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Chapter 13

Surviving Without Doctors

A TEMPORARY RETURN TO SELF-HELP

Most doctors, hospital facilities, and medical supplies are located in cities. An all-out attack would destroy most of these modern blessings. Even if medical assistance were nearby, only a few of the survivors confined to shelters in areas of heavy fallout would be able to get needed medicines or the help of a doctor. For periods ranging from days to months, most unprepared survivors would be forced to live under medical conditions almost as primitive as those experienced by the majority of mankind for all but the past few decades of human history.

BENIGN NEGLECT

Life without modern medical help would be less painful and hazardous for those survivors who have some practical knowledge of what should be done—or not done—under primitive, unsanitary conditions. Information about first aid and hygienic precautions can be obtained from widely available Red Cross and civil defense booklets and courses. This knowledge, with a stock of basic first aid supplies, would reduce suffering and prevent many dangerous illnesses. However, first aid instructions do not include advice about what to do for serious injuries and sicknesses if no doctors or effective medicines are available.

Where There Is No Doctor,³² the excellent self-help handbook recommended by Volunteers in Technical Assistance, gives much information that goes far beyond the scope of first aid. But even this handbook repeatedly recommends getting professional medical help whenever possible for serious injuries and illnesses.

Fortunately, the human body has remarkable capabilities for healing itself, especially if the injured

or sick person and his companions practice intelligent "benign neglect." Such purposeful non-interference with the body's recuperative processes was called "masterful inactivity" by Colonel C. Blanchard Henry, M.D., a widely recognized authority on mass casualty evacuation and treatment. Colonel Henry was one of the first medical officers to visit Hiroshima and Nagasaki after their destruction and was an experienced analyzer of civil defense preparations in several countries.

The following is a brief summary of Colonel Henry's medical advice for nuclear war survivors living under primitive conditions and unable to get the help of a doctor or effective medicines.³³ (Additional advice, enclosed in brackets, is from a medical publication.³⁴)

- **Wounds:** Apply only pressure dressings to stop bleeding—unless an artery has been cut, as by a blast-hurled piece of glass. If blood is spurting from a wound, apply both a pressure dressing and a windlass-type tourniquet. Loosen the tourniquet pressure about every 15 minutes, to allow enough blood to reach the flesh beyond the tourniquet and keep it alive. There is a fair chance that clotting under the pressure dressing will stop blood loss before it becomes fatal.

- **Infected wounds:** Do not change dressings frequently. The formation of white pus shows that white corpuscles are mobilizing to combat the infection. In World War I, wounded soldiers in hospitals suffered agonies having their wounds cleaned and dressed frequently; many died as a result of such harmful care. In contrast, before antibiotics became available late in World War II, casts and dressings on infected wounds sometimes were not changed for weeks. (The author saw this treatment in China and India and smelled the stench resulting

from such "benign neglect" of American soldiers' wounds—neglect that helped save limbs and lives.)

- **Pieces of glass deeply embedded in flesh:** Do not probe with tweezers or a knife in an attempt to extract them. Most glass will come out when the wounds discharge pus.
- **Burns:** Do not apply grease, oil or any other medicine to the burned area. Cover the area securely with a clean, dry dressing or folded cloth. Do not change the dressing frequently. [For most burns, the bandage need not be removed until the tenth to fourteenth day. Give plenty of slightly salted water: about 1 teaspoon (4.5 gm) of salt per quart (or liter), preferably chilled, in amounts of 1 to 3 liters daily.³⁴]
- **Broken bones:** Apply simple splints to keep the bones from moving. Do not worry about deformities; most can be corrected later by a doctor. Do not attempt traction setting of broken bones.
- **Shock:** Keep the victim warm. Place blankets or other insulation material under him. Do not cover him with so many blankets that he sweats and suffers harmful fluid losses. Give him plenty of slightly salted water [about a teaspoon of salt in a liter (or quart) of water].
- **Heat prostration:** Give adequate fluids, including slightly salty water.
- **Simple childbirth:** Keep hands off. Wait until the mother has given birth. Do not tie and cut the cord unless a potent disinfectant is available. Instead, use the primitive practice of wrapping the cord and the placenta around the infant until they dry. Avoid the risk of infecting the mother by removing the rest of the afterbirth; urge the mother to work to expel it.
- **Toothache:** Do not attempt to pull an aching tooth. Decaying teeth will abscess and fall out. This is a painful but seldom fatal process—one which was endured by most of our remote ancestors who reached maturity.

