

concerning the innumerable problems of medical-military organization and of military medicine.

The American Medical Association, the American Hospital Association, and the American College of Surgeons have placed information concerning the physical facilities and the medical, nursing and technical personnel of hospitals at the disposition of the appropriate government services, so that the hospitals might render the greatest aid to the armed forces and for the purpose of civilian defense. Of course, this has thrown a great burden on the medical profession and the hospitals, as with depleted staffs they are called upon not only to perform the added tasks called for by the armed forces and organized civilian defense, but also to continue to give the best medical and surgical care possible to the general civilian population.

The National Research Council has appointed many medical and surgical committees which have been conducting research along lines which will be of especial use in the efficient medical care of soldiers and sailors. Already several manuals have been published by these committees for the guidance of those in military medical service.

The medical schools of the country, also with depleted staffs, have done a noble job in carrying on their educational work, and in speeding it up, for their regular undergraduate students and for groups already assigned to the armed medical services. This is a subject of such common knowledge that I do not feel called upon to elaborate upon it, but could not omit mentioning it and paying tribute to it in a discussion of the relations of the medical profession and the war.

As in the last war, many medical schools and larger hospitals have formed special units which have been placed at the disposition of the Surgeons General of the Army and the Navy.

Previously in this paper I have mentioned some contributions war has made to the medical profession. I have referred to the advances which have occurred in medicine and in surgery, and to our introduction to tropical medicine. The present war still further broadens the horizon of the American medical profession and we must now think in terms of Global Medicine rather than American medicine, tropical medicine, or any other restricted phase of professional work. Our armed forces are going to all parts of the globe where new and hitherto unfamiliar diseases and living conditions are being found. These must be dealt with on the spot and the members of the profession who do not leave our shores must be in a position to recognize and to treat conditions in those who return which they have not before personally encountered. This condition inevitably is going to require readjustments in the medical curriculum of the teaching centers and it will place an added educational burden upon an already overloaded program.

Wendell Willkie in "One World" says: "Though we began to grow up with the earlier World War, we are only now changing completely from a young nation of domestic concerns to an adult nation of international interests and world outlook."

The American medical profession has always met its challenges and I have every confidence that it will meet this one.

THIAMIN CHLORIDE—AN AID IN THE SOLUTION OF THE MOSQUITO PROBLEM

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THE health hazard, to say nothing of the annoyance of the bite of the mosquito, is too universally recognized to need reemphasis. So it would seem superfluous to argue the advantages of any agent by which its malevolence could be reduced. It is the purpose of this paper to report and discuss results obtained in combatting the

mosquito pest by the internal administration of large doses of thiamin chloride.

A previous paper dealing with the use of this agent in the relief of itching conditions in infants and children (1) had been finished and presented for publication shortly before the mosquito season for 1942 came on. It was natural, therefore,

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to try to control the itching of mosquito bites with Vitamin B₁. The results at the very beginning were dramatic, and later observations were sufficiently favorable to warrant a preliminary report at this time.

Case Reports

Case 1.—A boy, two years of age, was seen because his mother said he had to be kept inside the house all of the time because of the viciousness with which mosquitoes attacked him whenever he got outside. Once bitten, he had lesions lasting for days, he scratched constantly, even his sleep being seriously disturbed. I found him to be literally covered with welts and excoriations, many of which were new and others obviously days old. Large oral doses of thiamin chloride were prescribed.

The mother's later report stated that on the first day she had given him 40 mg. of thiamin chloride and he slept all night without scratching. The next day he was given three doses of 20 mg. each. He did receive mosquito bites but they did not cause him to scratch, and even the excoriations of previous days did not seem to come to his consciousness. By evening all welts, not only those of the new bites but also those of days before, had disappeared and the patient had ceased to scratch altogether. Excoriations, of course, remained.

Case 2.—A girl, five years of age, had been obliged to stay indoors every summer of her life because of mosquitoes which attacked her violently on every exposure and poisoned her so that the lesions swelled to tremendous proportions and lasted for days. Her appearance at my office bore out the mother's statements.

I injected 35 mg. of thiamin chloride subcutaneously and prescribed 20 mg. more for the first day. This dose was to be repeated each day thereafter, but when the patient became apparently impervious to the insects it was gradually cut to 5 mg. per day.

According to the mother all itching ceased shortly after the injection was given at the office. The following day the patient was entirely comfortable though she did receive a few bites, but after this time the mosquitoes did not even approach her. A daily dose of 5 mg. gave her complete protection for the rest of the summer.

Case 3.—An adult female had been quite unable to get out into her yard at night because of the mosquitoes. As in the other cases they seemed to flock around her, bit ferociously, and poisoned her greatly. She was given 120 mg. during her working day at the office. That evening she worked until dark in her garden without a single bite. By taking large though unrecorded doses she kept herself impervious to mosquitoes during the rest of the summer.

