at right angles to the direction of motion does prevent rotation. (2) The upthrust tends to help the position of leg to foot to maintain its general relationship—that is, 90 degrees. The first is, I fear, cancelled by the obvious difficulty in walking on such a small surface, while the second is neutralized in that this should never be necessary in a correctly applied plaster.

I would suggest that interested readers use instead the highly satisfactory wooden rocker. This can easily be made in assorted sizes and shod with leather or fibre impregnated with rubber. It is easy to affix; if properly applied it rarely works loose; it is comfortable; can be removed, retreaded, and used again. Its best feature is that it permits a smooth natural walking motion and enables the walking patient to return to his routine daily work virtually unimpeded by his plaster. There is usually no need to raise the opposite shoe, and even children tolerate it and are as active as ever. It is widely used, highly efficient, and of proved value both in Service and civilian orthopaedics.—I am, etc.,

H.M.S. Terror. C. R. MAY, Surgeon Lieutenant, Royal Navy.

## Theory of Cancer Treatment

SIR,—The present theory of cancer treatment considers only two factors, the surgeon's knife (or rays) and the cancer cell; it has no room for the natural history of cancer, as Dr. Frank Riggall observes in his interesting letter (May 10, p. 1029). Although we know a great deal about the natural healing tendency which causes a malignant tumour to become stationary for years and perhaps to regress of its own accord, we have not been able to digest this knowledge and to absorb it into our rationale of treatment. The reason for this is rather startling. Our treatment of cancer by radical surgery and radical radiotherapy is not based on facts and logic, but on faith which has become a dogma.

The rationale of cancer surgery rests on the *belief* that a true analogy exists between malignant growth and infectious disease, that the "virulent" cancer cell is the real villain, and that its destruction at all costs and at all points, in one session, is the surgeon's proper answer to the problem.

The rationale of radiotherapy rests on an analogy with the principle of "Therapia magna sterilisans"—the *assumption* a priori (before all experience) that *x* rays kill cancer cells and leave normal cells undamaged.

Yet all pathologists are agreed that malignant growth is not an infectious disease, but a process of faulty regeneration and differentiation; that the cause of cancer is not the cancer cell, but the breakdown of the inherent "co-ordinating mechanism" (Barnard) controlling normal growth and repair. The specific "cancer" cell is a myth. In the various parts of the body cells can be found which resemble in every respect those which are found in tumours. Nor are these so-called cancer cells "aggressive"; as a matter of fact, they are frail and vulnerable "displaced persons," unable to grow by themselves; they can only do so with the help and kind permission of the *stroma* which the organism provides. Stray cells from the tumour get into the lymph and blood stream in the same manner as other foreign bodies, dead or damaged cells, are taken into this drainage system; and if they get there, they are destroyed. Tumour embolism is not tumour metastasis (Willis).

The local defence processes accompanying established growth have been well studied. Inflammatory reaction is a highly significant feature of malignant tumour growth. Ewing holds that a well-marked reaction indicates a pronounced capacity to limit the growth. Mayo called the stroma of a cancerous growth "the measure of Nature's resistance." It is the same stroma which first encourages and nourishes the pseudo-regenerative process that eventually mobilizes its mesenchymal forces in an attempt at removing the strange cell masses from its territory. The reason that these attempts are so feeble is that the tumour cells are not strange enough to rouse the defensive mechanism to full activity. This goes to show that in the natural history of cancer the stroma is much more important than the cancer cell. If our theory took the slightest interest in this *fact*, it would be realized that the ideal treatment of cancer should deliberately aim at the stroma, trying to sensitize it, make it more keenly aware of the presence of strangers. Moreover, it would have been noticed that this ideal line of treatment has been actually followed—though inadvertently—in radiotherapy.

I think it is time that those responsible for the treatment of our cancer patients should stop fooling themselves about what they are doing. A malignant tumour regresses after irradiation, not because the tumour cells are killed electively and the healthy cells left undamaged, but because a stroma reaction has been set up by irradiation, and it is this, indeed, which has a stupendous effect on the tumour. This is an elementary fact established beyond doubt. It has also been proved that the destruction of normal cells in the tumour bed is essential for the success of radiation. What makes a tumour "radio-sensitive" or "radio-resistant" is not the character of the tumour cells, but the amount and the character of the *stroma* and its reactive capacity.

Every radiotherapist knows that a "satisfactory" healing reaction is indispensable for the regression of a growth; he also knows that repeated small doses of irradiation (which maintain the healing reaction) are more effective than a single massive dose (which destroys the reactive tissues). Why does he not give up the frivolous notion of "tumour doses" lethal to the cancer cells and begin to think in terms of "stroma doses" necessary to enforce the right reaction? He can be sure of success in his practice every time he deliberately enforces a natural healing process; his results will be disappointing if he goes out to kill cancer cells.

The surgeon can greatly benefit from the experience of radiotherapy and the lesson drawn from it. When he reflects, like Dr. Riggall, upon the usefulness of those "ever-widening anatomical exercises done on the operating table" in search for cancer cells, it may occur to him that the theory of radical surgery cannot be sound. Once equipped with a biological theory which is in harmony with the facts of natural history, the cancer surgeon cannot fail to develop methods far superior to those of radiotherapy, methods designed to imitate and to improve upon Nature's healing processes.—I am, etc.,

London, N.8. F. M. LEHMANN.

## Educating the Public about Cancer

SIR,—I have read with great interest your leading article on "Progress of Cancer" (May 24, p. 1119). In this you refer to the work of Swynnerton and Truelove, and also of Foulds, and I agree with your statement that "the application of these principles to the prognosis of 'early' and 'late' tumours is especially timely."

You also mention McKinnon, whose idea that early treatment and cancer education are useless is well known, but there is not one word in the reports of these workers to justify such an assumption. Swynnerton and Truelove (*British Medical Journal*, February 9, p. 287), when writing about the higher survival rate in those patients treated for gastric carcinoma after a long pre-operative history than in those with symptoms of shorter duration, go on to say, "This finding should not be taken to indicate that early diagnosis is of little consequence. On the contrary, we believe that every effort should be made to shorten the time between the onset of symptoms and the making of the diagnosis."

Turning now to Foulds's published lecture (*Ann. roy. Coll. Surg. Engl.*, 1951, **9**, 93), in which the author uses the word "progression" to indicate various irreversible changes that may occur in a tumour, and which may be grouped under the term malignancy, he says, "At its first clinical appearance a tumour may be at any stage of progression," and, further on, "Progression may be abrupt or gradual." The fact that in some growths progression is abrupt and advanced when the patient is first seen must not prevent every effort being made to diagnose those growths in which progression is gradual, and this can only be done by cancer education among the public. The question of how many lives can be saved by such methods can only be found out by a carefully planned research in a limited area.—I am, etc.,

London, W.14. MALCOLM DONALDSON.