

## DEFICIENCY DISEASE IN ELDERLY PEOPLE

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Various nutritional disturbances occur quite commonly during all periods of life. However, they are more likely to produce distressing symptoms in infancy and in old age. In infancy and childhood, the anabolic processes impose great demands for the growth of tissue, and the well-balanced diet must include adequate quantities of proteins, fats, carbohydrates, minerals and vitamins. When a proper quantity of these substances is lacking, we are confronted, sooner or later, with various disturbances in growth and nutrition which are classified as deficiency disease. However, the modern training of pediatricians, the activities of various health agencies and of the Press have served to sensitize and educate mothers concerning proper foods for their children. These efforts have lowered infant mortality and resulted in a greater proportion of more sturdy youngsters. The addition of proper vitamins has served also to compensate to a great degree for the ultra refinement or concentration of certain foods and to assure healthy growth during the dark winter months.

Among the elderly members of the household, however, the situation may be quite different. There is no organized effort on the part of the family or society to supervise their dietary habits. Very commonly, old people eat excessive quantities of carbohydrates which supply more calories than are warranted by their physical activities. Then, too, the foods selected very often are deficient in iron and in vitamin B, and they may lack many important and indispensable amino acids. As the result of such deficiencies in iron, protein and essential vitamins—particularly vitamin B—the bone marrow receives an inadequate supply of materials which are necessary to build and mature blood cells. Anabolism and catabolism are present at all ages, and the latter is more and more predominant as senility approaches. Therefore, proper materials must be supplied for the rebuilding of destroyed body cells, and the fluid environment of these cells must be satisfactory.

We know very little concerning the factors which influence the degenerative changes in old age. In the vast majority of patients we find that the degeneration is in the cardio-vascular renal system. Often there are disturbances in one organ or another due to a narrowing or obliteration of capillaries. Also, we realize that infectious diseases such as rheumatic fever, scarlet fever and syphilis have a certain predilection for blood vessels, and may hasten degenerative changes. However, as life progresses and the wear and tear of living increases, the individual will endanger his health and longevity if he fails to eat, absorb or assimilate the building stones which are required to repair or replace damaged cells.

Each year we see an increasing number of patients who are beyond middle life and who, as a rule, have symptoms due to degenerative diseases. In addition to this, we find many among them who show unmistakable evidence of deficiency disease. The association of these two conditions may produce an exaggeration of the symptoms of degenerative disease so that the very common complaints are fatigue, dyspnea, dizziness or failing memory, and in such cases, a thorough examination and a correct diagnosis are essential even though the patient may be beyond the sixth decade of life. If a typical picture is presented of pellagra, sprue, or pernicious anemia, the diagnosis can usually be made without great effort or expense. In the border line cases, however, proper laboratory and clinical facilities must be employed. If our experience and our interest in the problem are adequate, we are able to collect evidence from the clinical and laboratory sources, which will lead us to the correct diagnosis.

To illustrate, let us assume that we are dealing with an elderly patient who has fairly advanced arteriosclerosis. For many years, the diet has been faulty, and for a long time, he has obtained poor meat, his vegetables have been low in iron content, and he has failed to eat adequate amounts of the foods which are rich in vitamins. As a result, a fairly severe grade of anemia has developed. Unless this patient's heart is able to increase its load and maintain an increased minute volume of blood through the capillaries, or if the capillaries are unable to dilate to the required degree, the patient will suffer from tissue anoxemia. This may occur in the brain, the joints, the kidneys, or elsewhere in the body. Among our cases of pernicious anemia in elderly people—and pernicious anemia is well recognized as a deficiency disease—our therapeutic results show that an exaggerated state of tissue anoxemia often is present. By careful study, we usually can determine whether the anoxemia is the result of a faulty diet, excessive elimination of essential food elements such as occurs in the presence of chronic diarrhea, or whether it is the result of disturbed digestion of food or of deficient absorption of food from the intestinal tract. This necessitates a careful examination of the blood which includes an accurate estimation of the hemoglobin, determination of the color index, volume and saturation index and icterus index. When we add these findings to the clinical features such as glossitis or an atrophic tongue, gastric achlorhydria, and neurological changes, a diagnosis of iron-deficiency anemia, or of pernicious anemia may be made. Obviously, other types of anemia such as the anemia of pregnancy, of hemorrhage, of nephritis, of chemical poisoning and of tapeworm infestation necessarily must be considered. In any case, however, the symptoms of degenerative disease will be increased or modified by the degree of anemia which is present. Should we fail to make a complete diagnosis