VETERINARIAN ANTIBIOTICS

People who for decades have used antibiotics to combat their infections have not produced normal quantities of antibodies, and have subnormal resistance to many infections. People who have not been dependent on antibiotics have these antibodies. In the aftermath of a massive nuclear attack, most surviving Americans would be in rural areas; many

would need antibiotics. A large part of their need could be met by the supplies of veterinarian antibiotics kept on livestock and chicken farms, at feed mills, and in small towns. Many animals are given more antibiotics in their short lives than most Americans receive in theirs. Hogs, for example, are given antibiotics and/or other disease-controlling medicines in their feed each day. In many farming areas, veterinary antibiotics and other medicines are in larger supply than are those for people. Realistic preparations to survive an all-out attack should include utilizing these supplies.

RADIATION SICKNESS

For the vast majority of Americans who would receive radiation doses from a massive attack, the help of doctors, antibiotics, blood transfusions, etc., would not be of life-or-death importance. Very few of those receiving acute doses (received within 24 hours) of less than 100 R would become sick, even briefly. All of those exposed to acute doses between 100 R and 200 R should recover from radiation effects.⁶ However, under post-attack conditions of multiple stresses and privations, some who receive acute radiation doses of 100 R to 200 R may die of infectious diseases because of their reduced resistance. If total doses this size or even several times larger are received over a period of a few months in small doses of around 6 R per day, no incapacitating symptoms should result. *The human body usually can repair almost all radiation damage if the daily doses are not too large.*

The majority of those with acute doses of less than about 350 R will recover without medical treatment. Almost all of those receiving acute doses of over 600 R would die within a few weeks, even if they were to receive treatment in a typical hospital during peacetime. If all doctors and the equipment and drugs needed for heroic treatments magically were to survive an attack — and persons suffering from radiation sickness could reach them — relatively few additional lives could be saved.

The most effective way to reduce losses of health and life from radiation sickness is to prevent excessive exposure to radiation. Adequate shelter and essential life-support items are the best means of saving lives in a nuclear war. The following information on radiation sickness is given to help the reader understand the importance of building a good shelter and to help him distinguish between symptoms of common illnesses and first symptoms of radiation sickness.

The first symptoms of radiation sickness are nausea, vomiting, headache, dizziness, and a general

feeling of illness.⁶ These symptoms begin several hours after exposure to acute doses of 100 R to 200 R, and within 30 minutes or less after receiving a fatal dose. A source of probable confusion is the fact that one or more of these symptoms is experienced by many people when they are first exposed to great danger, as in an air raid shelter during a conventional bombardment.

The occupants of a shelter might worry unnecessarily for weeks, mistaking their early emotional reactions for the initial phase of radiation sickness. This would be particularly true if they had no dependable instrument for measuring radiation, or if none of them knew how to use such an instrument.

The initial symptoms end within a day or two. Then follows the latent phase of radiation sickness, during which the patient experiences few, if any, symptoms. If the dose received was in the non-fatal range, the latent phase may last as long as 2 weeks.

In the final phase, the victim of serious or fatal radiation sickness will have reduced resistance to infections and is likely to suffer diarrhea, loss of hair, and small hemorrhages of the skin, mouth, and/or intestinal tract. Diarrhea from common causes may be confused with the onset of radiation sickness, but hemorrhages and loss of much hair are clear indications of having received serious, but not necessarily fatal, radiation exposure. The final phase usually lasts for one to two months. Any available antibiotics should be reserved for this critical phase of the illness.

Doses of 1000 R to 5000 R result in bloody diarrhea, fever, and blood circulation abnormalities, with the initial symptoms beginning within less than 30 minutes after exposure and the final phase occurring less than a day thereafter. Death results within 2 to 14 days. The victim of a dose of over 5000 R dies a hard death within 48 hours, due to radiation damage to the central nervous system.