This year, when the mosquitoes began to bother her, she took 80 mg. per day for one week and then reduced the dosage to 10 mg. per day. Mosquitoes did not approach her, and she neglected to take thiamin altogether for two or three days. At this time they began again

to pester her so she started the next day to take 80 mg. per day and has not been bothered since.

Case 4.—An adult female had been so bothered by mosquitoes all her life that she was unable to expose herself to them at all without suffering the tortures of their bites for days and nights thereafter. She took 40 mg. on the evening of the first day, 80 mg. the next day and went out into her garden that evening. Not a mosquito approached her and two days later she still had not been bitten though she had worked in her garden and yard and had had abundant exposure to the insects. The last two days she had taken 10 mg. per day.

Case 5.—A boy, fifteen months of age, was very badly poisoned by mosquitoes. He was given 20 mg. of thiamin chloride every four hours the first day, probably receiving 3 doses, and 10 mg. daily thereafter. One month later the mother reported that he had received only a few bites during that time and those he did get had not bothered him nor had they persisted.

Case 6.—A girl, four years of age, was brought to the office because of numerous mosquito bites which had been present for days and which she had scratched vigorously enough to cause many excoriations. My record contains the notation that while many obvious mosquito bites were present, new and old, some lesions were of a different character. She was given 80 mg. of thiamin that day and 20 mg. per day thereafter. When the mother returned with the child one week later she said that the mosquitoes no longer bothered. Lesions of scabies did, however, remain and were given their specific treatment.

Case 7.—Baby boy, 8½ months of age, was found to be covered with mosquito bites during a routine examination. He was given 80 mg. of thiamin the first day and 20 mg. daily thereafter. Two months later the mother reported that the bites had cleared almost at once and that no evidence of the mosquito pest had been noted since.

Case 8.—Girl, seven years old, was unable to swim in the lake at which she lived because of the mosquitoes. She had numerous lesions typical of mosquito bites on her exposed areas. She was given 80 mg. of thiamin chloride that day and 10 mg. daily thereafter. Two months later the mother reported that the patient had been swimming every day without any trouble from mosquitoes.

Case 9.—A boy, eighteen months of age, was found on physical examination to be suffering from an acute upper respiratory infection. His skin, however, presented the appearance so characteristic of the mosquito-sensitive infant, old and new welts interspersed with old and new abrasions due to incessant scratching. He was given 40 mg. of thiamin chloride that day and the next. Four days later the mother reported that

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the welts had disappeared almost at once and that while the mosquitoes had been abundant, they had not approached the patient. I advised the continuance of thiamin, 20 mg. per day for two days and then 10 mg. per day. This was continued with complete success for the rest of the summer.

Case 10.—An adult male, preparatory to a trout-fishing trip (a frequent indulgence to which his greatest obstacle was the mosquito problem) took orally 40 mg. of thiamin chloride before going to bed, 40 mg. on leaving home at 4:30 a.m., and another 40 mg. at noon following. He fished all day, along with the other members of his party, and mosquitoes were very numerous. The others were bitten ferociously and were covered with welts on all accessible surfaces. He was annoyed, as always, by the swarms of insects about his head, but sustained only a few bites, none of which was bothersome, and returned home bearing not a single lesion.

Discussion

If there were any purpose, many more cases could be included but all phases of the problem that I know are adequately illustrated here. That knowledge can be summed up in three facts which emerge after one considers the group carefully. First, thiamin chloride administered either by injection or by mouth is capable, in adequate dosage, of causing previously susceptible persons to become not only tolerant but actually repellent to mosquitoes; second, it is capable of minimizing or completely eliminating the itching from bites either recent or old; third, it is capable of affecting the papules that mosquito bites habitually cause in such a way as to both prevent (or minimize) immediate reactions and cause the rapid recession of lesions of long standing.

The questions that these facts bring up are more numerous and include such uncertainties as that of proper dosage; what is the mechanism by which the thiamin acts; does it work in all individuals; is it effective against all species of mosquitoes, and what is the health value of this method of treatment.

The last question, most important of all, is least answerable. The final estimate of the importance of the whole procedure will depend upon the solutions of the problems which make its answer possible. Obviously, to have a health value, it must affect disease-carrying mosquitoes, and whether it does or not is not known. Then too, complete protection of human beings demands complete protection against the bite in all individuals. For many this has not been the

experience, even though the number and effects of the bites have been greatly reduced.

