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The natural history of windows: a cautionary tale

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The very first rule of nursing... is to keep the air the patient breathes as pure as the external air, without chilling him. . . . Air from a closed court is often as stagnant as that from a passage. . . . The question is often asked—when ought the windows to be opened? The answer is—when ought they to be shut? . . . Always open windows at the top rather than the bottom. A chink at the top will keep the air fresher than a draught from the bottom. . . . Second only to the need of the sick for fresh air is their need for light. . . . Bad houses do for the healthy what bad hospitals do for the sick—kill them off—Florence Nightingale, *Notes on Nursing*. London, 1859.

Human beings often find it difficult to behave according to the dictates of common sense. Altering irrational behaviour is no easy matter, for it entails admitting one's mistakes, if only to oneself. The aim of this paper is to try to alter behaviour in one simple respect. I want, if I can, to make sure that never again do we create buildings in which people have to work permanently in rooms without windows.

It is against the law to build such rooms in houses. It is not against the law to build such rooms in offices, factories, hospitals, or health centres—but it ought to be. I recently inspected a new hospital costing nearly £100m, where 70% of the working accommodation for staff was windowless. The staff turnover was above 10% yearly, largely because they could not face this perpetual troglodyte existence. The effects of a windowless environment on those who work in it have been studied by P J Keep, consultant anaesthetist at the Norfolk and Norwich Hospital.¹ He is concerned with the effects of windowless theatres and intensive therapy units (ITUs) on those who work in them. The strain on both staff and patients in ITUs is considerable. Most patients are conscious for much of the time. Deprivation of links with the outside world, particularly the visual stimuli of day and night, leads to anxiety, transient confusion, and restlessness. The incidence of postoperative delirium is twice as high in windowless ITUs as in those with windows.² A year's experience of working in the windowless ITU in the new 10-storey hospital complex at Norwich has convinced Keep that "such a design is unacceptable and that no further units of this type should be built."

Windowless operating theatres have similar effects, particularly on staff—anaesthetists, theatre sisters, and ancillary staff—who have to spend most of their professional life in such rooms. Not only is morale affected but also recruitment.³ A

small proportion of theatre users are indifferent to lack of daylight. Another small proportion prefer artificial light for technical reasons; their needs can be met by providing blinds. Most users will always vote for windows, although those who work in windowless units often feel powerless to effect changes.⁴ In the battle against a windowless working environment, the ancillary staff's trade unions can be powerful allies. What applies to ITUs and operating theatres applies equally to x-ray departments. Much of their work can be conducted in daylight, but blinds for windows must be available and efficient. The tradition of windowless x-ray departments appears to have arisen because so many of them started life in the basements of old hospital buildings, simply because there was nowhere else available. The traditional difficulties of recruitment of both radiological and anaesthetic staff are partly a reflection of the extraordinary working environment in which they are expected to spend their lives.

For all other working environments, whether in hospital, office, or factory, windowless rooms must be condemned out of hand. To spend the whole of one's working life in a room without windows might be considered a refined form of totalitarian torture. Yet good men in many countries are inflicting this misery on tens of thousands of their fellows, without apparently giving it a second thought.

The perpetuation of folly

All too often, human beings learn only by making the most dreadful and costly mistakes, usually at other people's expense. In medicine, our chickens come home to roost fairly quickly. So we usually manage to get the right answers inside five or ten years. Architectural mistakes live on long after their perpetrators are dead, afflicting generation after generation. Because it is so uncomfortable to face up to these errors, there is often a conspiracy of silence. So mistakes are repeated, long after their folly is recognised. A good example of this is provided by the unwanted multistorey blocks of municipal flats that have been erected all over Britain. The folly of overdoing high-rise apartments was well known 30 years ago. When we began building Harlow New Town in the early 1950s, we wanted some tall buildings to break up the visual landscape. So we investigated what the incoming population wanted—and needed. We found that 80% of families wanted a house with a fenced back garden, in which young children could play safely and their parents could grow vegetables and flowers. About 10%, almost entirely old people, wanted a bungalow. The final 10% wanted flats or apartments without individual gardens. Of these, only half would have been happy to live in high-rise buildings. This small group consisted entirely of people under 60 without children—single, married couples, widows or widowers. We built accordingly and all was well. Few local authorities learnt the lesson we tried to teach. High-rise became the fashion, and nobody bothered about keeping an idea which was good in small doses within reasonable bounds.

