of cancer in a cell (of the system under study) is $G(t)$ and that there are n cells "at risk." On the usual independence assumption we may then deduce the probability distribution function of age of appearance of the disease in the individual as^{3,4}

$$F(t) = 1 - [1 - G(t)]^n.$$

The age-specific incidence of the disease at age t will then be $f(t)/\{1 - F(t)\}$, where $f(t) = dF(t)/dt$. For large n , $F(t)$ will be virtually determined by the structure of $G(t)$ as $G(t) \rightarrow 0$.³ This can be shown to imply that any $g(t) [= dG(t)/dt]$ which behaves as a power of t for small $G(t)$ will produce the known age-specific incidence pattern.³

For example, both the following $g(t)$'s will produce the required age-specific incidence pattern:

$$(1) \quad g(t) = e^{-\lambda t} \lambda^r t^{r-1}/(r-1)!$$

$$(2) \quad g(t) = v_1^{\frac{1}{2}v_1} v_2^{\frac{1}{2}v_2} t^{\frac{1}{2}(v_1-2)/}$$

$$[B(\frac{1}{2}v_1, \frac{1}{2}v_2) (v_1 + v_2)^{\frac{1}{2}(v_1+v_2)}]$$

(1) is the model of r somatic mutations required in any order within a single cell where the mutations occur at a constant rate λ per cell per year, and (2) is the well-known F distribution on v_1 and v_2 degrees of freedom.

We carry no torch for any particular alternative theory but wish only to point out that no theory of carcinogenesis can be considered to be established solely on the basis of the mathematical relationship between incidence rates and age.—We are, etc.,

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REFERENCES

- ¹ Nordling, C. O., *Brit. J. Cancer*, 1953, 7, 68.
- ² Armitage, P., and Doll, R., *ibid.*, 1954, 8, 1.
- ³ Gumbel, E. J., *Statistics of Extremes*, 1958. Columbia University Press, New York.
- ⁴ Pike, M. C., *Biometrics*, 1965, in the press.

Retinal Detachment Centres

SIR,—Retinal detachments are fascinating and frustrating. The present rate of cure in a good centre should be in new cases 90%, including cases who have no operation because they are hopeless. Few regional consultants ever have the time that detachments require, nor opportunities to learn the necessary techniques to attain 90%, such as indirect ophthalmoscopy and the detailed examination of the ora. Indeed, after learning this last, one performs operations on the anterior segment with a new concern as to what its effects are on the posterior segment.

All surgeons desire either to operate successfully or pass the patient to a suitable centre. Detachment centres are excellent provided they have a head on whom the consuming fascination of detachment surgery has descended. Should his replacement not have this fascination that centre sinks to a utility level. Surgeons in the regional groups, where registrars and opticians are almost unknown, have geographical and administrative difficulties with waiting-lists which prevent more

than an occasional detachment operation. Where registrars are available in the region or teaching hospital, detachments commonly become their concern. This time-honoured method of solving a difficult problem has produced brilliant successes in the past, but the 90% results of a good detachment centre leave failures that require a research unit instead of a registrar.

A possible solution is for one surgeon, keen on detachments, in a group of surgeons to have two sessions of his contract set aside by mutual consent for detachment examination and operation. It could be arranged so that a colleague could operate on a particular detachment while the detachment surgeon does his clinic, an arrangement which could be mutually advantageous. Helpful discussions would follow with the interested surgeons in the nearest groups. The scheme may become important as the supply of ophthalmologists trained in detachments decreases. Further, one interested surgeon might handle cases for two groups by these modern methods, which allow the patients to be discharged in 10 days or less. The chance of better visual acuity after a successful first operation being greater than after the second operation will be taken advantage of in this scheme by using the new complicated methods first to ensure success. As the use of the laser increases (also in diabetes, etc.) and the price falls, these will become available to the groups and save much transport to light coagulation centres.

Ethically, either centres or this two-session idea seem theoretically to present difficulties due to our custom of practice. Indeed, a centre was proposed in 1947 but was shelved mainly for this reason. In fact, however, the consultants' desire for success is predominant and cases are now not uncommonly sent to those interested in detachments who manage as best they can.

Statistics for the country as a whole are not available, but hearsay suggests that one operable detachment in six is passed over while the remainder has a cure rate of 55% instead of 90%. Thus, at approximately 1 detachment in 7,000 in the population we have 7,000 in 50,000,000. A 90% cure rate with operation in all cases would give a cure to 6,300 cases with 700 failures. On the contrary, assuming that 1 in 6 are "thought unsuitable" for operation (1,166) and the failure rate in the remainder (7,000—1,166=5,834) is 45% (2,625) we have a failure rate of 1,166+2,625=3,791. This is a loss at present of nearly 3,800 eyes instead of 700.

Financially, the scheme would cost roughly £15 a week (two sessions). Discharge in 10 days instead of 20 would save £25 per case. Two patients can be examined and operated on in two sessions with a saving of £65. To the horror of the administrators, the least important figure of bed occupancy would fall—but the most important figure of turnover would rise, with a yearly saving of £1,250—i.e., almost enough to buy a laser. Further, approximately one-fifth have bilateral detachments and can become blind. If, say, one-tenth of the failures over the first 100 reach blind registration—i.e., one-tenth of 3,000, say 300—the country must supply £23,400 annually (£1 10s. each weekly), in itself a small thing compared with the personal tragedies.

