Iodine in appropriate amounts, like iron, calcium, copper, and many other chemical elements, is essential throughout life. Yet many people do not get enough iodine from their food to meet their normal requirements, and long-continued iodine deficiency may result in serious disease, or at least in a chronic state of borderline malnutrition.

It has been demonstrated many times in this country and abroad that iodine deficiency is easily corrected and better health achieved through the daily routine use of table salt to which small amounts of iodine have been added by the manufacturer. This salt is as pure as, and tastes no different from, ordinary salt. It can be obtained at no extra cost or inconvenience to the consumer, and he can voluntarily insure his supply of this food essential.

IODINE AND THE THYROID GLAND

The thyroid gland is a large U-shaped gland in the neck. It has been poetically described as contributing to the beauty of the neck by filling up the vacant spaces around the larynx, particularly in women. The weight of the thyroid gland in the male varies from 20 to 60 g., or about 1 to 2 ounces. The normal thyroid in women usually is a little heavier. Its rich supply of blood and lymph attests to the importance of this gland to the entire body.

Iodine taken in the form of iodized salt, or iodine-rich food, such as oysters, salmon, or tuna fish, travels through the blood in the form of a salt, an iodide. The thyroid gland, of all the body tissues, has an affinity for iodine. When the thyroid gland absorbs the iodide it is oxidized by an enzymatic process. This releases iodine in a form which readily combines with an amino acid, tyrosine. Two molecules of this compound combine to form thyroxine, which is the thyroid hormone. Thyroxine may be carried by the blood stream to produce striking effects in many parts of the body, or it may be stored as a colloid, thyroglobulin, to be called upon when needed.

COURSE OF FOOD IODINE IN THE BODY

<table>
<thead>
<tr>
<th>Food iodine</th>
<th>Iodized salt, seafood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alimentary canal</td>
<td>Iodine absorbed by body</td>
</tr>
<tr>
<td>Blood stream</td>
<td>Iodine carried to the thyroid</td>
</tr>
<tr>
<td>Thyroid gland</td>
<td>Iodide (iodine) + tyrosine = thyroxine + protein = thyroglobulin</td>
</tr>
<tr>
<td>Thyroglobulin</td>
<td>Used as hormone or stored as colloid</td>
</tr>
</tbody>
</table>
Just as calcium is essential for formation of bones, and iron is necessary to form hemoglobin for blood, so iodine is absolutely essential for formation of thyroxine. The thyroid normally contains from 15 to 20 mg. of iodine. In normal adults a supply of about 75 mg. of iodine per year will maintain the thyroid in normal condition.

The thyroid hormone controls the rate of heat production in the body by controlling the rate of cell oxidation. Heat production is coupled with energy liberation from the cells. Basal metabolism tests measure thyroid activity by measuring the rate of heat production in a resting individual.

Other functions of the thyroid are to aid in stimulation of normal growth of bones, hair, and skin; normal development of the brain; stimulation of sexual development at puberty; maintenance of a normal pregnancy; and production of an adequate milk supply during nursing.

When the thyroid becomes enlarged, it is recognized as a goiter.

Simple goiter. This type of goiter is by far the most common form. It begins with a lessening in the amount of iodine in the colloid (the storage fluid in the thyroid gland) and an increase in size and number of thyroid cells. The enlargement which occurs in simple goiter may be accompanied by a mild degree of hypothyroidism, or underactivity. The enlargement represents an effort to manufacture more adequate amounts of thyroxine.

Simple goiter is so called because it does not cause any toxic or poisoning symptoms. Its importance from a medical standpoint is due to the fact that it may lead to a more serious form and may subsequently become toxic or poisonous; also, symptoms due to pressure on neighboring structures such as the windpipe may occasionally be bothersome. Where iodized salt is used from infancy, a simple goiter, with very few exceptions, is avoided.

Cretinism. A cretin is a child who is dwarfed by lack of sufficient thyroid secretion during fetal life. Cretins, in the past, were found in districts where goiter was common. Among these areas are the Himalayas, the Pyrenees, the Alps, the Andes in South America, the St. Lawrence and Great Lakes regions, and the northwestern area of the United States. So many of these unfortunates were found in certain localities in the Alps that government aid was necessary to support them.

In cretins, the mental, physical, and sexual development is greatly retarded. If these cretin dwarfs live to adulthood, they retain their childhood body build, and may not mature sexually. If untreated, their mentality may be arrested at a low level, making them unable to support themselves. The metabolism is very low, the skin has a typical dry, thick appearance, and deafmutism is common. At autopsy, abnormal or very small thyroid glands are found.

If thyroid extract is given to cretins at an early age, marked improvements result but complete recovery does not always occur. Cretinism should be prevented by assuring an adequate supply of iodine for the mother before and during pregnancy.

Myxedema. When destruction or degeneration of the thyroid gland occurs at any time after birth, the hypothyroid condition called myxedema results. Typical manifestations are a loss of mental and physical vigor, dry brittle hair, an apathetic, lethargic reaction to mental stimuli, a peculiar thickening of the skin, and a low-metabolic rate.
The outlook for the adult with myxedema is hopeful today. Three months of administration of thyroid extract makes a dramatic improvement. Thyroid extract will control the symptoms of myxedema entirely, and keep the patient in good health.

