

## Precautions after doses of radioactive iodine (RAI) for thyroid cancer

*The following was originally written by Ian Adam<sup>1</sup> and Kate Kressmann-Kehoe of the United Kingdom, and updated in 2010 by Ian Adam, and represents their opinions. If any of this appears to contradict your own Doctors or other professionals it is not intended to do so, as this text is generic and cannot take precedence over specific advice.*

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A lot of people have asked for more specifics about post-RAI precautions. Here is another cut at it that might be useful.

Please remember that radiation safety is based on science not opinion and, from a time perspective, long enough is long enough. Think of it like letting a hot pie cool down to room temperature. Some people might say 1 hour, some might say 2 hours, to be sure. Leaving it for 3, 4 or 5 hours won't get it any cooler. For safety the times given above are long enough and they are what I would do in your shoes. Longer will not give any additional benefit (but will do no harm either).

The risks to people around you from RAI don't go away completely for a couple of weeks, but they do decline pretty rapidly. It can help to think of the risks as having two phases:

PHASE ONE = early, high radiation, full precautions.

PHASE TWO = later, residual radiation, minimal precautions.

The line between the two phases is not clear-cut of course. You don't suddenly go from being a menace on Wednesday to safe on Thursday. But this may help give some idea of what is going on and why the generic instructions you get are sometimes vague.

Another thing to remember is that the people giving the RAI have probably never had it themselves and don't always understand the implications of their instructions.

FYI Most people seem to agree that the Phase One precautions are difficult and stressful to follow if you have babies or children who are too young to understand/remember why you are being distant. And/or if you have little crawlers who take things out of the garbage, run their hands on the toilet edge and then put them in their mouths etc.

If you are in this situation, you might want to look into whether it is possible for your partner and the children to stay with friends, family or even go to hotel for as much as possible of Phase One and until you've had a chance to clean up the hottest areas.

(Also, I found it very hard to remember not to taste, cough etc while cooking and hypo and radioactive. Although it is theoretically possible, I don't recommend cooking for others until you are out of Phase Two, or at least out of Phase One -- Kate).

How long will you stay in each phase?

The first thing to consider is that not everyone gets rid of surplus RAI at the same rate. There are 2

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big factors -- age and kidney function. So, an older person with kidney problems will spend a longer time in Phase One than a younger person without kidney problems. You can estimate rates for yourself using the following age /kidney factors:

Age / kidney factors:

Younger (under 30) Normal kidneys: 0.4	Impaired kidneys: up to 0.8
Middle (30-60) Normal kidneys: 0.6	Impaired kidneys: up to 1.0
Older (60-plus) Normal kidneys: 0.8	Impaired kidneys: up to 1.6

Relatively few people will come under the impaired kidneys column, and the values given should be discussed with your Doctor. The 'up to' values depend on just how serious the kidney problem is – something that I cannot know, so I am suggesting “up to double” as a starting point.

Of course, a major thing to consider is how much RAI you got in the first place Obviously, the higher the dose, the greater the risks. If you had only a tracer dose, you can go straight to Phase Two.

And, there is a final factor. Depending on the extent of any metastases, and also on how much thyroid tissue you have left, there will be a greater or lesser amount of RAI that stays in your system for a longer period of time. You can ask your doctors what level of uptake they are seeing, and therefore what your level of RAI will be until that RAI decays, which is a slower process. If you are having high levels of uptake, you will need to maintain precautions for distance for a longer period.

Phase One: Early, high radiation, full precautions for both body fluids and distance

Phase One starts immediately after the treatment dose. You might be spending the first part of this phase in isolation, but this phase might also last into the first days after you are released from the hospital. In Phase One you are very radioactive and people should keep their distance and spend very limited time close to you.

Distance: The risk declines exponentially with distance, so every foot farther away you can be helps. For instance, in the same amount of time, supervising a child's bath from 2 feet away gives 1/4 the exposure as feeding him or her dinner from 1 foot away. Better yet, share watching a video from chairs at opposite ends of the room. In Phase One you should sleep alone.

The risk also depends on the duration of the exposure, so if someone needs to be close to you (for instance to drive you home) it should be for only a short while. If they can be far away, it can be for a longer time.

To give some examples:

10 min @ 1 foot gives the same radiation exposure as

40 min @ 2 feet

1.5 hours @ 3 feet

6 hours @ 6 feet

17 hours @ 10 feet (a foot is 30 cm)

The moral here is "Forget the time, increase the distance"

Body fluids: Your body liquids are radioactive and very dangerous to people, especially your saliva which is 7 to 100 times more radioactive than other fluids, so you should be very fastidious about your saliva, urine, tears, nose and chest mucus.

You should be especially careful about coughing or sneezing on or near people, and the things that

go in your mouth such as pencils, toothbrushes, spoons, etc.

You don't want anyone else swallowing your RAI, so kissing, tasting food you are cooking, licking things that someone else may also lick etc must be avoided

As far as sweat is concerned, normal washing practices are perfectly adequate for removing RAI and you do not need to wash your clothes and sheets separately.