Surgically, and financially, this scheme could improve administration, bringing fulfil-

ment of a frustrated dream to the detachment surgeon, relief to many and sight to thousands, and reduce the work of the teaching hospital with the inconvenience and transport difficulties involved.

In theory it is possible to arrange this type of scheme in one's own contract, but such a proposition is a delicate one to initiate and it is with the idea of promoting discussion which might result in such a change that this letter is written.—I am, etc.,

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Is Arterial Puncture Dangerous?

SIR,—In reply to Professor W. W. Mushin's letter (1 August, p. 310), we wish to describe one recent fatal complication, arising from the insertion of catheters into the femoral artery by the Seldinger technique, for the purpose of haemodialysis. Over 100 catheterizations had been performed before this accident occurred.

The case involved a man of 62 years of age, who had to be haemodialysed because of acute renal failure. The left femoral artery was punctured, and the Seldinger wire slipped in easily. The catheter was also inserted with ease, to a length of 8 in. (20 cm.), but on removing the wire no blood flowed back. Presumably the tip of the needle had come out of the lumen of the artery, and the wire and catheter had created an artificial track in the retroperitoneal tissues. The catheter was therefore removed and pressure was applied over the groin for five to ten minutes, after which time the external bleeding had stopped, although a subcutaneous haematoma the size of a walnut had been formed. This groin was not used again.

About half an hour later 2,000 U. of heparin was given and the dialysis commenced. Immediately the blood-pressure fell from 150 mm. Hg systolic to 100 mm. Hg systolic. The clotting time was kept at ten minutes throughout. The haematoma in the groin did not increase in size and there was no external bleeding from the skin incision in the left groin, which had not been sutured. Gradually, however, a tender mass appeared in the left flank. A continuous blood-transfusion of 4 pints (2.3 litres) of blood failed to maintain the pressure above 100 mm. Hg and so the dialysis was stopped prematurely after three hours. Subsequently the blood-pressure continued to fall in spite of administration of protamine sulphate and a further transfusion of 3 pints (1.7 litres) of blood over a period of two hours, and so it was decided to explore the vessel. At this stage we imagined that the Seldinger wire and catheter had pierced the artery wall high up in the abdomen, as there were no signs of bleeding in the groin.

At operation there was only the one puncture site in the femoral artery in the groin, about 1½ in. (4 cm.) below the inguinal ligament. But it was still bleeding. The blood had tracked upwards via the femoral sheath into the retroperitoneal tissues, forming a huge retroperitoneal haematoma. The vessel wall was intact throughout its course in the abdomen. The bleeding site was closed and the patient withstood the operation. However, he suffered from chronic asthmatic-bronchitis, and had needed steroids for several years: post-operatively he went into respiratory failure and died.

The femoral sheath is the apex of a fascial funnel composed anteriorly by the transversalis fascia and posteriorly by the ileopectineal fascia. It is a prolongation downwards of the fascia lining the abdomen. It therefore forms a natural channel for blood escaping from the femoral artery.

In retrospect it is clear that if bleeding continues following femoral-artery puncture pressure must be reapplied over the groin, even though there is no external evidence of continuous haemorrhage at this site.—We are, etc.,

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Estimation of Haemoglobin

SIR,—I would like to make one or two comments on your "To-day's Drugs" article on the estimation of haemoglobin (2 January, p. 40). The subject is always of interest and one about which most haematologists have strong personal views.

Haemoglobin estimations fall into two groups, those performed in a laboratory by technical staff and those performed in general practice or in the wards at night by a doctor. The article mentions that cyanmethaemoglobin methods are at present fashionable and later on that the solution has to stand at room temperature for 10 minutes. This delay is its weakness and makes the use of the pigment undesirable in laboratories receiving many specimens.

This laboratory performs about 100 estimations daily, and recently we reached a record of 160. Oxyhaemoglobin is used as the pigment, and instead of the Autoanalyzer mentioned in your article a semi-automatic procedure is employed. In this procedure both the haemoglobin estimation and white-cell count are performed on the same specimen, no pipettes are needed, and the process takes only 60 seconds.¹ Experiments being conducted at present suggest that an electronic P.C.V. reading can be added to the procedure without appreciably increasing the time taken.

For use in general practice the article recommends the M.R.C. Grey-wedge Photometer. This instrument, which is accurate, has the disadvantages of being relatively heavy and expensive. Recent trials in this laboratory suggest that the Lovibond haemoglobinometer, using oxyhaemoglobin as the pigment and reading against an x-ray screen, is a suitable alternative.—I am, etc.,

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REFERENCE

- ¹ Davis, R. E., and Nicol, D. J., *J. clin. Path.*, 1964, 17, 467.