Recovery from most cases of radiation sickness will be more likely for patients who receive a well balanced diet, rest, freedom from stress, and clean surroundings. But most patients, even without these advantages, will survive—as proved by the survival of thousands of Hiroshima and Nagasaki citizens who suffered serious radiation sickness. Nursing radiation victims is not hazardous. Even persons dying from a dose of 5000 R are not sources of dangerous radiation

by wartime standards, and radiation sickness is not contagious.

LIFETIME RISKS FROM RADIATION

The large radiation doses that many survivors of a nuclear attack would receive would result in serious long-term risks of death from cancer, but the lifetime risks from even large wartime radiation doses are not as bad as many people believe. Significantly, no official U.S. estimates have been made available to the public regarding excess cancer deaths to be expected if America is subjected to a nuclear attack. However, reliable statistics are available on the numbers of additional fatal cancers suffered by persons who received large whole-body radiation doses at Hiroshima and in other disasters, and who lived for months to decades before dying. Dr. John N. Auxier—who for years was a leading health physicist at Oak Ridge National Laboratory, was one of the American scientists working in Japan with Japanese scientists studying the Hiroshima and Nagasaki survivors, and currently is working on radiation problems with International Technology Corporation—in 1986 summarized for me the risk of excess fatal cancers from large whole-body radiation doses: “If 1,000 people each receive a whole-body radiation dose of 100 rems [or 100 rads, or 100 R], about 10 additional fatal cancers will result.” These 10 fatal cancers will be in addition to about 150 fatal cancers that normally will develop among these 1,000 people during their lifetimes. This risk is proportional to large doses; thus, if 1,000 people each receive a dose of 200 rems, about 20 additional lethal cancer cases would be expected.

“Rem” is an abbreviation for “roentgen equivalent (in) man.”⁷ The rem takes into account the biological effects of different kinds of radiation. For external gamma-ray radiation from fallout, the numerical value of an exposure or dose given in roentgens is approximately the same as the numerical value given in rems or in rads. The rad is the unit of radiation energy absorption in any material and applies to all kinds of nuclear radiations. Therefore, for simplicity’s sake, this book gives both instrument readings (exposures) and doses in roentgens (R).

The reader desiring good information on the long-term and worldwide effects of radiation is referred to two authoritative reports of the National Academy of Sciences, Washington, D.C. 20006: *The Effects on Populations of Exposures to Low Levels of Ionizing Radiation* (The BEIR Report made by the NAS Committee on the Biological Effects of Ionizing

Radiation) (November 1972); and *Long-Term Worldwide Effects of Multiple Nuclear-Weapons Detonations* (1975).

From the standpoint of basic survival know-how, these and other complicated scientific studies show that to minimize lifetime risks from radiation, after a nuclear attack people should:

- Provide the best protection against radiation for pregnant women and young children, since fetuses and the very young are the most likely to be hurt by radiation.
- Realize that, with the exception of lung cancer, older people are no more susceptible to radiation injury than are those in the prime of life. Also, a 65-year-old probably will not live long enough to die of a cancer that takes 20 years or more to develop. Many older people, if they know realistic risk estimates, will choose to do essential outdoor work and take non-incapacitating radiation doses in order to spare younger members of their families the risk of getting cancer decades later.

PREVENTION OF THYROID DAMAGE FROM RADIOACTIVE IODINES

There is no medicine that will effectively prevent nuclear radiations from damaging the human body cells that they strike. However, a salt of the elements potassium and iodine, taken orally even in very small quantities ¹/₂ hour to 1 day before radioactive iodines are swallowed or inhaled, prevents about 99% of the damage to the thyroid gland that otherwise would result. The thyroid gland readily absorbs both non-radioactive and radioactive iodine, and normally it retains much of this element in either or both forms. When ordinary, non-radioactive iodine is made available in the blood for absorption by the thyroid gland before any radioactive iodine is made available, the gland will absorb and retain so much that it becomes saturated with non-radioactive iodine. When saturated, the thyroid can absorb only about 1% as much additional iodine, including radioactive forms that later may become available in the blood; then it is said to be blocked. (Excess iodine in the blood is rapidly eliminated by the action of the kidneys.)

