

REDUCING SECOND HAND EXPOSURE TO RADIOACTIVE IODINE  
HOME CLEANUP FOLLOWING THYROID TREATMENT



# Bind-It™

I131 Removal for Multiple Surfaces

**THE SAFE AND GENTLE WAY  
TO EFFECTIVELY REDUCE  
SECOND HAND EXPOSURE**

**LTI** LABORATORY  
TECHNOLOGIES, INC.

# A Little Background

## Radioactive Iodine for Thyroid Treatment

For over 40 years, radioactive iodine (I-131) has been used to treat hyperthyroid conditions as well as thyroid cancer. Radioactive iodine has been described by some as a “magic bullet” because it almost exclusively targets the thyroid gland. It has proven to be extremely effective at killing diseased thyroid tissue while sparing surrounding tissue from damage.

## How it works

Our thyroids require iodine to make the thyroid hormones that control metabolism. Because iodine is not readily available in large quantities in our diets, the thyroid has developed the ability to efficiently extract it from the food we eat. It is then stored in the thyroid for use as needed to make hormones. This very function of iodine storage is why radioactive iodine treatment works so well. Our bodies cannot distinguish between radioactive and stable iodine. Therefore they will use radioactive iodine to make thyroid hormones. The radioactive iodine is usually administered in capsule form. Once this capsule is swallowed, the thyroid “takes up” the radioactive iodine until it is filled to capacity.

Iodine 131 emits both gamma and beta radiation as it decays to stable Xenon 131. The gamma radiation is useful for nuclear imaging purposes (allowing the doctor to actually “see” the thyroid using a specialized camera), and the beta radiation works to destroy the thyroid tissue by bombarding the thyroid cells with particles as the I-131 decays. Because the beta particles are easily stopped by tissue (tissue penetration is  $\leq 2$ mm), they only effect the thyroid tissue - without harming other organs. This is the “magic bullet” effect described above.

## After the pill is taken

After the pill is swallowed, the patient is radioactive. Depending on the amount (or dose) of radioactive iodine that is administered, as well as local regulations, the patient may be allowed to return home immediately. If immediate release is not permitted by regulations, then a period of isolation at the hospital will be necessary. Either way, the patient will still be radioactive for some time. Once the thyroid has absorbed all the I-131 it can, the rest will be excreted by the body through urine, feces, perspiration and saliva. As the thyroid uses the radioactive iodine to make hormones, it is slowly released for an extended period as the body processes it. This is often referred to as the biological half-life. The radioactive decay is the physical half-life. The physical half-life is approximately 8 days. This means that every 8 days, 50% of the I131 becomes stable Xenon 131 and is no longer radioactive. As an example, 10 millicuries of I-131 will be reduced to 5 millicuries in 8 days. In another 8 days, the amount remaining will be 2.5 millicuries of I-131. Both the biological half-life and the physical half-life happen together.

Limiting exposure to other people from the gamma emissions is easy. Radiation exposure follows a principle called the ‘inverse square law’. Simply put, every time you double the distance from the source of radioactivity, the amount of exposure is reduced by a factor of 4 (75% reduction in exposure). Maintaining distance from other people is the best way to reduce exposure to the gamma radiation the treated person is emitting. Since the beta radiation is stopped easily by tissue, nobody is receiving a beta dose from the I-131 within the patient’s body.

The problem of second hand exposure stems from the fact that the excess I-131 is eliminated by the various bodily means. As it exits the patient, it will contaminate any surface it comes in contact with. Clothes, towels, bed sheets, sinks, showers, toilets, floors, door handles, even TV remote controls and telephones can be contaminated. If another person comes in contact with this contamination, it can enter their bodies. Iodine can enter the body through the mouth, nose and eyes - it may even be absorbed directly through the skin.

Exposure to radioactive iodine should be avoided by anyone other than the thyroid patient being treated. Children and pregnant women are especially cautioned to avoid any exposure. Children and fetuses have much smaller thyroid glands than adults, therefore what may be a little exposure to an adult becomes a lot of exposure to a child. The National Cancer Institute recognizes that exposure to I-131 increases the risk for developing Thyroid Cancer.