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A friend of mine, a most sensible architect, had built a group of seven-storey flats in a metropolitan borough. The council concerned then asked him to build a group of three, 24-storey flat blocks, in close proximity. This he rightly refused to do. So he was dismissed. The group of 24-storey flat blocks were built, and the results are now as might have been expected. No doubt this council was convinced that it was acting for the best. Its fault lay in an inability to imagine what life would be like for a family or an old person living 15 or 20 storeys up when there was a power cut, or the lifts went wrong, or the maintenance men came out on strike. Thanks to steel and reinforced concrete frames, it is now possible to build buildings in all shapes and sizes. This does not mean that it is desirable to do so. Architects, naturally enough, enjoy this new freedom. But it is all too easy for them to forget their duty to *everyone* who is going to inhabit the building throughout its expected life.

advantage to work in a series of smaller, separate units, even at considerable distances apart. In such units quality, morale, and team spirit can flourish among the staff and physical flexibility is far greater. The only people disappointed are the empire-builders and perhaps the architects.

It is always alleged that economies in running costs follow from great size. This is not my experience. In terms of physical resources, running costs are almost always higher in new buildings than in old ones. In the huge hospital the first victim is staff morale—medical, nursing, ancillary, and administrative. Sickness rates among nurses and ancillary staff rise steadily with size, as do days lost from strikes among unionised staff. The same applies to staff turnover. When we were building Harlow New Town it became apparent that the maximum optimum size of a factory is 800-1000 workers (including everybody). At or below this size human relations tend to be happy and morale

FIG 1—How the size of a cube block determines natural lighting and ventilation of rooms inside. Plans not to same scale. Block B is four times the size of block A, block C is four times the size of block B.

How shape determines the internal environment

In the past 15 years, for the first time in a generation, it has become possible to start building new hospitals. The new generation of architects and planners have been making their initial mistakes all over again. Their predecessors had built up their experience over the years, and the best of their productions are still very good. All too often, those who have been clamouring for new hospitals are deeply—and rightly—disappointed when they get them. "Patients, doctors, and nurses at St Thomas's Hospital seem united in their preference for the old-style Nightingale wards in contrast to the smaller cubicle units in the new blocks. A report from the North London Polytechnic (prepared for the district management team) found that patients thought the large wards friendly and cheerful and few became bored; but in the small bays in the new wings they found themselves confined in small groups which might or might not be compatible. Nurses had problems of observation and supervision in the cubicles, while the physical unity and ease of communication in the older blocks helped staff and patients to identify with the ward and each other."⁵

At the very start of planning a new hospital, things can go wrong in ways that can never be corrected. At the very start, the size and shape of the building will be decided. These decisions force a pattern onto the building itself. During the current period of painful relearning three major errors of hospital builders have been graphically demonstrated. The three resulting lessons are as follows. Firstly, do not build hospitals too big in terms of bed numbers. Secondly, do not build them too high, in terms of storeys. Thirdly, do not build them in the shape of great cubes. When a new hospital is being planned, every department wants to be on the main site. This is more for reasons of prestige than technical advantage. The result is an escalating demand for beds and outpatient space. In practice it is greatly to everyone's

good. Above this size the job becomes impersonal and the incidence of strikes rapidly increases. If, for technical reasons, a bigger plant is needed another factory should be built elsewhere. Extra transport is a small price to pay for happiness, efficiency, and industrial peace.

Hospital numbers must include both staff and inpatients. I would suggest that the optimum maximum for the combined figure is again 800-1000. We go beyond this at our peril. Over 20 years ago I carried out a survey in search of the good mental hospital. The optimum maximum was then 600-800 beds. Above this figure, in almost every respect, quality of staff morale and patient care steadily declined with size. I believe that the ideal hospital of the future, on a single site, will have under 500 beds. Comprehensiveness will be achieved by associated hospitals of similar or smaller size, each largely autonomous. In the hospital that is too big communications between staff for the benefit of patients become increasingly difficult. Vertical construction makes for even greater staff isolation than size alone. The inhabitants of one floor (or group of floors) seldom mix with their vertical neighbours, as also is the case in tower blocks of flats. Even on a single floor each occupant tends to shut himself into his cell. Dependence on multistorey lifts greatly slows up patient and staff movement. While food trolleys or sterile supplies are delivered, hours are wasted, whether the contemplated journey is six or 16 floors. Problems of engineering and servicing all correspondingly increase.