An excess of ordinary iodine retained in the thyroid gland is harmless, but quite small amounts of radioactive iodine retained in the thyroid eventually will give such a large radiation dose to thyroid cells that abnormalities are likely to result. These would include loss of thyroid function, nodules in the

thyroid, or thyroid cancer. Sixty-four Marshall Islanders on Rongelap Atoll were accidentally exposed to radioactive fallout produced by a large H-bomb test explosion on Bikini Atoll, about 100 miles away. Twenty-two of them developed thyroid abnormalities beginning nine years later.⁶ In the two days before they were taken out of the fallout area, these completely uninformed natives, living essentially outdoors, had received estimated whole-body gamma-ray doses of about 175 R from the fallout all around them. They absorbed most of the radioactive iodine retained by their thyroid glands as a result of eating and drinking fallout-contaminated food and water during their two days of exposure. (Because of unusual environmental conditions at the time of fallout deposition, some of the retained radioactive iodine may have come from the air they breathed.)

An extremely small and inexpensive daily dose of the preferred non-radioactive potassium salt, potassium iodide (KI), if taken ¹/₂ hour to 1 day before exposure to radioactive iodine, will reduce later absorption of radioactive iodine by the thyroid to only about 1% of what the absorption would be without this preventive measure. Extensive experimentation and study have led to the Federal Drug Administration's approval of 130-milligram (130-mg) tablets for this preventive (prophylactic) use only.^{36,37} A 130-mg dose provides the same daily amount of iodine as does each tablet that English authorities for years have placed in the hands of the police near nuclear power plants, for distribution to the surrounding population in the very unlikely event of a major nuclear accident. It is quite likely that a similar-sized dose is in the Russian "individual, standard first-aid packet." According to a comprehensive Soviet 1969 civil defense handbook,³⁸ this first-aid packet contains "anti-radiation tablets and anti-vomiting tablets (potassium iodide and etaperain)."

- **Prophylactic use of potassium iodide in peacetime nuclear accidents.**

When the Three Mile Island nuclear reactor accident was worsening and it appeared that the reactor's containment structure might rupture and release dangerous amounts of radioactive iodines and other radioactive material into the atmosphere, the Government rushed preparation of small bottles of a saturated solution of potassium iodide. The reactor's containment structure did not rupture. The 237,013 bottles of saturated KI solution that were delivered to Harrisburg, Pennsylvania—mostly too late to

have been effective if the Three Mile Island accident had become an uncontained meltdown — were stored in secret in a warehouse, and were never used.

Since this famous 1979 accident, that injured no one, the Governors of the 50 states have been given the responsibility for protecting Americans against radioiodines by providing prophylactic potassium iodide. By May of 1986, only in Tennessee have Americans, other than some specialists, been given potassium iodide tablets; around one nuclear reactor some 7,500 residents have been given the officially approved KI tablets, to assure their having this protection if a nuclear accident occurs.

In April of 1982 the Bureau of Radiological Health and Bureau of Drugs, Food and Drug Administration, Department of Health and Human Services released "FINAL RECOMMENDATIONS, Potassium Iodide As A Thyroid-Blocking Agent In A Radiation Emergency: Recommendations On Use". These lengthy recommendations are summarized in the FDA's "mandated patient product insert". (See a complete copy in the following section.) This insert is packed with every bottle of non-prescription KI tablets sold. However, the lengthy FDA recommendations contain many facts not mentioned in this required insert, including the following: "Based on the FDA adverse reaction reports and an estimated 48×10^6 [48 million] 300-mg doses of potassium iodide administered each year [in the United States], the NCRP [National Council on Radiation Protection and Measurements] estimated an adverse reaction rate of from 1 in a million to 1 in 10 million doses." (Note that this extremely low adverse reaction rate is for doses over twice as large as the 130-mg prophylactic dose.)

FDA PATIENT INFORMATION USE OF 130-MG SCORED TABLETS OF POTASSIUM IODIDE FOR THYROID BLOCKING

(Potassium Iodide Tablets, U.S.P.)
(Pronounced poe-TASS-e-um EYE-oh-dyed)
(Abbreviated KI)

TAKE POTASSIUM IODIDE ONLY WHEN PUBLIC HEALTH OFFICIALS TELL YOU. IN A RADIATION EMERGENCY, RADIOACTIVE IODINE COULD BE RELEASED INTO THE AIR. POTASSIUM IODIDE (A FORM OF IODINE) CAN HELP PROTECT YOU.

