A FEW ELEMENTARY REMARKS ON HEAT STROKE.

By Major J. Mackay-Dick, M.B., Ch.B., M.R.C.P.Edin.

Royal Army Medical Corps.

I am prompted to write a few notes on heat stroke because, in my experience, there is a great deal of ignorance as regards the most obvious aetiological factors, prophylaxis, early recognition and treatment of this condition.

Normally in healthy individuals it matters not whether they live in a very cold climate or in a hot climate because, through the heat regulating centre, which balances heat loss and heat production, the average body temperature remains at, or about, 98.4° F. Now to those of us who live in a temperate climate there is no difficulty in keeping our body temperature at, or about, 98.4° F. We take no special precautions to ensure this because we are natives of that climate and we naturally keep ourselves warm by our native diet, dress and exercise. In such a climate, during the greater part of the year, we are concerned with the conservation of heat and we find no real difficulty in doing this, having done it automatically for a large number of years.

However in a hot climate, especially if the humidity is relatively high, we find a complete reversal in the state of affairs to which we are accustomed in a temperate climate. We are newcomers to a hot climate where it is common for the temperature to be well above the average body temperature. We are accustomed to drinking really large quantities of bland fluids and many individuals (essentially the troops and especially those in isolated areas) do not worry unduly if their bowels miss a day or two—some do not worry if their bowels are not opened for four or five days or even longer. In such a climate we are especially concerned with heat loss and the various methods of regulating this successfully. We therefore facilitate heat loss by the use of suitable clothing and by not over-exerting ourselves. We especially facilitate heat loss by (a) encouraging the free action of the skin in sweating. To make up for the fluid loss and chloride loss, and to keep up this action, we greatly increase our fluid intake and also (or we ought to) increase our intake of common salt. Deficiency of salt intake is characterized by lack of energy, lassitude, undue exhaustion, mental irritability, hypopieses, tachycardia and general malaise. It does not appear to be realized by many that, if we do not increase our salt intake, in a hot climate, at the same time as we greatly increase our fluid intake, we will sweat profusely and rapidly and wonder why the great increase of fluid intake has produced so little relief. However if the salt intake is also increased it is found that, although we have to increase greatly our fluid intake in a hot climate, marked benefit is obtained by ingesting fluid in quantities smaller
than those which produce so little benefit when the intake of salt is low.

(b) Ensuring a good easy bowel action once daily at least.

In addition we keep ourselves fit by judicious exercises at the appropriate time of the day and time of the year. We avoid alcoholic excess by restricting the consumption of alcohol either by complete abstinence or by not drinking alcoholic liquors until sundown and then, usually, we should not make a habit of having more than two or three drinks each evening.

Now if in individuals there is not a fine balance between heat loss and heat production, and should the latter gain the ascendancy, then the internal body temperature rises and continues to rise in no uncertain fashion until hyperpyrexia and the other signs and symptoms of heat hyperpyrexia appear. There is no doubt that constipation, injudicious consumption of alcohol and the inadequate intake of bland fluids and common salt, impose an excessive strain on the heat regulating mechanism when the humidity is high or in a very hot climate where the humidity is relatively high. It is my belief that if such individuals suffer an elevation of temperature from any cause, especially from one of those conditions characterized by rigors, where there is a sudden and dramatic rise in the internal body temperature such as occurs characteristically during the rigor stage of malaria, then this increase in internal body temperature is such that the already sorely tried heat regulating mechanism cannot cope with it and it fails. As a result the temperature shoots up with dramatic suddenness to 106°F—107°F or even higher. The patient rapidly develops the other signs and symptoms of heat hyperpyrexia (heat stroke), and in a relatively short space of time he becomes comatose. Unless such cases are properly and adequately treated by all appropriate measures, for heat stroke as well as the emergency treatment for malaria if that condition be also present or even suspected, then there will be a relatively high mortality.

There is one rule which should be adopted by all medical officers in very hot climates with a relatively raised humidity or where the humidity is high, namely "Regard all febrile cases admitted to hospital as potential cases of heat stroke and carry out prophylactic treatment as well as the treatment for the condition from which the patient is suffering." If this is done zealously by all Orderly Medical Officers and Nursing Sisters then no cases of heat hyperpyrexia should develop or, anyway, reach maturity in hospital. This suggested rule may appear to be extreme but it will be recognized as a very sound one by all medical officers who have really seen and treated true cases of heat hyperpyrexia. It is my opinion that heat hyperpyrexia is the cause, in a very large percentage of cases, of the continuation of fever which is seen in many cases of malaria under adequate quinine therapy.

Such cases of malaria are frequently mentioned in hushed voices and how often have I heard the remark "You have a very severe (or resistant) type of malaria in such and such a district." I believe that if in addition to adequate treatment for malaria such patients are given an enema on admis
sion to hospital as well as fluids *ad lib.*, calomel grs. iii followed by salts, tepid sponged frequently and nursed under a fan from the moment they are admitted to hospital then prolonged fever in adequately treated cases of malaria will not occur. There is no doubt in my mind that the prolonged fever in such cases is not really due to malarial infection but is due to unrecognized and untreated incipient heat stroke which has been precipitated in a patient so predisposed.

Another type of case, the true nature of which is not infrequently missed in the early stages, is the individual who is admitted to hospital with low fever, vague pains in the loins and/or lower abdomen, slight dysuria and with a few pus cells in the urine. He is usually treated primarily as a case of urinary infection. Soon after admission or on the next day his temperature shoots up to 106° F. or thereabouts and it is finally recognized that he is now a definite case of heat hyperpyrexia.

Why are such cases of incipient heat hyperpyrexia frequently missed on first admission to hospital? The answer is that it is not sufficiently recognized (a) that it is common to find pus cells in the urine of individuals (Europeans) living in a very hot climate and who drink insufficient quantities of bland fluids; and (b) that the other signs and symptoms presented by such patients are also characteristic of the incipient case of heat hyperpyrexia.

I would commend the following suggestions to all medical officers newcomers to Africa or similar climates.

(1) In the very hot weather regard all febrile cases admitted to hospital as candidates for heat stroke and institute all measures for the prevention of the development of this condition. This includes the adequate treatment of the condition primarily responsible for the patient reporting sick.

(2) In all cases showing fever of any type, even when the cause may appear to be obvious, never forget that the patient may also have malaria. In addition if any febrile condition is not responding as well to your treatment as it should then consider malaria. If you can find no evidence of the latter condition then the mere fact that the patient may have been exposed to malarial infection some time in his career is sufficient justification for the exhibition of quinine in adequate doses.

(3) Advise all personnel in your unit on the potential danger of consuming liquor before sundown and of alcoholic excess.

(4) Avoid constipation in your unit and see to it that everyone gets as much fluid as possible.

In addition I would suggest that the extra salt ration should be given in the form of salted nuts.

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