Faced with limited metropolitan sites and medical staff demands for great numbers of beds, architects naturally attempted the vertical hospital. Now that its folly has been conclusively demonstrated, they have been driven to the extraordinary expedient of constructing gigantic cubes. The effect of this is shown in figure 1. In terms of natural lighting and ventilation, the cube is the worst possible design. A cube composed of 16 equal-sized rooms will have four rooms with no

external walls, and therefore no windows. If the size of the cube is increased four times to 64 rooms, the number of windowless rooms rises to 36. A further fourfold increase to 256 rooms produces no less than 196 without windows! The new St Thomas's is a gigantic double cube. Here is the official answer to a parliamentary question⁶ about it. "There are approximately 873 rooms in the treatment block at St Thomas's, of which 684 are without windows. Only 224 of these rooms are permanently occupied by staff. All the rooms are air conditioned. . . . The high proportion of windowless rooms arises from the design of the new hospital buildings, which have been planned in depth to accommodate all the facilities required, and had to take account of the restricted site and the planning requirement that the buildings should not exceed the height of the neighbouring County Hall."

Even the wildest advocates of windowless rooms for staff shy off providing windowless wards for inpatients. Figure 2 shows how they have solved this problem. In the first hospital, they have put the wards round the outside, thus increasing the proportion of staff who work in windowless rooms. In the second, they have, as it were, burrowed into the top three floors of their cube, to produce eight small courts. In the third the wards are located in a huge U placed on top of a largely windowless podium. In figure 3 six alternatives to the 64-room cube in figure 1 are shown. In none of these does the number of inevitably windowless rooms exceed one-eighth of the total. In the calculations given here, the assumption is that all rooms are square and of equal size; in practice, given a building with plenty of external wall space, the clever architect will have no difficulty in avoiding windowless rooms altogether.

FIG 2—Three modern hospitals designed as cubes. Drawings not to scale.

FIG 3—How a 64-room cube, with 36 windowless rooms, can be rearranged to bring natural light and ventilation to most rooms.

The three quadrangular shapes in figure 3 are those used so successfully by our ancestors in old Bart's, old Guy's, and St Thomas's when it was in the borough. They were, of course, simple adaptations of the Oxbridge collegiate structure, which is still unrivalled for its purpose; indeed, it is still used when new colleges are built. Quadrangular buildings must be kept low if airless courts are to be avoided. The flexibility of this type of building is great; it can be easily extended in any direction. This is splendidly exemplified in the new DHSS prototype "nucleus" hospital (fig 4).

FIG 4—DHSS prototype "nucleus" hospital; an economic and flexible quadrangular design, with capacity for extension in seven directions. (Picture previously published in *BMA News Review*.⁹)

The cross and the double cross are practical but space-consuming in terms of site. Accordingly, they encourage architects to build them on top of largely windowless podia. The cross and the podium are exemplified in University College Hospital. The Nightingale pavilion remains an excellent basic plan with great flexibility. As new medical needs arise service extensions can be provided on the "spine" opposite to the ward blocks. The original St Thomas's in Lambeth was, in my view, not far short of an ideal plan, save that its lateral extension was blocked by old Lambeth Palace Road. It did require a great deal more in the way of lavatories and bathrooms for patients and staff, as all who have been inpatients there will testify. This defect was not, however, inherent in its design.

Justification

When architects are forced, by pressure or circumstance, or encouraged by fashion, to build cubes containing many windowless rooms a wild pseudorationality often appears. It is claimed that the cube conserves energy. If heat loss through external walls was the main cause of energy consumption this would make some sense. But with modern insulation such heat loss is small. Moreover, in a large cube building it is necessary to pump air, warmed in winter and cooled in summer, into all the windowless rooms. A huge cube is in fact an enormous energy consumer. It is claimed that a cube is cheaper to build and cheaper to run. Both these claims are untrue. Services to the windowless rooms may actually increase the cost of the building by up to one third. In two cube hospitals with which I am familiar there are so-called "interstitial spaces" or extra service floors between the floors. Each such space is about five feet high; in it are a mass of air-conditioning ducts and other pipes that can be worked on by the service engineers. The cost of these spaces is immense.