IF YOU ARE TOLD TO TAKE THIS MEDICINE, TAKE IT ONE TIME EVERY 24 HOURS. DO NOT TAKE IT MORE OFTEN. MORE WILL

NOT HELP YOU AND MAY INCREASE THE RISK OF SIDE EFFECTS. DO NOT TAKE THIS DRUG IF YOU KNOW YOU ARE ALLERGIC TO IODINE (SEE SIDE EFFECTS BELOW).

INDICATIONS

THYROID BLOCKING IN A RADIATION EMERGENCY ONLY

DIRECTIONS FOR USE

Use only as directed by State or local public health authorities in the event of a radiation emergency.

DOSE

ADULTS AND CHILDREN ONE YEAR OF AGE OR OLDER: One (1) tablet once a day. Crush for small children.

BABIES UNDER ONE YEAR OF AGE: One-half (½) tablet once a day. Crush first.

DOSAGE: Take for 10 days unless directed otherwise by State or local public health authorities.

Store at controlled room temperature between 15° and 30°C (59° to 86°F). Keep bottle tightly closed and protect from light.

WARNING

POTASSIUM IODIDE SHOULD NOT BE USED BY PEOPLE ALLERGIC TO IODIDE. Keep out of the reach of children. In case of overdose or allergic reaction, contact a physician or public health authority.

DESCRIPTION

Each IOSAT™ Tablet contains 130 mg. of potassium iodide.

HOW POTASSIUM IODIDE WORKS

Certain forms of iodine help your thyroid gland work right. Most people get the iodine they need from foods like iodized salt or fish. The thyroid can "store" or hold only a certain amount of iodine.

In a radiation emergency, radioactive iodine may be released in the air. This material may be breathed or swallowed. It may enter the thyroid gland and damage it. The damage would probably not show itself for years. Children are most likely to have thyroid damage.

If you take potassium iodide, it will fill up your thyroid gland. This reduces the chance that harmful radioactive iodine will enter the thyroid gland.

WHO SHOULD NOT TAKE POTASSIUM IODIDE

The only people who should not take potassium iodide are people who know they are allergic to iodide. You may take potassium iodide even if you are taking medicines for a thyroid problem (for example, a thyroid hormone or antithyroid drug). Pregnant and nursing women and babies and children may also take this drug.

HOW AND WHEN TO TAKE POTASSIUM IODIDE

Potassium iodide should be taken as soon as possible after public health officials tell you. You should take one dose every 24 hours. More will not help you because the thyroid can "hold" only limited amounts of iodine. Larger doses will increase the risk of side effects. You will probably be told not to take the drug for more than 10 days.

SIDE EFFECTS

Usually, side effects of potassium iodide happen when people take higher doses for a long time. You should be careful not to take more than the recommended dose or take it for longer than you are told. Side effects are unlikely because of the low dose and the short time you will be taking the drug.

Possible side effects include skin rashes, swelling of the salivary glands, and "iodism" (metallic taste, burning mouth and throat, sore teeth and gums, symptoms of a head cold, and sometimes stomach upset and diarrhea).

A few people have an allergic reaction with more serious symptoms. These could be fever and joint pains, or swelling of parts of the face and body and at times severe shortness of breath requiring immediate medical attention.

Taking iodide may rarely cause overactivity of the thyroid gland, underactivity of the thyroid gland, or enlargement of the thyroid gland (goiter).

WHAT TO DO IF SIDE EFFECTS OCCUR

If the side effects are severe or if you have an allergic reaction, stop taking potassium iodide. Then, if possible, call a doctor or public health authority for instructions.

HOW SUPPLIED

Tablets (Potassium Iodide Tablets, U.S.P.): bottles of [number of tablets in a bottle] tablets (). Each white, round, scored tablet contains 130 mg. potassium iodide.

Note that this official FDA required insert given above prudently stresses the name, the pronunciation, and the chemical formula (KI) of these Government-approved 130-mg potassium iodide tablets. Perhaps this emphasized information will keep some alarmed Americans (misinformed in a future crisis by the media that typically stated during the Chernobyl nuclear accident that "iodine tablets" were being given to people endangered by radioactive iodine from the burning reactor) from getting and taking iodine tablets, widely sold for water purification, or tincture of iodine.

