy, and this fact, associated with the limitations previously mentioned, prompted an examination of the serum levels of other enzymes in cases of suspected cardiac infarction.

Hill and Levi (1954) demonstrated the presence of lactic dehydrogenase in human blood serum, and Wróblewski and LaDue (1955) observed an increase in activity similar to that of GO-T in cases of cardiac infarction. Wacker *et al.* (1956) confirmed this observation on 22 patients, as did Zimmerman and Weinstein (1956) on five patients in whom elevated enzyme activity up to two weeks after infarction was noted.

Snodgrass *et al.* (1959) repeated the work in great detail and showed in a large series of cases that cardiac infarction was invariably associated with elevation of lactic dehydrogenase level of serum. They considered such enzyme assay to be a determinate diagnostic measure in cardiac infarction.

Lactic dehydrogenase (LDH) is an enzyme, which, utilizing coenzyme 1 (DPN) as hydrogen carrier, shows its greatest activity in the reaction,

The present report deals with the serum levels of LDH compared with those of GO-T found in serial assays on a series of cases admitted to hospital with cardiac pain.

Methods and Materials

Serum GO-T was estimated by the method of King (1960a). LDH activity was assayed using a colorimetric technique. This technique and the values encountered in normal subjects have been described elsewhere (King, 1959, 1960b).

The clinical material consisted of 50 subjects admitted to the North Lonsdale Hospital with cardiac pain and electrocardiographic changes supporting a diagnosis of coronary thrombosis. Cases in which the electrocardiographic findings were equivocal, or were