If you live in a small apartment with a big family then you will have bigger problems following the precautions in this phase than if you live in a house where you can have your own room and bathroom.

Phase One ends when your remaining radioactivity is somewhere around the 5mCi level. But, since few people have access to the equipment to measure how radioactive they are, you can use the following calculations to guess how radioactive you are:

Millicuries of RAI multiplied by the age / kidney factor = hours in phase 1.

So, a young person with normal kidneys (0.4) having had 150mCi will be in Phase One for:

$0.4 \times 150 = 60$  hours or 2 1/2 days.

An older person with normal kidneys having had 150mCi will be in Phase One for:

$0.8 \times 150 = 120$  hours or 5 days.

Phase Two: Later, residual radiation, minimal precautions. mainly for body fluids

After Phase One, most people don't have much RAI in their system. There is some left in your saliva and urine, but it is only a risk to those who might ingest it through their mouth, so any form of sexual activity involving the mouth (other than 'dry' kissing) should wait. Also, you should avoid putting the spoon back in after tasting while cooking, kissing children near the mouth, etc. Normal levels of hygiene will take the risk out of other activities.

While it probably OK to sleep next to an adult at this point, sleeping near children, babies or pregnant women is probably best avoided, especially if you drool on your pillow (which almost everyone does, I know, I've monitored them -- Ian.)

5 days multiplied by the age / kidney factor used above = days in phase 2.

So, a young person without kidney problems (0.4) be in Phase Two for:  $5 \times 0.4 = 2$  days.

An older person without kidney problems (1.0) will be in Phase Two for:  $5 \times 0.8 = 4$  days.

Special Case : Extensive uptake

The switch from Phase One to Phase Two precautions is slower if you have had significant uptake due to extensive remnant thyroid tissue or mets. If you are in this situation, you also still need to take some precautions for distance, especially distance from your throat or other locations of mets. You also should avoid sitting, staying or sleeping, next to the same person for another few days. An extreme case of extensive uptake was patient who couldn't take surgery for a TT, so they ablated the thyroid with RAI only. She held onto about half the (sizeable) dose and couldn't go home for a long time - purely on distance grounds.

Example

Here is an example of what thyroid and blood levels of RAI might be for someone with minimal thyroid tissue to ablate.

Day 0: Blood: 200mCi	Thyroid uptake: 0mCi
Day 1: Blood: 50mCi	Thyroid uptake: 0.95mCi

Day 2: Blood: 12.5mCi	Thyroid uptake: 1.0mCi
Day 3: Blood: 3mCi	Thyroid uptake: 0.92mCi
Day 4: Blood: 0.75mCi	Thyroid uptake: 0.84mCi
Day 5: Blood: 0.2mCi	Thyroid uptake: 0.77mCi
Day 6: Blood: 0.05mCi	Thyroid uptake: 0.71mCi
Day 7: Blood: 0.0125mCi	Thyroid uptake: 0.65mCi
Day 8: Blood: 0.0031mCi	Thyroid uptake: 0.59mCi
Day 9: Blood: 0.0008mCi	Thyroid uptake: 0.55mCi
Day 10: Blood: 0.0002mCi	Thyroid uptake: 0.50mCi

This is a youngish person so Phase One would end after 3 days (day 4). There is still 0.75 mCi of 'free' RAI which will be excreted over the next 5 days, hence the precautions about saliva and urine. There is also  $0.84 + 0.75$  of total RAI which will irradiate their bed partner.

So what about items that you have contaminated with the RAI from your body?

High levels of contamination can be expected on items that have been in contact with urine or saliva, especially if the item is porous such as fabric or wipes..

Medium levels may be expected on items that have been handled a lot, sneezed or coughed upon.

Low levels might be detected on items that have been in contact with skin.

Items in the high group should be carefully cleaned with a damp cloth, put through a dishwasher or washing machine, hand washed or otherwise made safe before any vulnerable person (children, pregnant etc) could come in contact with them. This is especially true for items that may be chewed or sucked.

Where washing is not practicable the item should be put out of the way (eg into a plastic bag on top of the wardrobe) for a period of between 6 and 12 weeks depending on your estimate of the amount of contamination present and the vulnerability of any exposed persons.

Items in the medium group can generally be decontaminated by a damp wipe or any other 'lightweight' version of the treatments above. If not possible then a month of isolation should be ample.

Items in the low group are unlikely to cause a hazard, but a quick wipe over should be adequate cleaning.

Water is the best cleaner and nothing is gained by using aggressive cleaners, bleach, disinfectant or detergents.

If you are concerned about contaminating things that you touch, remember that prevention is better than cure. Very little RAI comes out in perspiration so you will not be leaving significant amounts on door handles, keyboards, remotes, cell phones etc, but rinsing your hands (full scale washing is not necessary at all) fairly frequently will remove the problem before it arises.

Ian