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in such a case, we could scarcely expect to prescribe the proper treatment which would lead to satisfactory therapeutic results.

In an effort to obtain further information on this subject, we made a careful survey of the clinical records of 50 patients with pernicious anemia whose ages were in the sixth, seventh and eighth decades of life. In each case, the diagnosis of pernicious anemia was based upon a characteristic macrocytosis of the red cells, a color index above one, an absence of free hydrochloric acid in the stomach as determined by the Ewald test meal, and frequently glossitis or atrophy of the tongue, and in many instances, the clinical picture of subacute degeneration of the spinal cord. In all but two patients, definite associated conditions, such as arteriosclerosis, diabetes, cardiac insufficiency and various abnormalities in the gastro-intestinal system were found which contributed to the symptomatology. So far as we could determine, the diagnosis of pernicious anemia had not been made prior to an examination in 44 (88 per cent) of the cases which were studied, but the symptoms had been attributed to other pathological states. A correct diagnosis had been made elsewhere in 16 instances (32 per cent) and of these, only six patients had taken a sufficient quantity of liver to maintain the red cell level at 4 million per cm. As a result, all but two of the patients had one or more of the following symptoms: weakness, shortness of breath, failing memory, failing vision, sore tongue and various degrees of numbness and ataxia. While these symptoms can occur in patients with degenerative diseases who have no clinical anemia, our study has convinced us that in this series of cases, pernicious anemia played an important and often the major rôle in the symptomatology.

The following three cases illustrated some of the diagnostic problems which we have encountered and the treatment which has been used.

*Case 1:* A woman, 73 years of age, came to the Clinic complaining of extreme fatigue, pains in the joints, numbness in the fingers and slight soreness of the tongue. The admission diagnosis was arteriosclerosis and hypertrophic osteoarthritis. Physical examination showed these two diseases were present in a quite marked degree. It was found that the patient had a moderate degree of glossitis, a gastric free acidity of 0 and considerable pallor which led us to suspect the presence of pernicious anemia. Examination of the blood revealed 1,990,000 red blood cells, hemoglobin, 55 per cent (Haden-Hausser); volume index, 1.4; saturation index, 0.98; and icterus index, 20.

*Treatment:* Liver extract was administered in doses of 3 cc. intramuscularly daily for two weeks. A high vitamin diet and one-half pound of cooked liver three times a week was prescribed. As soon as the blood count reached normal, a maintenance dose of 3 cc. of liver extract intramuscularly once a week and the same diet of liver was used. As soon as the blood returned to normal, the joint pains disappeared and other symptoms were alleviated with the exception of

numbness in the fingers. When the patient was seen last, 22 months after treatment was begun, her physical strength and mental vigor were normal.

*Comment:* This patient, who had symptoms which appeared to be due to arteriosclerosis and hypertrophic osteoarthritis, was restored to satisfactory health by the adequate treatment of pernicious anemia.

*Case 2:* The patient, a woman 62 years of age, complained of intermittent attacks of nausea and vomiting which had been present for ten years. A previous examination in another city showed an obstructing lesion at the outlet of the stomach and a diagnosis of carcinoma of the pylorus had been made. The principal symptoms were nausea and vomiting, weakness, shortness of breath and a weight loss of 10 pounds in 6 months.