Strangely, neither in official information available to the general public on the prophylactic use of KI nor in the above-mentioned FDA "Final Recommendations" is any mention made of the much greater need for KI in a nuclear war—even for Americans during an overseas nuclear war in which the United States would not be a belligerent.

Also note that this official insert contains no instructions for giving a crushed KI tablet to

infants and small children. Nor is there any mention of the fact that the KI under the tablet's coating is a more painful-tasting drug than any that most people ever have taken. This omitted information is given in the next to last section of this chapter.

● Protection against radioactive iodine in fallout from a nuclear war fought outside the United States.

Most strategists believe that a nuclear war fought by nations other than the United States is a more likely catastrophe than a nuclear attack on America. Several of the Soviet and Chinese nuclear test explosions have resulted in very light fallout deposition and some contamination of milk by radioactive iodine in many of the 50 states. However, serious contamination of milk, fruits, and vegetables could result if war fallout from many overseas nuclear explosions were carried to an America at peace. These potential dangers and effective countermeasures are included in Chapter 18, Trans-Pacific Fallout.

If a nuclear war were to be fought in northern parts of Asia, or in Europe, or in the Middle East, a very small fraction of the fallout would come to earth on parts or all of the United States.⁴⁰ This fallout would not result in an overwhelming catastrophe to Americans, although the long-term health hazards would be serious by peacetime standards and the economic losses would be great.⁴⁰ The dangers from radioactive iodine in milk produced by cows that ate fallout-contaminated feeds or drank fallout-contaminated water would be minimized if Americans did not consume dairy products for several weeks after the arrival of war fallout. Safe milk and other baby foods would be the only essential foods that soon would be in very short supply. The parents of babies and young children who had stored potassium iodide would be especially thankful they had made this very inexpensive preparation, that can give 99%-effective protection to the thyroid. All members of families with a supply of potassium iodide could safely eat a normal diet long before those without it could do so.

The most dangerous type of radioactive iodine decays rapidly. At the end of each 8-day period it gives off only half as much radiation as at the start of that period. So at the end of 80 days it emits only about 1/1000 as much radiation per hour as at the beginning of these 80 days. Because of this rapid decay, a 100-day supply of potassium iodide should be sufficient if a nuclear war, either overseas or within the United States, were to last no more than a week or two.

The probability of most Americans being supplied with prophylactic potassium iodide during a major nuclear disaster appears low. Under present regulations the decision concerning whether to stockpile and dispense potassium iodide tablets rests solely with each state's governor.⁴¹

- **Need for thyroid protection after a nuclear attack on the United States.**

After a nuclear attack, very few of the survivors would be able to obtain potassium iodide or to get advice about when to start taking it or stop taking it. In areas of heavy fallout, some survivors without potassium iodide would receive radiation doses large enough to destroy thyroid function before modern medical treatments would again become available. Even those injuries to the thyroid that result in its complete failure to function cause few deaths in normal times, but under post-attack conditions thyroid damage would be much more hazardous.

- **Ways to obtain potassium iodide for prophylactic use.**

- * *By prescription.*

With a prescription from a doctor, a U.S.P. saturated solution of potassium iodide can be bought at many pharmacies today. (In a crisis, the present local supplies would be entirely inadequate.) The saturated solution contains a very small amount of a compound that prevents it from deteriorating significantly for a few years. It is best stored in a dark glass bottle with a solid, non-metallic cap that screws on liquid-tight. A separate medicine dropper should be kept in the same place. An authoritative publication³⁶ of the National Committee on Radiation Protection and Measurements states: "Supplies of potassium iodide can be stored in a variety of places, including homes, . . ."

In 1990 the price of a 2-ounce bottle of U.S.P. saturated solution of potassium iodide, which is sold by prescription only, ranges from about \$7.00 to \$11.00 in Colorado. A 2-ounce bottle contains about 500 drops. Four drops provide the daily dose of 130 mg for adults and for children older than one year. For babies less than one year old, the daily dose of a saturated solution is two drops (65 mg). Thus approximately 99% effective protection against the subsequent uptake of radioactive iodine by the thyroid can be gotten by taking saturated potassium iodide solution. If bought by prescription, today the recommended daily dose costs 6 to 9 cents.