Training of Surgeons

SIR,—Mr. C. Naunton Morgan's statement (6 February, p. 380) that essential facilities for aspiring surgeons should be provided by all training posts throughout the country as soon as possible is indeed welcome in view of the new regulations for the F.R.C.S. examination. One can only hope that the College will be more strict in its inspection and approval of these positions in the future, for I am sure that its list of approved appointments would be drastically reduced if all these hospital posts could be inspected now. And if the opinions of the junior staff concerned

were elicited, many of the hospitals, which at first sight appear to conform to the standards imposed by the College, would in fact fail to do so.

Despite statements in the medical press to the contrary, only too often junior staff are looked upon as a "pair of hands." In many hospitals the registrar is on call every night except, perhaps, for one evening off a week. He is considered by his consultant to be well off—"I did not get that even when I was in your position." How can the surgeon in training attend lectures, evening courses, or even settle down to study on his own under these circumstances. For the majority, adequate time off for study is a myth.

How many of these hospitals have a well-stocked library with up-to-date books? How often do the standard text-books date back to the 1940's, or even earlier, and are more of historical interest than of practical use? Side by side with these there may be a recent book of limited appeal to the postgraduate student, but in which the consultant has an interest. In the selection of books, the purchase of which is limited by a derisively small amount, the junior staff frequently are not consulted. Surprisingly, many hospitals do not possess a book on operative surgery for even the established surgeon to consult, let alone his juniors. It can be said, however, that even if text-books are not provided journals usually are, even if limited to the *British Medical Journal* and the *Lancet*, but these often have to do the rounds of pharmacist, sister tutor, etc., before finally reaching the junior staff several weeks later.

Teaching on the whole is non-existent unless one attends a definite postgraduate course. This invariably means having unpaid leave of absence for a course of any length, if one is fortunate to be released for as long, say, as three months, because study leave is limited to two weeks per year; and one does not qualify for unemployment benefit. It is no wonder that many married doctors cannot afford to participate. Surgical tutors and regional advisers are a step in the right direction, but more far-reaching proposals are needed to enable the postgraduate student to pursue his studies with the minimum of financial worry.

I have heard many overseas doctors complaining of the lack of postgraduate training in this country and wishing that they had gone to America. All of them come over here to obtain one of our postgraduate qualifications, in addition to getting experience in what they think is one of the leading countries in surgery in the world. The majority return home with the coveted F.R.C.S., but disappointed and disillusioned about the training facilities for advancing their skills. It is probably true to say that quite a large number leave these shores with little addition to their surgical dexterity, and a no greater enhanced theoretical knowledge, gained from text-books, than could have been achieved in their own country.

If we want to continue to attract overseas doctors and our own graduates, too, into our hospitals, we must cease to regard them as general dogs'-bodies to carry out the routine hospital work at a poor salary. Before the new regulations come into force some serious re-thinking regarding the position in the hospital staff structure of the surgeon in training appears to be necessary.—I am, etc.,

Orpington, Kent.

R. F. BOLAM.

Diagnosis of Amphetamine Addiction

SIR,—The letter by Dr. P. G. M. G. Walker (6 February, p. 384) raises the problem of diagnosis of amphetamine/barbiturate addiction because of the difficulty in determining amphetamine in urine.

For many months we have been using a simple specific method based on gas-liquid chromatography which can be used for the analysis of amphetamine in urine; the details have now been published.¹ The presence of barbiturates does not interfere with the determination of amphetamine by this method, and amphetamine may be readily distinguished from other sympathomimetic amines. Since gas-liquid chromatography is now an accepted versatile biochemical tool, and an instrument can be maintained in an operative condition for very little cost, the method we use could be applied as a routine analytical procedure.—We are, etc.,

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REFERENCE

- ¹ Beckett, A. H., and Rowland, M., *J. Pharm. Pharmacol.*, 1965, 17, 59.

Snuff

SIR,—I feel that some reply is required to the letter by Mr. P. E. Roland (20 February, p. 524), for I feel he is unaware of some of Mr. Clifford's later contributions to the medical literature regarding nasopharyngeal carcinoma in the native population in Kenya.¹

A paper by him in the *British Journal of Cancer* in March 1964 pointed out that the increased incidence of neoplasia at this site was confined to certain specific ethnic groups, living not at the coast but in areas above 2,000 feet in altitudes where the annual rainfall was over 20 inches. At a symposium on this subject in Singapore in August the members came to the conclusion that a contributing factor that could possibly explain this unusual localization of nasopharyngeal carcinoma was that the natives at this altitude lived in small huts without ventilation, and the high incidence of carcinogenic substances in the air they breathed might result in post-nasal neoplasia.

Snuff addiction was not common in this particular region and was not a contributing factor.—I am, etc.,

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REFERENCE

- ¹ Clifford, P., *Brit. J. Cancer*, 1964, 18, 25.

Cheap Purchase of Patented Drugs

SIR,—In his note on the decision of the House of Lords in Pfizer Corporation v. Ministry of Health (13 February, p. 460), your legal correspondent stated that the House of Lords had held that "the Ministry of Health is entitled to import patented drugs from unlicensed sources for hospitals within the Health Service without making any payment to the patentee." It is true that the House of Lords held, by a majority of three to two, that the Ministry of Health is entitled to import patented drugs from unlicensed sources for use in National Health Service