Proposals of guidelines (june 2004)

Follow up of well-differentiated thyroid cancer (DTC)

BSNM, WG Endocrinology and WG Metabolic Therapy
G. Andry (I. Bordet, Bruxelles), P. Bergmann (CHU Brugmann, Bruxelles), P. Bourgeois (I. Bordet, Bruxelles), B. Corvilain (Erasme, Bruxelles), C. Daumerie (CU St Luc, Bruxelles), J. Foidart – Willems (CHU, Liège), P. Flamen (I. Bordet, Bruxelles), J.Hermans (C H de Jolimont), F. Jamar (CU St Luc, Bruxelles), D. Glinoer (CHU St Pierre, Bruxelles), E. Laurent (Edith Cavell, Bruxelles), R. Moreno Reyes (Erasme, Bruxelles), E. Harmoir (CHU, Liège), P. Paulus (CHR Citadelle, Liège), L. Plat (I. Bordet, Bruxelles), J.P. Squifflet (CU St Luc, Bruxelles), A. Van Coevorden (CHU Tivoli, La Louvière), P. Van Crombrugge (OLV, Aalst)

Introduction

The yearly incidence of thyroid carcinoma in Belgium is estimated at 2 to 4 cases/ 100.000, most of them being well-differentiated. The long term outcome of patients treated for differentiated thyroid carcinoma is usually favourable, with an overall 10-year survival rate of 80 to 90%. However, 5 to 20 % of patients develop local or regional recurrences and 10 to 15% distant metastases, mainly in the lungs and the bones. Patients at high risk of recurrence can be identified at the time of diagnosis by considering well-established prognostic factors. The principal variables having an independent worse prognostic impact are extremes of age, male gender, poorly differentiated histological features of the tumor and tumor stage and extra thyroidal extension.
In recent years, the composition of patients with DTC has changed. A large number of thyroid carcinomas are now discovered at an early stage in part due to incidental findings on neck ultrasonography (US) for non thyroid indications. In fact, the majority of patients are at low risk of recurrence and previous follow up protocols based on data from high-risk patients no longer apply. We actually need a protocol with a high negative predictive value able to avoid unnecessary investigations to most off the patients with a non-significant risk of recurrence.

The management of well-differentiated thyroid cancer should be the responsibility of a specialists multidisciplinary thyroid cancer team.

Initial surgical treatment of differentiated thyroid carcinoma

There is no doubt that the primary mode of therapy for patients with DTC is surgery.
Total thyroidectomy is recommended if the primary tumor is 1.0 cm or more in diameter or if extrathyroidal extension is present. Completeness is better and morbidity rate is lesser in the hands of highly trained and experienced thyroid surgeon.
The main disagreement centers on the extent of surgery that is optimal for tumors from 0.5 to 1 cm, without metastases. Because performing lobectomy alone may result in an overall increased recurrence rate (1,2) and because (near)total thyroidectomy facilitates the follow up, most of the surgeons opt for total thyroidectomy when the diagnosis is known (3,4,5).
Unilateral lobectomy is adequate for papillary microcarcinoma (<1 cm) discovered after surgery for benign nodules, provided the tumor is unifocal and confined to the thyroid without vascular invasion or other histological features suggesting poor prognosis.
Lymph-node surgery is a routine procedure, specially in the presence of papillary carcinoma in which lymph-node metastases are found in 35 to 65 % of the cases (6).

Second operations are technically more difficult than primary procedures. In case of primary lobectomy for a supposedly benign tumor, completion thyroidectomy is usually not indicated in papillary carcinomas when unifocal, intra-lobar and discovered at the final histological analysis, as well as in minimally invasive follicular carcinomas < 2 cm. A completion thyroidectomy is indicated in patients with papillary carcinoma with post-operative demonstration of lymph-node metastases and in case of follicular carcinomas.

Radioiodine in the treatment of well-differentiated thyroid cell carcinoma

Normal thyroid cells has a unique ability to concentrate radioiodine by means of a sodium-iodide transporter. Although well-differentiated thyroid carcinomas have a reduced capacity to transport and organify iodide, when all normal thyroid tissue has been removed and serum thyrotropin (TSH) concentration is high, most of them take up enough radioiodide to be detected by scanning and synthetize thyroglobulin (Tg).
131I-Iodine (131I) is the most effective nonsurgical treatment for well-differentiated thyroid carcinoma.
131I causes thyroid cell-death by emission of short pathlength (1 to 2 mm) beta rays (0.61MeV). The doses recommended for ablation of thyroid remnants and for the treatment of metastases are 300 Gy and 100 Gy, respectively. The radiation dose to extra-thyroidal tissue is 1.000 to 10.000 times lower than to the thyroid gland.
The uptake of 131I by thyroid tissue can be visualized by scanning to detect the gamma radiation also emitted by the isotope (364 KeV).
In our country, administration of therapeutic 131I radioiodine must be carried out only in centers equipped with appropriate facilities.