Finally, it is claimed that absence of windows improves working performance, by reducing external distraction. It is true that excessively large windows distract attention, just as they

also cause excessive room-heating in summer and excessive cooling in winter. Complete absence of windows is just as upsetting but in a different way. As with so much else in life, the right answer is the middle way. I was discussing the plans for a largely windowless hospital with a distinguished professor of paediatrics who was to work in it for part of his time. "Why fuss about it?" he said. "People will get used to any kind of working conditions. Look at coalminers." Human capacity for adaptation is truly remarkable. Some people will put up with horrible environments provided that they are satisfied that this is necessary. In hospitals or offices, or other manmade workplaces such environments are not necessary. I would regard such environments as justifying higher wage rates, as does working unsocial hours.

Ventilation

For special work in hospitals elaborate air filtration and humidity control is essential. This is a costly job. Fortunately, the space needed comprises only perhaps a fiftieth or less of the whole of such buildings. In hot and humid climates air-conditioning is a near essential for the working environment. In the tropics and subtropics and in the interior of the world's great land masses it is reasonable and right for every hospital to be air-conditioned throughout, despite the great expense. But in temperate climates such as ours, and indeed in many colder climates, universal air-conditioning is a huge waste of money. Costs of installation are gigantic, running costs are enormous, and occasional breakdowns inevitable and disastrous. The effects of breakdowns are particularly bad if all windows are hermetically sealed. It is true that, in hot and humid weather, air-conditioning is effective only if the windows are shut. But this soon becomes apparent to the occupant of any room. Closing windows can safely be left to those directly concerned.

To justify the cost of air-conditioning engineers often resort to the argument that used air must be recirculated to conserve heat. This extraordinary expedient would only be justified if the air was adequately filtered for both bacteria and viruses, and was itself reconditioned by removing excess water vapour and CO₂ and adding O₂. In my experience this is never done, as the costs would be prohibitive. Droplet spray remains a most important means of spread of infection, particularly of the upper respiratory tract. Recirculation of air without adequate filtration is completely unjustified in any hospital, and probably unjustified in any heavily occupied building. I once traced the course of the used air from a large, windowless lecture theatre in a medical school. I found that it went directly to the experimental animal department in the basement. When I pointed out the risks to the validity of animal experiments from an epidemic of coughs and colds among the students, the engineers righted matters by reversing the flow so that the students got the air from the animals.

I think that Florence Nightingale was right in supposing that fresh air is, of itself, therapeutic. Wherever climatically possible, opening windows are the best method of air-conditioning so far devised. In the treatment and nursing of the sick it is inevitable that there should sometimes be unpleasant smells. Here, constant-flow air-conditioning helps little; an open window, however, soon puts things right. But Miss Nightingale's provisos must be remembered. Windows opening on to stagnant courts do little good; and windows should open at the top as well as at the bottom.

History and the swing of the pendulum

Most people take windows for granted; not so our ancestors. There was the great day when men first learnt to glaze windows. Until then, thin strips of horn were used to let in a little light and keep the draughts away. For a thousand years or more, glass remained the perquisite of the rich. The poor had to make do

with skins or cloth or more often wooden shutters. In the earliest glazed windows small panes were the rule, dictated by the limited strength of the lead which held them in place. Then came the invention of the sash windows with its delicate wooden cross-members. For aesthetic excellence, functional efficiency, and cheapness in replacing broken glass, the Georgian sash window has never been beaten.⁷ It remained the hallmark of Queen Anne and Georgian architecture for nearly 200 years. In North American domestic architecture, where our Georgian style was adapted in the eighteenth century as "Colonial," the sash window has retained its popularity to this day. Unfortunately, the American version usually opens only at the bottom.

The casement window, hinged at the side, predates the sash window by about two centuries. The iron-framed leaded windows of Tudor and Stuart times were often simple casements. Today the casement is the commonest form of English

magazines of the time. Naturally enough, these pictures failed to reveal the renal stones which were the price so many of them paid for their sunlight hypervitaminosis. The Rollier fashion for heliotherapy died a natural death, but not before it had convinced both the architects and the glass manufacturers that glass and health marched hand in hand. So we have inherited the problems and miseries of the classrooms in the all-glass school—too hot in summer, too cold in winter, and too distracting at all times. To a lesser extent, these have been matched in the all-glass factory or office block, hospital, or health centre. The proper function of the all-glass house is to provide an environment for photosynthesis, in which desirable means of carbohydrate production man as an animal does not share.