The mechanism of action is also without explanation at this time. Some patients have observed that there is a characteristic odor, typical of thiamin chloride, which emanates from the skin of persons receiving large doses of the vitamin. This might cause mosquitoes to avoid such persons and one could suspect this to be important when one watches mosquitoes approach heavily-dosed individuals, hover around them, perhaps alight temporarily in several places, and finally fly away. On the other hand one person was induced to apply an ointment containing three per cent of thiamin chloride on uncovered surfaces and then deliberately expose herself to the insects. She was not protected even though the odor was sufficiently prominent to cause her friends to avoid her. Furthermore it would be impossible to give more than partial credit to such a mode of action since such profound effects on itching and welts, even welts of long duration, could hardly result from a cast-off smell.

Even the question of required dosage is uncertain. Blood concentration determinations could do much to eliminate this, but, lacking these in the present study, the handicap was sidestepped by the simple expedient of trial and error. This method has shown that for rapid results initial dosage should be large, even fantastic in terms of the accepted normal daily requirements of this vitamin. It is presumed that the large initial dosage brings about a rapid saturation of the tissues and that quick therapeutic results are dependent upon that fact. By prescribing the vitamin in doses of 40 mg. every four hours until relief it has been possible to arrive at the rough conclusion that from 80 to 120 mg. the first twenty-four hours will produce satisfactory results in almost every person before the second day arrives. As a matter of fact the period before results are noticed is frequently but a few hours and this fact gives the treatment a practical value which is so well illustrated in Case 10. Here the patient deliberately protected himself against an anticipated temporary exposure to mosquitoes, in this case a fishing trip, by loading up on the vitamin before and during the event. The possibilities for the extension of this type of application to practical problems and situations are too numerous to mention. This is especially

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applicable to those individuals whose possible exposure to the insects is periodic and anticipatory.

Beyond this point I have not been able to conclude anything. As an example of the variabilities I might compare Cases 1 and 2. In the former, an infant of two years, the initial dosage of 100 mg. in the first twenty-four hours was entirely satisfactory and it resulted in a tremendous change for the better. However, the mother reported later that in order to keep her son adequately protected she had to give from 60 to 80 mg. per day. Her final reaction was to decide to keep him indoors. Case 2, on the other hand, was able to roam the countryside on 5 mg. per day after the initial saturation. Still others, adults, have been protected on 10 mg. daily after the large initial doses. Certain observations have caused me to wonder if excessive perspiration might not be one of the determining elements in the uncertainty of individual requirement.

Conclusions

Thiamin chloride in adequate dosage, administered either by mouth or by injection, is capable of reducing the mosquito hazard as it applies to human beings in at least three ways: first, it diminishes, may altogether eliminate, the approach of the mosquito toward the protected individual; second, it lessens and may entirely combat the itching that usually follows the bite; third, it minimizes and often entirely prevents the formation of a papule at the site of the bite. Indeed it causes a rapid recession of welts even of long standing.

Such being the case it is capable of contributing much to the elimination of the nuisance problem which the mosquito presents. Whether or not it can contribute toward the solution of the health problem depends upon many undetermined factors.

Reference

1. Shannon, W. Ray: Thiamin chloride in the treatment of itching conditions, particularly with reference to infants and children. *Urol. and Cutan. Rev.* 46:786, (Dec.) 1942.

DIET HINTS FOR REGULAR BLOOD DONORS

Those who are giving blood regularly to the American Red Cross for our fighting men should eat foods that supply plenty of iron, copper and high grade proteins, so that they will quickly build up more blood for themselves and the blood and plasma banks. Under food rationing, this takes a little planning. To help you with this, the American Dietetic Association has published recommendations and a sample menu.

Immediately after giving a blood donation, they advise one or two cups of hot cocoa for nourishment and stimulation. If cocoa is not available, take hot milk flavored as you wish.

Every day eat about four ounces of meat, poultry, fish or soybeans. Include liver or kidney two or more times a week. One-half cup of cooked soybeans is equivalent to about two ounces of edible meat.

One or more eggs should be eaten daily. One-quarter cup cooked soybeans is the equivalent of one egg.

Take one pint of milk or more daily. One ounce of American cheese is about equal to one seven-ounce glass of milk except that it has considerably less of two of the B vitamins, thiamin and riboflavin.

Two or more servings per week of soybeans, dried peas, beans, lentils or peanut butter are advised.

Two or more servings of fruit should be eaten daily. This should include one large serving of citrus fruit or tomato, fresh or canned. Apricots, peaches and prunes are good choices for the second fruit, when you can get them, because of their blood-building qualities.

Two or more servings of vegetables daily, one of them leafy green or yellow, should be eaten in addition to one or more daily servings of white or sweet potatoes.

Whole grain or enriched cereals and whole grain or enriched bread should be used daily. Fats and sweets may be added to, but not substituted for, the above foods. Too much sugar or fat will destroy the appetite for the other foods and may cause an undesirable weight gain. Remember that molasses, sorghum and maple syrup are good sources of iron as well as being good sweeteners for foods. Corn syrup and brown sugar also contain some iron.—*Science News Letter*, August 28, 1943.