- * *Without prescription.*

In 1990 the leading company selling **130-mg potassium iodide tablets** without prescription and by mail order in the United States is ANBEX, Inc., P.O. Box 861, Cooper Station, New York,

N.Y. 10276. Two bottles, each containing fourteen 130-mg potassium iodide tablets, cost \$10.00. Thus the cost per 24-hour dose is 36 cents. To the best of my knowledge, the company in the U.S. that in July of 1990 is selling 130-mg KI tablets without prescription at the lowest price is Preparedness Products, 3855 South 500 West, Bldg. G, Salt Lake City, Utah 84115. This company sells 14 tablets, in a brown, screw-cap glass bottle, for \$3.50, postpaid, including shipping charges. For three or more bottles, the price is \$2.50 per bottle.

After the disastrous Russian nuclear power reactor accident at Chernobyl in May of 1986, pharmacies in Sweden soon sold all of their 130-mg potassium iodide tablets and Poland limited its inadequate supplies of prophylactic iodide salts to the protection of children. In California, pharmacists reported abnormally large sales of iodine tablets, and also of tincture of iodine—apparently due to the buyers' having been misinformed by the media's reports that Europeans were taking "iodine" for protection.

Individuals can buy **chemical reagent grade potassium iodide**, that is purer than the pharmaceutical grade, from some chemical supply firms. No prescription or other authorization is necessary. In 1990 the least expensive source of which I am aware is NASCO, 901 Jamesville Avenue, Fort Atkinson, Wisconsin 53538. The price for 100 grams (100,000 mg) in 1990 is \$10.50, plus \$2.00 to \$4.00 for shipping costs. Thus the cost in 1990 for a 130-mg daily dose is less than 2 cents. NASCO sells 500 grams (500,000 mg—about one pound) for \$35.50, plus \$2.00 to \$4.00 for shipping—making the cost per standard daily dose only one cent.

For years of storage, crystalline or granular potassium iodide is better than a saturated solution. Dry potassium iodide should be stored in a dark bottle with a gasketed, non-metallic cap that screws on tightly. Two-fluid-ounce bottles, filled with dry potassium iodide as described below, are good sizes for a family. Separate medicine droppers should be kept with stored bottles.

Thus at low cost you can buy and store enough potassium iodide for your family and large numbers of your friends and neighbors—as I did years ago.

- **Practical expedient ways to prepare and take daily prophylactic doses of a saturated solution of potassium iodide.**

To prepare a saturated solution of potassium iodide, fill a bottle about 60% full of crystalline or granular potassium iodide. (A 2-fluid-ounce bottle, made of dark glass and having a solid, non-metallic,

screwcap top, is a good size for a family. About 2 ounces of crystalline or granular potassium iodide is needed to fill a 2-fluid-ounce bottle about 60% full.) Next, pour safe, room-temperature water into the bottle until it is about 90% full. Then close the bottle tightly and shake it vigorously for at least 2 minutes. Some of the solid potassium iodide should remain permanently undissolved at the bottom of the bottle; this is proof that the solution is saturated.

Experiments with a variety of ordinary household medicine droppers determined that 1 drop of a saturated solution of potassium iodide contains from 28 to 36 mg of potassium iodide. The recommended expedient daily doses of a saturated solution (approximately 130 mg for adults and children older than one year, and 65 mg for babies younger than one year) are as follows:

- * For adults and children older than one year, 4 drops of a saturated solution of potassium iodide each 24 hours.

- * For babies younger than one year, 2 drops of a saturated solution of potassium iodide each 24 hours.

Potassium iodide has a painfully bad taste, so bad that a single crystal or 1 drop of the saturated solution in a small child's mouth would make him cry. (A small child would be screaming in pain before he could eat enough granular or crystalline KI to make him sick. Some KI tablets are coated and tasteless.) Since many persons will not take a bad-tasting medication, especially if no short-term health hazards are likely to result from not taking it, the following two methods of taking a saturated solution are recommended:

- * Put 4 drops of the solution into a glass of milk or other beverage, stir, and drink quickly. Then drink some of the beverage with nothing added. If only water is available, use it in the same manner.