Roentgen examination of the stomach showed that the deformity was due to a diverticulum of the second part of the duodenum which exerted pressure on the duodenal bulb and pyloric antrum. It was evident that the mechanical obstruction was the cause of the vomiting. The Ewald test meal was negative for free hydrochloric acid. The tongue was red and sore, and the neurological examination revealed sensory and reflex abnormalities in the lower extremities which were characteristic of combined degeneration of the spinal cord. Examination of the blood revealed a severe grade of pernicious anemia. The blood examination showed 2,260,000 red blood cells; hemoglobin, 55 per cent; color index, 1.22; volume index, 1.33; saturation index, 0.92; icterus index, 4.0.

*Treatment:* Anti-anemic treatment consisted of daily intramuscular injections of 3 cc. of liver extract for 17 days, one teaspoonful of dilute hydrochloric acid by mouth with each meal, Haliver oil capsules three times a day, and a pernicious anemia diet. Following this parenteral liver therapy, 1 ounce of liver extract by mouth four times a day was used, and the hydrochloric acid was continued. This was gradually reduced to 1 ounce of liver extract daily. The reticulocyte response to intramuscular liver therapy was 9.7 per cent in eight days. In seven weeks, the blood examination showed red blood cells, 4,580,000; hemoglobin, 84 per cent; color index, 0.91; volume index, 1.09; saturation index, 0.84; icterus index, 3.0. The clinical improvement, likewise, was prompt and striking. Vomiting ceased, the strength and weight returned to normal, and the glossitis and the ataxia or tingling in the lower extremities cleared up.

*Comment:* It appears that two therapeutic procedures were responsible for the satisfactory results in this case. First, the period of bed rest was undoubtedly responsible for the relief of the pyloric obstruction, and second, the specific anti-anemia treatment cleared up the deficiency symptoms. The patient has remained in excellent health for two years and as yet, no surgical interference has been necessary.

*Case 3:* The patient was a woman 64 years of age who was admitted to the hospital with the diagnosis of chronic nephritis. She had been troubled with swelling of the feet and ankles for 4 or 5 years which was accompanied by palpitation and dyspnea, swelling of the eyelids and numbness of the hands and feet. The tongue was atrophic, the gastric contents showed no free hydrochloric acid, and there was some dehydration. The skin was dry, and it was pale and yellowish in color. The spleen and liver were palpable. The sensorium was quite clouded. The urea clearance test showed 48 per cent function at the end of the first hour and 56 per cent at the end of the second hour.

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The serum protein was 5.86—albumin 3.63, globulin, 2.23. Examination of the blood showed 1,030,000 red blood cells; hemoglobin, 32 per cent; color index, 1.52; volume index, 1.66; saturation index, 0.91; icterus index, 10.0. Specific liver therapy for pernicious anemia was administered, and in three and one-half months, examination of the blood revealed 5,180,000 red blood cells; hemoglobin, 84 per cent; color index, 0.81; volume index, 0.91; saturation index, 0.89; icterus index, 4. The maximum reticulocyte response was 31.6 per cent on the sixth day of treatment.

The therapeutic results were most satisfactory. When the anemia was alleviated, the edema, air hunger, fatigue, mental confusion, and the dryness of the skin had entirely disappeared and only a slight residual numbness in the feet remained.

*Comment:* The satisfactory results in this case are sufficient evidence to show that the anemia was not due to chronic nephritis but to a deficiency of the specific anti-anemia substances which are present in liver and liver extract.

In elderly patients who may have one or more forms of degenerative disease, one can very easily overlook cases of atypical pernicious anemia. Unless complete blood studies are made in a well-equipped blood laboratory, a proper classification of the anemia cannot be made. We do not believe that pernicious anemia is especially common in elderly people; however, when it does occur and when the diagnosis is made, the result of treatment is fully as satisfactory as it is in younger people provided degeneration of the body has not progressed too far.