Radioiodine ablation therapy

Despite total thyroidectomy, more than 95% of patients undergoing postoperative 131I scanning have residual normal thyroid tissue uptake in the neck.
Till now, the most commune attitude was to consider that all patients with a tumor size of more than 1cm in diameter should have remnant ablation therapy (7,8,9).
Recently, it has been suggested that this therapy could be optional for low risk tumors (pTNM stage I) because the prognosis appears highly favourable in these cases (10). Ablative 131I has been proven beneficial in terms of recurrence and mortality rates only in high-risk patients and with known or suspected residual neoplastic disease. Although, most of the clinicians advocate the same treatment strategy for all patients with DTC since its consequences are minimal and follow up is facilitated.
On the other hand, in our country, a large proportion of patients who have undergone (near)total thyroidectomy have significant 131I uptake in the thyroid bed (>2%), requiring 131-I ablation.

There are several reasons for the postoperative ablative 131I treatment.
Firstly, high TSH levels necessary to enhance tumor 131I uptake cannot be achieved with a large thyroid remnant.
Secondly, Tg measurements as a tumor marker under TSH stimulation requires ablation of all normal thyroid tissue.
Thirdly, 131I total body scan (TBS) is more sensitive after ablation of normal thyroid remnants, because normal thyroid tissue with a high uptake may preclude the visualisation of neoplastic foci in which uptake is lower. Moreover, some regional or distant metastases may be seen only on the post-ablative TBS (and not on a low 131I dose diagnostic TBS).

Finally, remnant ablation may also destroy microscopic foci of carcinoma cells within the thyroid remnant thereby reducing local and regional recurrence as well as long-term mortality, particularly in tumors of more than 1.0 cm (7,8,11,12)
Complete ablation of normal thyroid remnants requires an effective radiation dose to the tissue of at least 300 Gy (13).
As previous exposure to 131-I may stun the thyroid tissue, a TBS with a diagnostic amount of 131I is usually not recommended before ablation (9,14). A diagnostic 131I WBS is advised only when the patient undergone less than a near-total thyroidectomy in order to appreciate the amount of thyroid tissue left.
The usual recommended ablation dose varies between 1110 MBq (30 mCi) and 3700 MBq (100 mCi). The results of studies of the relative efficacy of low-dose (1110 MBq) versus high-dose (3700 MBq) ablation are conflicting. Some studies report a similar efficacy of both types of doses (15,16,17,18,19). Total ablation is achieved in 80-90% of patients who undergo a (near) thyroidectomy (<2% of uptake in thyroid remnants) with a standard dose of either 1110 or 3700 MBq 131I. There are however other reports suggesting a lesser efficacity of lower doses (20,21,22,23). For example, total ablation with 1110 MBq is achieved in only two-thirds of the cases with larger thyroid remnants (10).
A TBS is performed 3 to 7 days after ablation dose administration, as it is a significantly more sensitive procedure than a diagnostic radioiodine scan employing a small dose of radioiodine (24). In 20% of the cases, the post-therapy scan reveals new uptake foci, not seen on the diagnostic scan (25).

Radioiodine therapy for recurrence

There are two approaches to 131I therapy: empiric fixed doses and quantitative tumor dosimetry. The first one is the most widely used and its main advantages are simplicity and safety. On the other hand, there are no available long term data regarding the efficacy of dosimetrically-determined 131-I treatment on cancer recurrence or mortality.
Patients with local regional lymph nodes disease are treated with 5550 MBq (150 mCi).
Doses of 5550 to 6500 MBq (150 to 175 mCi) are advocated for treatment of pulmonary metastases and 5550 to 7400 MBq (150 to 200 mCi) for bone disease.
131I therapy is proposed as long as metastases trap 131I without any limit to the cumulative dose, although the risk of leukaemia increases slightly above 18,5 GBq (500 mCi). The limiting factor is the radiation dose delivered to the bone marrow.
In every case of demonstrated metastasis, the multidisciplinary team should discuss the opportunity of surgical approach or external radiotherapy.