**Hyperthyroidism.** Hyperthyroidism, or toxic goiter, may begin in a previously healthy individual with enlargement of the gland and simultaneous toxic symptoms of rapid pulse, palpitation, tremor, nervousness, restlessness, and irritability. The type of toxic goiter is called primary or exophthalmic goiter, or Graves' disease.

A severe, primary, toxic goiter may soon be accompanied by a popeyed condition, medically called exophthalmos. The metabolic rate goes up, perhaps as high as 80 per cent or more above normal, and a rapid burning of fuel is accompanied by a rapid loss in weight. The animation increases to an abnormal nervousness which is very trying to the patient and his associates. There may be difficulty in breathing upon exertion and severe heart symptoms. Fortunately, various methods of cure for exophthalmic goiter are known today.

A temporarily increased demand for iodine may make a previously sufficient iodine supply dangerously inadequate. The well-known situations of increased demand are puberty, pregnancy, and lactation. Since the thyroid hormone is closely associated with the gonads, sex glands, it is natural that sexual development should make an increased call for thyroid hormone. Enlargement of the thyroid often occurs during these growth periods. Many obstetricians today are giving additional iodine to all their pregnant and lactating patients.

The Food and Nutrition Board of the National Research Council gives the daily requirement of iodine for an adult as 0.15 to 0.30 mg. and states that this need can be met by the regular use of iodized salt. Attention is called to the special importance of its use in adolescence and pregnancy.

**INCIDENCE OF GOITER AND RELATION TO IODINE**

Goiter occurs throughout the world, wherever the supply of iodine is inadequate. Michigan lies in the Great Lakes goiter belt. In 1924 a survey placed the incidence of goiter in Michigan at 38.6 per cent. A promotion plan for consumption of iodized salt was put into effect, and in 1928 a re-examination showed the incidence to have decreased to 9 per cent.

During the depression approximately two-thirds of the families in the copper-mining community of Calumet, Michigan, were on relief. Relief officials, endeavoring to cut costs, distributed noniodized salt. The result was an upshoot in the goiter rate among the families using the iodine-lacking salt. Sixty per cent of the children who received noniodized salt had goiter. Only 3 per cent of the children, in the same community, who had remained on iodized salt had goiter.

Some plan of giving everyone the food equivalent of iodine has been tried in many parts of the globe for many years. The most popular and most practical way has been to add an infinitesimal (0.01 per cent) amount of necessary iodine to table salt.

Since iodine occurs in nature in some sources of salt, iodized salt is properly regarded as natural food. It is an improved salt. Simple goiter may be prevented by eating food iodine, and tiny preventive amounts of food iodine in iodized salt are safe for the sufferer
from toxic goiter. Many people who take vitamin tablets and are careful about getting an adequate supply of vitamins neglect the need for a normal supply of iodine. With today's emphasis on positive health, many medical authorities are actively endorsing the use of food iodine as a simple, cheap, easy insurance against the possible handicaps of a subclinical iodine deficiency.

WHY IODINE MAY BE INADEQUATE IN DIETS

From ancient times goiter has been known to exist in certain regions. In areas where endemic goiter exists, the soil, water, and vegetation are poor in iodine. Analysis of drinking water in cities in the United States shows a wide variation in iodine content, from 0.01 microgram per kilogram in Duluth, Minnesota and Spokane, Washington to 73.30 micrograms per kilogram in San Dimas, California.

Seafood is a good source of iodine, but the iodine content varies with the variety of fish or crustacean and with the iodine content of the sea water from which it comes. Seafood-eating people, even in a goitrous area, are remarkably free from goiter.

Some natural salt deposits contain iodine, but others do not. A dramatic demonstration of man's accidental conversion of a naturally healthy area into a goitrous area occurred in the Kanawha River Valley of West Virginia. Prior to 1900, goiter was exceedingly rare, according to local physicians. Table salt came from the local salt wells. It was a crude, coarse salt with brown particles. After 1900, a sparkling white salt was shipped in. This white salt contained no iodine, but it pushed the crude salt off the market. During the next quarter of a century, the goiter rate rose sharply, and by 1922 a goiter survey showed that about 60 per cent of adolescent girls in that valley had goiter.

The iodine content of plants can be increased by addition of iodine-containing salts to the soil, and the iodine content of milk can also be increased by feeding suitable rations to the cow. However, such practices are considered to be utterly impractical in meeting the goiter problem. They are too inefficient, uneconomic, and difficult to put into operation on a national scale.

It seems that the goiter problem in the United States today is due largely to lack of measures which would ensure everyone obtaining iodized salt. Many people do not recognize the importance of iodized salt, others have been misled into thinking it a medicated product, and representatives of the salt industry insist on making both iodized and uniodized salt available for household use. Legislation to correct this has been proposed, but is being held in abeyance until the effect of a new public health education campaign on iodized salt has been demonstrated.

A WORD TO DIAMOND CRYSTAL-COLONIAL SALESMEN

Time and time again our salesmen are questioned about the various properties of iodized salt as contrasted to Plain Free-Running Salt. Much information has been disseminated regarding the actual need for iodized salt in the various sections of the country. At long last a very complete and concise resume has been prepared. It was written by Dr. W. H. Sebrell, Jr. of the National Institutes of Health in Bethesda, Maryland and published in the May, 1950 issue of "Nutrition Reviews."

It is reprinted here in its entirety. We urge you to read it carefully, digesting it thoroughly. It should be of immense help in discussing the relative properties of iodized and plain salt to persons interested.