- * If bread is available, place 4 drops of the solution on a small piece of it; dampen and mold it into a firm ball the size of a large pea, about $\frac{3}{8}$ inch in diameter. There is almost no taste if this "pill" is swallowed quickly with water. (If the pill is coated with margarine, there is no taste.)

As stated before, 4 drops of the saturated solution provide a dose approximately equal to 130 mg of potassium iodide.

● **Preparing potassium iodide tablets to give to infants and small children.**

The official FDA instructions for using KI tablets state that one half of a 130-mg tablet, "first crushed", should be given every 24 hours to "babies under one year of age", and that a whole tablet should be crushed "for small children."

Putting even a small fraction of a crushed or pulverized potassium iodide tablet on one's tongue is a startling experience, with a burning sensation. A slightly burnt sensation continues for hours. Therefore, a mother is advised to make this experiment where her children cannot see her.

To eliminate the painfully bad taste of a crushed or pulverized KI tablet, first **pulverize it thoroughly**. Next stir it for a minute into at least 2 ounces of milk, orange juice, or cold drink, to make sure that the KI (a salt) is completely dissolved. Then the taste is not objectionable. If only water is available, stir the pulverized tablet into more than 2 ounces of water.

KI is a corrosive salt, more injurious than aspirin to tissue with which it is in direct contact. Some doctors advise taking KI tablets after meals, except when so doing would delay taking the initial dose during an emergency. All recognize that taking a dilute solution of KI is easier on the stomach than taking the same dose in tablet form. This may be a consequential consideration when taking KI for weeks during a prolonged nuclear war emergency.

● **WARNINGS**

- * Elemental (free) iodine is poisonous, except in the very small amounts in water disinfected with iodine tablets or a few drops of tincture of iodine. Furthermore, elemental iodine supplied by iodine tablets and released by tincture of iodine dropped into water is not effective as a blocking agent to prevent thyroid damage. If you do not have any potassium iodide, **DO NOT TAKE IODINE TABLETS OR TINCTURE OF IODINE.**

- * **DO NOT MAKE A FUTILE, HARMFUL ATTEMPT TO EAT ENOUGH IODIZED SALT TO RESULT IN THYROID BLOCKING.** Iodized salt contains potassium iodide, but in such a low concentration that it is impossible to eat enough iodized salt to be helpful as a blocking agent.

OTHER WAYS TO PREVENT THYROID DAMAGE

Besides the prophylactic use of potassium iodide, the following are ways to prevent or reduce thyroid damage under peacetime or war-time conditions:

- * Do not drink or otherwise use fresh milk produced by cows that have consumed feed or

water consequentially contaminated with fallout or other radioactive material resulting from a peacetime accident or from nuclear explosions in a war.

* As a general rule, do not eat fresh vegetables until advised it is safe to do so. If under wartime conditions no official advice is obtainable, avoid eating fresh leafy vegetables that were growing or exposed at the time of fallout deposition; thoroughly wash all vegetables and fruits.

* If a dangerously radioactive air mass is being blown toward your area and is relatively small (as from some possible nuclear power facility accidents), and if there is time, an ordered evacuation of your area may make it unnecessary even to take potassium iodide.

* For protection against **inhaled** radioactive iodine, the FDA Final Recommendations (which are mentioned in the preceding section) state that the following measures "should be considered": "... sheltering [merely staying indoors can significantly reduce inhaled doses], evacuation, respiratory protection, and/or the use of stable iodide."

Research has been carried out in an effort to develop a thyroid protection procedure based on the ordinary iodine solutions which are used as disinfectants. Since iodine solutions such as tincture of iodine and povidone-iodine are dangerous poisons if taken orally, these experiments have utilized absorption through the skin after topical application on bare skin.

All reported experimental topical applications on human skin have given less thyroid protection than does proper oral administration of potassium iodide. Moreover, undesirable side effects of skin application can be serious. For these reasons researchers to date have not recommended a procedure for the use of ordinary iodine solutions for thyroid protection.

Potassium iodide, when obtained in the crystalline reagent form and used as recommended above on pages 114 and 115, is safe, inexpensive, and easy to administer. Prudent individuals should obtain and keep ready for use an adequate supply of potassium iodide well in advance of a crisis.