Preparation of the patient for 131-I treatment

For patients receiving a diagnostic or a therapeutic dose of 131I, the treating physician must obtain and review the patient's thyroid-related medical history, the results of serum TSH, Tg and antithyroglobulin antibodies (anti-Tg) measurements and the operative and histology reports. The cumulative administered activity of 131I should also be recorded.
Female patients who have the potential to be pregnant should be tested for pregnancy within a few days before. Breastfeeding has to be stopped. Opinions vary widely as to how long to defer pregnancy after 131-I therapy. Most of the centers recommend 6 months.
Arrangements are to be made to prevent contamination by incontinence. The physician has to explain the procedure, treatment and side effects. An information sheet explaining all radioprotection procedures should be given to the patient.

Iodide uptake by thyroid tissue is stimulated by TSH and suppressed by increased endogenous iodide stores. After thyroidectomy or T4 treatment withdrawal, the patient's serum TSH concentration must rise to above 25 to 30 mU/L (26). This may take 4 to 6 weeks. This interval could be shortened after cessation of a substitutive treatment with T3. TSH may not rise to the required level if a large volume of functioning tissue remains.
Hypothyroidism could be avoided by administering recombinant human TSH (rhTSH) before administration of 131I to prepare patients for diagnostic scans (see below).
Patients are instructed to discontinue all iodine-containing medications or other medications that could affect the ability of thyroid tissue to concentrate iodide. A diet to limit dietary intake of iodide should be started at least two weeks before 131-I is given (see appendix 1). Urinary iodine measurement should be considered as a routine practice before radio-iodine treatment measured.

Side-effects of 131-I therapy

Short term secondary effects
Side-effects of 131-I treatment are usually minimal and transient.
The most frequent complications are:
-Nausea and abnormalities of taste (last a few days)
-painless neck edema within 48 hours
-Radiation sialoadenitis involving the parotid or submandibular glands, occurring in the first three days. Swelling and pain can be minimized by drinking large volumes, chewing gums and sucking lemons. Non steroidal anti-inflammatory drugs are usually adequate for relieving symptoms.
-Radiation thyroiditis is characterized by pain and swelling in the neck region within a few days after treatment. This secondary effect is most frequent in case of large remnants.
-Transient and asymptomatic reduction in platelets and white-cell counts

More dramatic acute side effects could affect distant metastases such as radiation-induced soft tissue reactions (pain, tumor edema or hemorrhage). In case of spinal cord or brain metastasis, external radiotherapy or surgery should be considered as first therapeutic choice.

Late effects
Pulmonary fibrosis may occur in patients with diffuse pulmonary metastases treated with high doses of 131I.
The incidence of leukaemia (mostly acute myeloid leukaemia, 2 to 10 years after therapy) after 131I therapy is extremely low, of the order of 0.5% (10,27).
Increased urinary bladder cancer has been reported for cumulative doses of more than 37000 MBq (1000 mCi)
A low increase of the incidence of solid tumors could occur in patients exposed to high cumulative doses (> 20 GBq) (10).

Effects on fertility and genetic effects
131-I is strictly contraindicated in pregnant and lactating women. Conception has to be postponed for 6 months after a therapeutic dose.
Transient radiation oligospermia and ovarian failure can occur.
Pre-treatment sperm banking is to be considered in male patients likely to have several high doses of 131-I.

There is no evidence of increased risk of congenital abnormalities in previously treated women, the outcome of pregnancy being not different than without therapy (28,29).

Safety modalities for medical personnel and household members

Patients have to stay hospitalised in a dedicated room until the radiation dose measured at 1 meter has declined under 20 microSv/h.

The physician administering the 131-I treatment dose must instruct the patient on how to reduce unnecessary exposure to family members and to the public. The Belgian "Conseil Supérieur de l'Hygiène (section radiations)", "Hoge Gezondheidsraad (Afdeling stralingen)" has published recommendations about this subject in 1997 (appendix 2).

Post ablative L-thyroxine (T4) treatment

The growth of thyroid tumor cells is in part controlled by TSH. Inhibition of TSH secretion with T4 improves the recurrence rate in high risk patients (30).

The adequacy of therapy is monitored by measuring serum TSH 3 months after its beginning, the initial goal for the first 6 to 12 months being a serum TSH concentration of <0.1 mU/L.

L-T4 treatment is life-long and the dose has to be adjusted according to the individual risk level.

In low risk patients or in those with solid evidence of cure, T4 therapy may be decreased to maintain a low but not suppressed serum TSH concentration (0.1-0.5 mU/L). The risk of recurrence is so low that chronic overdosage is unjustified.

In high-risk patients or in patients with recurrent disease, a suppressive dose of T4 should be continued because the risk of relapse is greater.

