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GENEESKUNDE IN DIE LUGRUIMTE

Daar word vandag merkwaardige navorsing gedoen ten opsigte van die fisiese probleme wat ontstaan as gevolg van fisiese spanning op die menslike liggaam.[1] Die aansporing vir hierdie navorsing is die noodsaaklikheid om te bepaal hoe om die menslike liggaam in gesonde toestand te hou onder die besondere eise wat reise deur die lugruimte daaraan stel. Die probleme kan in twee groepe verdeel word. Die eerste behels die probleme van versnelling en vertraging, en die tweede groep gaan oor die instandhouding van die lewe terwyl die reis deur die lugruimte voortgesit word.

Die mens het reeds 'n reis tot op 'n hoogte van 24 myl bokant die aarde se oppervlakte oorlewe, waar die atmosferiese digtheid 99·44 persent minder is. Alhoewel hierdie reis baie kort van duur was, is ingenieurs nou oortuig daarvan dat ‚raketvoortstuwing en ruimtereise van die een deel van die aarde tot die ander net om die draai is'. As ons dus die deskundige sy verstaanbare geesdrif toelaat, is dit duidelik dat raketvoortstuwing en ruimtevlug, hoewel miskien nie net om die draai nie, tog naby genoeg is om binnekort nie meer die uitsluitlike terrein van klein seuntjies in plastiese hooftooi te wees nie. Die mediese aspek van die probleem sal dus volledig ondersoek moet word.

Die sielkundige aspek stel 'n heel besondere probleem. Hoe sal die mens die doodse stilte verdra—die onpeilbare duisternis, die stilstand van die tyd en die gemis aan aardse vastepunte soos afstand en so voort? Hoe sal hy reageer op die eerste donderende rumoer as die spuitvliegtuie wegtrek en die daaropvolgende volslae stilte, en hoe sal sy stofwisseling voortgesit word? Al die probleme van waterstofkondensasie en -kolleksie, van urinekondensors, die wegruiming van uitskeiding, en al die ander moeilikhede moet maar opgelos word soos hulle opduik.

Die probleme wat met versnelling en vertraging saamhang behels hoofsaaklik die voorkoming van besering van die sentrale senuweestelsel as gevolg van die lediging van die brein se bloedvate. Hierdie beserings word voorkom deur sentripetale verbande om die ledemate en die dra van lugdrukgereëlde pakke klere sodat die ingewandsbloedvate nie kan vul en die brein van bloed dreineer nie. In hierdie verband vorm die RAF se navorsing tydens die oorlog op beswyming (*black-out*) tans die basis van 'n baie groter tak van eksperimentele fisiologie en geneeskunde.

Gedurende 'n reis deur die ruimte moet die begrip van aardse ‚tyd' desnoods veel van sy betekenis verloor; hierdie feit was aanleiding tot proewe met ‚dae' van 18 tot 20 uur lank wat verdeel word in ‚spesifieke tye vir werk, slaap en ontspanning'.

EDITORIAL

SPACE MEDICINE

Some extraordinary investigations are now being made into physical problems arising out of the effects of physical stresses on the human body.[1] The stimulus for these investigations comes from the need to find out how to maintain the human body in a satisfactory condition under the peculiar stresses and strains of space travel. The problems may be divided into two main groups. The first is concerned with acceleration and deceleration, the second with maintaining life while travel in space goes on.

Already man has survived a trip to a height of 24 miles above the earth's surface, where the density of the atmosphere is reduced by 99·44% and, although this trip was of very short duration, engineers are convinced that 'rocket flight involving space travel from one point of the earth to the other is just round the corner'. It is clear, after making due allowance for the enthusiasm of the expert, that rocket and space travel is, if not exactly round the corner, at least near enough to cease very shortly to be the preserve of small boys in plastic helmets, and that the medical side of the problem will need to be fully investigated.

A peculiar problem is the psychological one. How will man tolerate the absolute silence, the Stygian darkness, the loss of gravity and the absence of time, distance and other earthly fixed points? How will he put up with the first thunderous clamour as the jets take off and the subsequent tomb-like silence, and how will his metabolism carry on? All the problems of water-vapour condensation and collection, of urinary condensers, of stercus disposal, and other difficulties—not all predictable—must be overcome as they appear.

The problems presented by acceleration and deceleration are, in the main, concerned with the prevention of damage to the central nervous system caused by the emptying of the blood vessels of the brain. This is being accomplished by centripetal bandaging of the limbs and the wearing of pressurized suits so that the splanchnic blood vessels are unable to fill and drain the brain of blood; the wartime experiments on 'black-out' that were conducted by the RAF now form the basis of a much larger branch of experimental physiology and medicine.