Until this century the walls of a building carried all the weight of the upper floors and roof. The only exceptions were the Gothic cathedrals with their flying buttresses. A very high building cannot support itself on its walls alone, unless these are

FIG 5—How architects show different types of opening windows in their drawings of elevations of buildings.

domestic window, often in combination with one or more hoppers. For economy of initial cost and functional efficiency these combination windows rank very high. The hopper window is one which is hinged horizontally either at the top or the bottom. On its own, it gives good but limited ventilation. The top-hinged hopper must open outwards and the bottom-hinged hopper inwards; otherwise the hopper serves as a means of shooting rain into the room.

Technical improvements in glass-making led in the nineteenth century to the sash window with only two large panes and no wooden cross-members. In the twentieth century, the Pilkington float-glass process, in which the molten glass is floated on a bath of liquid tin, has made possible the creation of the huge picture windows. In some situations, this can be most attractive. But arguably picture windows have done more harm than good. They are quite unsuitable for rooms where privacy is desirable, such as bedrooms, doctors' consulting-rooms, surgeries, examination and dressing rooms, and even waiting rooms—for not everyone wants the world and his wife to know of the visit to the doctor. In work rooms and living rooms, the glare from the picture window is often excessive, making both concentration and relaxation difficult. In a survey of 200 new office blocks, nearly half the occupants complained of discomfort through excessive solar heat.⁷

The craze for sunlight inside buildings had some medical backing. Between the two wars, Dr Auguste Rollier built his glass-walled sanatorium in Switzerland to let in "the health-giving rays of the sun." Pictures of his sun-baked tubercular patients in their G-strings were a regular feature of the glossy

inordinately thick. The introduction of the internal frame of steel or reinforced concrete to do the necessary weight-bearing has meant that the walls need provide only a light wind- and weather-proof cladding. Claddings of glass, fibreglass, plastic, asbestos board, stainless steel, and aluminium, as well as brick and stone, have all been used, often set in frames of metal or concrete. We see the results in all our great cities today. It is not necessary here to take a stand for or against these non-weight-bearing "curtain walls." Their structural nature, however, allows the architect to create rooms with one or more sides composed totally of glass. From the occupants' point of view this is seldom justified. One further type of window requires brief mention. It is the slit window, whether vertical or horizontal. These windows have enjoyed a certain fashionable popularity among architects. In ordinary rooms, they are of little use. They may, however, have a place in warehouses and factories on very restricted sites, and in the design of ultra-secure prison cells.

The character of any room is determined by its windows and its internal proportions. Rooms that are too high for their area are forbidding and depressing. The cosiness of the cottage kitchen or the public-house bar depends partly on its low roof. A good room should give a sense of friendliness; this depends on a sense of safety and reasonable enclosure. It is almost impossible to achieve this, when one wall is made of glass. The swing-of-the-pendulum phenomenon, from too much glass to none at all, has thus had several causes. The discovery of one set of mistakes seems to lead to overreaction in the opposite direction. This has been helped forward by new technical possibilities, and by

pressure from clients wanting to get a quart of accommodation onto a pint-sized site. But there has also operated a certain trendiness among architects, a desire to be in the vanguard, or at least in the fashionable swim. Fashion in ephemera like clothes can afford to be bizarre. In architecture, however, permanence sets a limit to the degree of legitimate experiment. In an age when discipline has been at a discount it is inevitable that architecture should be caught up in the wave of discord that has afflicted the other arts.

As user clients, the medical profession can play a valuable part in helping our architectural colleagues to keep in touch with the everyday world. To do this, however, we have to be able to read and understand their drawings.

The doctor as a client

With some justification architects are inclined to regard their clients as slightly crazy. The problems of client-architect relations have been wittily described in a classic of architectural literature, *The Honeywood File*.⁸ This is recommended reading for all non-architect members of building committees. For several reasons doctors encounter greater difficulties in hospital planning than most clients. Few doctors have a natural aptitude for spatial relations and for converting in the mind's eye paper drawings into functioning buildings. This skill has to be learnt. When they are building group-practice centres at their own expense, they do extremely well. Simple financial restraints enforce economy and efficiency. With big private-enterprise buildings, similar constraints, relating initial costs to ultimate returns, operate. But with publicly financed hospitals, such restraints are not apparent until the buildings are completed. So each departmental head puts in unrealistic demands, in anticipation of possible cuts. The simplest sanction to control such excesses is the threat of exclusion from the main body of the kirk.