Tools of follow up

131I TBS (diagnostic, post-ablative or post-therapy dose)

Diagnostic 131I scans for localization of uptake foci are usually performed using doses of 74 to 185 MBq (2 to 5 mCi) 131I (27). Higher doses can lead to "stunning" in which there is reduced uptake of the subsequent therapeutic dose due to sublethal radiation delivered by the diagnostic dose (25,31). Stunning may also be avoided by using 123I for scanning 6 to 24 H later, but this isotope is considerably more expensive than 131I. This scan requires high TSH level obtained after T4 treatment withdrawal (TSH > 25 to 30 mU/ml obtained after 4 weeks) or after rhTSH stimulation.

Between 48 and 96 hours after administration of the 131I diagnostic, ablative or therapeutic dose, a whole body scan and spot images of the neck and other uptake areas are performed with a high energy parallel collimator fitted gamma camera. The acquisitions consist of anterior and posterior whole body scans completed by a zoom acquisition on the neck region with anatomical and clinical marks. A minimum of 30 minutes scanning time or a minimum of 140.000 counts should be obtained. For spot images, scanning for a minimum of 10 minutes and for at least 60.000 counts (10) .

In some institutions, quantitative dosimetry is performed to determine whole body and lesion uptakes; however this requires specialized equipment (32).

In order to avoid false positive results, scans must be interpreted with care. Special attention will be brought to physiological uptakes of 131I in the breast, the salivary glands, the thymus, the gastro-intestinal and urinary tracts. Pathologic pulmonary transudates, inflammatory diseases, clothes or skin contamination may also produce false positive scans. Reduction of the risk of

artifacts can be achieved by asking the patient to drink large amounts of liquid and lemon juice, chew gum, change clothes and take a shower before scanning.

Serum thyroglobulin (Tg) concentration measurements

Tg measurements should always use a modern immunometric assay with a sensitivity of less than 1 ng/ml, and should be performed by a laboratory experienced in Tg testing. The same method in the same laboratory should be used for serial measurements in each patient.
The use of the most recent assays allowed Tg measurement to become the cornerstone of follow-up of thyroid cancer patients. In the absence of any thyroid tissue remnant, serum Tg is a specific and sensitive marker reflecting the presence or absence of neoplastic disease. The rare false negatives are due to small isolated lymph node metastases. Serum Tg is undetectable in 20% of patients receiving T4 treatment who have lymph node metastases (9).
When initial surgery and thyroid remnant ablation are successful, the serum Tg should be undetectable, both during T4 therapy and under endogenous or exogenous TSH stimulation. Detectable serum Tg under T4 treatment is highly suggestive of residual or recurrent tumor. Those patients are automatically scheduled for a therapeutic dose of 131-I followed by a post-treatment TBS.
Even in papillary and follicular thyroid cancer cells, Tg synthesis increases upon TSH stimulation. So, the diagnostic sensitivity of serum Tg could be enhanced by an elevated serum TSH concentration. Two recent retrospective studies performed in large series of patients have shown that when serum Tg on TSH stimulation is undetectable, routine diagnostic 131I-TBS could not add any further information on the clinical status (33,34)
Anti-Tg antibodies are found in 15 to 25% of patients with thyroid carcinoma (35). Because these antibodies interfere with all assays for Tg, measurements of Tg cannot be used to monitor patients who have these antibodies. In this case, the monitoring of the patients relies solely on 131I scanning. However, the antibodies tend to disappear with time after thyroidectomy and ablation. As an alternative, interferences can be detected by a recovery test (36).

Neck Ultrasonography (US)

Recent works confirm the major role of neck ultrasonography in the detection of neck recurrence in DTC (37).
Lymph nodes are virtually the only site of recurrence in patients in whom serum Tg is undetectable after TSH stimulation and most of them are detected by US.
At the present time, most lymph nodes metastases (even of 2-3mm) are discovered at US performed with a high frequence probe (>7.5-13 MHz) (33,34,38). Suspicious US findings are hypoechogenic, lack an echogenic central line, have a round shape, contain microcalcifications or a kystic component and have a hypervascularised appearance on colour Doppler. In case of suspicious lymph node lesion, a fine needle biopsy (preferably with Tg measurement in the liquid aspirate) under US guidance is performed.. These procedures should be routinely performed during follow up of DTC by an operator with day-to-day experience in evaluating thyroid cancer.
It is to be kept in mind that lymph nodes of a few mm in diameter cannot be demonstrated by 131I-TBS.