During space travel, earthly 'time' must lose much of its meaning; and this conception has led to experimentation

Navorsers het daarin geslaag om vrywilligers 24 uur lank in goeie kondisie te hou in 'n klein kajuitjie wat hulle gebou het om raketvlugtoestande na te boots. Probleme wat hulle moes ondersoek was die outomatiese beheer van suurstof en die verwydering van urine en waterdamp—eersgenoemde deur distillasie vir verdere gebruik. Die ‚silindriese kajuit se apparaat vir urine-distillasie lewer (reeds) water wat meer drinkbaar is as menige munisipaliteit se watervoorraad', en aangesien ‚groeiende alge 'n groot gedeelte van die (ruimtereisiger se) voedselvoorraad' mag vorm en terselfdertyd as nuttige suurstof-CO_2-wisselaars kan dien, verklaar die verslag verder dat ‚veelbelowende proefnemings nou gedoen word om soortgelyke nuttige alge van menslike uitskeiding te kweek'. Inderdaad veelbelowend! *Per ardua ad astra.*

1. *Verslag* (1957): J. Amer. Med. Assoc., **164,** 765.

with 'days' of 18 to 28 hours long, divided into 'specific periods for work, sleep and recreation'.

In the small cabin that has been built to simulate rocket conditions it has been found possible to keep volunteers in good condition for 24 hours at a stretch. The problems that have been investigated are the automatic control of oxygen, the disposal of urine and water vapour—the former by distillation for re-use. Already the 'cylindrical cabin's urine distillation apparatus produces water that is more potable than many municipal drinking supplies' and as 'growing algae may supply a major part of (the space traveller's) food' as well as acting as useful oxygen-CO_2 exchangers, the report continues that 'promising experiments now are under way to grow similarly valuable algae from human faeces'. Promising indeed! *Per ardua ad astra.*

1. *Report* (1957): J. Amer. Med. Assoc., **164,** 765.

ESTERHUIZEN *VERSUS* ADMINISTRATOR, TRANSVAAL

The lessons which may be drawn from the judgment published in this issue of the *Journal* at page 908 in the case of Esterhuizen *versus* the Transvaal Provincial Administration merit careful attention by the medical profession.

The learned judge makes it very clear that 'assent without knowledge of the dangers involved is not, in reality, consent' and points out how necessary it is not only to apprise every patient of the nature of the proposed medical or surgical therapy but to make certain that the patient understands the risks involved. In the case of minors, the parents or guardians must be similarly informed.

It is evident that the consent form commonly used at hospitals does not cover these requirements. It only serves to delude the medical staff and to give them a sense of security which the learned judge has here shown to be illusory. Clearly a formula is not the answer to this problem.

But the doctor is often torn between the desire to tell the patient all his doubts and fears and so to share his burden, and the knowledge that to do this would be the worst possible prelude to a serious operation or any other treatment. This doctor's dilemma has no solution; we have referred to it before.[1] Does this mean that we should only give safe therapy? Are we to restrict the possible chance of success because the risk of failure may result in a lawsuit? It requires great experience to know which is the right course to follow.

Even if we do explain everything, how can we record or even satisfy ourselves that the patient truly understands? Must each grave procedure be preceded by a solemn lecture, an equally solemn catechism, and a carefully worded legal document? The imagination balks at the prospect; not only would progress in medical care be seriously handicapped, but it would be halted in a way peculiarly distasteful to the doctor; he would be back in the days of ancient Egypt, where the risky or dangerous case was marked 'this thou shalt not treat' and the case that would recover spontaneously was gleefully labelled 'this is to be treated'.

The doctor must protect himself by carefully explaining to the patient the risks involved. The *onus* then falls on to the patient to prove that he had not understood this explanation. Wessels, J.,[2] quoted by the learned judge, stated that 'the surgeon (must perform) the operation with such technical skill as the average medical practitioner in South Africa possesses and (must) apply that skill with reasonable care and judgment . . . ' This is achieved by consultation with his seniors, by open discussion with colleagues, and by paying careful attention to the opinions thus expressed.

'No man is an island.'

1. Editorial (1957): S. Afr. Med. J., **31,** 299.
2. Wessels, J. A. in *Van Wyk* v. *Lewis*, 1924 A.D., 438, p. 456.