### **Ordinary Household Cleaners**

Ordinary cleaners are not designed for radioactive iodine. Iodine is a very reactive element and using the wrong type of cleaner can have bad results. Ordinary radioactive decontaminants do not work for radioactive iodine. Some even emit a very strong rotten egg odor that is unwelcome in the home, hospital isolation room or anywhere. Bleach and acidic cleaners will cause radioactive iodine to volatilize and become airborne. Airborne I-131 can spread far and wide and contaminate areas well beyond the patient's isolation space. Furthermore, airborne I-131 can be inhaled by others. Some examples of the type of cleaners that may cause problems include: bleach, powdered cleansers, toilet bowl cleaners, bathroom and tile cleaners made for removing soap scum or hard water deposits, etc. In fact, it is safer to use ordinary bar soap - even plain water. Safer in the fact that the iodine is not volatilized - but unfortunately not effective at removing the contamination.

### **The Solution**

Bind-It™ products are designed specifically to attract, bind and trap radioactive iodine in solution so that it can be safely and effectively removed. Removing contamination eliminates the possibility of second hand exposure to other family members.

Bind-It™ allows you to remove radioactive iodine. It does not "neutralize" or make it disappear. It is important to remember that the I-131 will remain radioactive until such time as it decays to stable Xenon-131. It will take a number of half-lives before it effectively "disappears". While the natural decay scheme means that eventually the I-131 will no longer exist (as I-131) or be radioactive, it also means that the only way to eliminate contamination is to remove it and dispose of it where it can decay harmlessly.

Bind-It™ literally binds to and traps the radioactive iodine in solution. When a contaminated area is sprayed with Bind-It™ and then wiped with paper towels, the paper towels become radioactive, and must be disposed of properly. They should be placed into plastic garbage bags and kept away from pets and children.

Patients should check with their health care provider to see what local regulations are for disposal of this radioactive waste. Some locations may allow them to immediately dispose of this waste in the trash, while others may require that they store the bags of waste in an isolated area, where children, pets or other animals cannot get into it, until such time as it has decayed sufficiently.

Bind-It™ is available in three forms:

**Spray** - A spray bottle, equipped with a high pressure spray head that helps deliver Bind-It™ to surfaces with the proper force to get under and help lift contamination off most surfaces so that it will "bind" to the solution. Once in solution, it can be safely and effectively wiped away with paper towels.

**Concentrate** - A concentrate is ideal for toilet decontamination. Because the toilet bowl already contains water, adding concentrate will dilute and effectively bind the I-131. Since urine is the largest mode of iodine excretion, the toilet bowl is the single most important area to clean properly.

Bind-It™ concentrate also works well for soaking laundry prior to washing. Clothes, bed sheets and towels may be soaked in a Bind-It™ solution and rinsed well to aid in removing I-131 from fabrics. Bind-It™ concentrate may also be used to refill the spray bottle.

Hand Soap - Hands become easily contaminated through perspiration and coming in contact with already contaminated surfaces. Frequently washing with Bind-It™ Hand Soap can help stop cross-contamination. The Hand Soap is also gentle enough to be used in the shower. By showering with Bind-It™ Hand Soap, skin contamination from perspiration is removed and a major source of cross-contamination is eliminated. Wearing long pants and long sleeved shirts will reduce cross-contamination. It is also very important that patients wear socks or slippers at all times to avoid contaminating floors and carpets as their feet perspire. Frequent skin washing with Bind-It™ hand soap will reduce cross-contamination from sweat and body oil.

Convenient sizes are available for both home and institutional use.

## **Conclusion**

Radioactive iodine is a time tested, highly effective method of treatment for hyperthyroidism and thyroid cancer. When proper precautions are taken, second hand exposure to family can be minimized or eliminated. Bind-It™ products are uniquely well suited to aid in keeping family members safe from the contaminating effects of the procedure.

Radioactive iodine treatment is deemed safe by the NRC, health care providers, and over 40 years of data. However, second hand exposure to others should not be taken lightly. Proper safety guidelines should be carefully followed at all times. Including Bind-It™ in your post treatment safety program is a safe and effective way to minimize second hand exposure to family, friends and hospital workers.