In reading architectural drawings two simple lessons must be

learnt. Firstly, overall shape determines absolutely the internal working environment of a hospital. This has been clearly shown in figs 1, 2, and 3. Secondly, window design is as important as room design. Most doctors cannot read a simple elevational drawing. Figure 5 shows the nine common types of opening window, together with the way architects show them in their drawings. When a new hospital is being built, it is a good plan to try out the proposed windows in advance. In small medical buildings, especially group-practice centres, window design is of paramount importance in both controlling initial costs and in operating efficiency.*

Here are seven simple rules. If these are adhered to, we shall in the future have very good hospitals at reasonable prices: (1) *all* rooms to have windows; (2) *all* windows to open; (3) *no* rooms to have all-glass sides; (4) *no* air-conditioning in temperate climates, except where technically necessary; (5) *no* high-rise construction; (6) *no* cube construction; (7) *not* more than 500 beds on any one site.

*For group-practice centres, domestic windows work well. There are standard designs, originally produced by the English Joinery Manufacturers' Association, and therefore called EJMA windows. The Association has now changed its name to the British Woodworking Federation, but EJMA windows still live on.

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What is meralgia paraesthetica and how should it be treated?

Meralgia paraesthetica is a compression neuropathy of the lateral cutaneous nerve of thigh, which is derived from the posterior parts of the second and third lumbar roots. It may be constricted at the level of the inguinal ligament or where it pierces the fascia lata 10 cm distal to the anterior superior iliac spine. Symptoms are anaesthesia or a painful burning paraesthesia of part or the whole of its cutaneous distribution. The condition occurs in middle life and is more common in men than women. The aetiology is obscure: it is said to be associated with increased obesity and wearing tight trousers. It is also often exacerbated by an uncomfortable driving position when motoring for long distances. There is an association between meralgia paraesthetica and lumbar spondylosis as between the carpal tunnel syndrome and cervical spondylosis, and the symptoms may reflect a chronic spinal radiculitis or a local segmental demyelination. Spontaneous recovery is rare, but surgical decompression is said to be highly effective. Electrophysiological testing and nerve conduction studies can confirm diagnosis.

What, if any, health hazard is likely from a householder periodically distributing the contents of a domestic cesspool over his garden?

A cesspool is not a means of treating sewage but only a method of storing it until it can be correctly disposed of. In the normal approved method of emptying, a pipe extends to the bottom of the cesspool so that there is no agitation of its contents, hence the procedure is inoffensive and can safely be carried out at any time of the day. Disposal of the sewage should be over a properly prepared, and if necessary subsoil-drained, site in an *isolated position*.

Faecal organisms reaching ground water can travel up to 6 m in any direction, up to 30 m with the stream, and unlimited distances in subterranean streams which may be reached through fissures in

chalk soil. It is irregular to discharge untreated sewage into a stream or river. Until 1953 cesspools had to be sited at a prescribed minimum distance from any dwelling or well. Since then this safeguard has been omitted on the assumption that the contents will be disposed of properly. The vintage of this particular cesspool might therefore be significant. The random deposit of raw sewage upon the ground and any vegetables, fruit, etc, in the vicinity is bound to be a source of continuing nuisance. Although in practice the hazard to health is smaller than one might fear, there must be a direct risk to anyone consuming unwashed products of the garden and an indirect risk of the transmission of faecal organisms and parasites, not only through any adjacent water courses or wells, but by vectors such as flies, rodents, or domestic animals.

What causes eosinophilia in the cerebrospinal fluid?

As eosinophils are not produced anywhere in the central nervous system, the answer to this question depends on knowing the general human diseases in which eosinophilia features. For the eosinophils to get into the cerebrospinal fluid there must be either sufficient meningeal irritation or trauma for the barrier to break down and the cells to leak through. There may be infiltration by malignant tissues such as the reticulosarcomas in which eosinophilia may be a feature. The general diseases in which eosinophilia occurs are numerous and range from allergies to parasitic infestations of many kinds, particularly by helminths, nematodes (roundworms), cestodes (tapeworms), and trematodes (flukes). It may occur in sarcoid that invades the CNS and similarly with other granulomas, including tuberculosis, if the patient has a sensitivity against the organism. For eosinophils to be in the central nervous system they must be in the peripheral blood, and there must be meningeal inflammation or penetration or both for them to get there.