Recombinant human TSH (rhTSH)

Withdrawal of T4 therapy to stimulate thyroid tissue for tracer uptake results in temporary hypothyroidism, poorly tolerated by some patients. Indeed, the signs of hypothyroidism occurring during this period may result in a substantial impairment of the quality of life and ability to work (9,39,40). Intramuscular injections of rhTSH are an alternative allowing continuation of T4 treatment. Side effects are minimal and consist essentially in mild nausea (16%).
Serum Tg levels are lower following rhTSH than following thyroid hormone withdrawal, but both testing modalities are diagnostically equivalent when using a sensitive Tg assay. It is also shown that for the same administered 131I dose, the specific activity of radioiodine available for uptake by thyroid tissue is lesser after rhTSH in the euthyroid state than it is in hypothyroidism after T4 withdrawal. Indeed, the 48 hours retention of 131I and the peak of serum Tg appear lower after rhTSH than those obtained after classical withdrawal (41). The explanation for this could be found in the more rapid clearance of administered 131I in the euthyroid state. However when combining 131I total boby scanning and serum Tg measurements, the efficiency of rhTSH testing seems comparable to that of T4 withdrawal in most patients (41,42,43)
The information currently available suggests that previously low risk 131I-ablated patients may be followed up by measurement of basal and rhTSH-stimulated serum Tg (44).
Diagnostic 131I-TBS is normal in patients with undetectable rhTSH-stimulated Tg and does not add significant information in most patients with detectable serum Tg levels after rhTSH. This makes diagnostic 131I-TBS unnecessary for follow up in the majority of patients with no evidence of disease.

Patients who are likely to require treatment with 131I should have a conventional thyroid hormone withdrawal scan. This includes patients with detectable serum Tg, known thyroid remnant or metastatic lesions. During the course of a patient's postoperative follow-up, the decision regarding when to begin using rhTSH rather than hormone withdrawal testing should take several factors into account, such as a reasonable evidence that all normal thyroid tissue has been ablated and a low risk of tumor recurrence.

rhTSH stimulation for 131-I therapy or ablation may not be as effective as thyroid hormone withdrawal and dosimetric studies are needed to assess both the optimal amount of 131I to be administered and the radiation dose delivered to body structures. rhTSH is currently not approved for subsequent 131-I therapy which has to be administered following thyroid hormone withdrawal.
However, rhTSH is sometimes the only possible or safe option for diagnostic purposes and may also prove useful for therapy. Such cases are hypopituitarism, functional metastases causing suppression of serum TSH, severe ischemic heart disease, previous history of psychiatric disturbance precipitated by hypothyroidism, metastasis closely related to the central nervous system or advanced disease/frailty (45).

The rhTSH scanning protocol recommended is:

rh TSH (0.9 mg) administered by deep intramuscular injection on days 1 and 2
Tracing dose of 131-I 111 to 185 MBq (3-5 mCi) on day 3
Tg measurement and TBS performed on day 5

PET scan

18F-FDG tracer uptake in thyroid cancer appears to be inversely related to 131I uptake. 131I negative tumor cells are readily detected with 18F-FDG, demonstrating that dedifferentiated tumors that are no longer 131I avid exhibit a high glucose metabolism (46).
18F-FDG PET scan can be performed while the patient is on T4 therapy. However a recent paper showed that 30 % of lesions were demonstrated only following TSH stimulation and that other lesions had higher uptake in this condition (47). 18F-FDG uptake was enhanced in poorly-differentiated thyroid carcinomas, in which no detectable 131I uptake could be observed (48,49,50).
This technique shows a high sensitivity for neck and mediastinal lymph node metastases. PET is best performed in patients with a negative high dose 131I TBS and a high likelihood of persistent disease (elevated Tg level).

Strategy of follow-up

4 subgroups of patients have to be distinguished:
1. Patients treated with (near)total thyroidectomy alone.
In some centers, the administration of an ablative 131I dose can be mandatory in low risk patients with a tumor diameter < 15 mm (10).
In these patients, the follow up based on Tg concentration (on T4 and on TSH stimulation) can be applied. Yearly neck US could evaluate thyroid tissue remnants.
A late ablative 131I dose may be given if a detectable Tg level persists on T4 therapy.

2. Patients treated with lobectomy alone
(patients operated for supposedly benign nodule, with final histology positive for a cancerous lesion).
Low risk patients will be prescribed a T4 treatment and their follow up should consist in yearly neck examination and serum Tg measurement on T4. Serum Tg after withdrawal will be poorly informative. Repeated neck US is able to easily detect the occurrence of any lesions in the remaining lobe and select patients for an eventual completion surgery.
Other patients will be reoperated (see surgical treatment) and others will receive an ablative 131I dose.

3. Patients classified as high risk since the first evaluation
TNM T3 and T4 patients or patients with distant metastases, neck disease and poorly differentiated histotypes should be treated and followed up according to specific protocols.

4. The low risk patients
The largest group (75 to 80% of the case of DTC) is constituted by the low risk patients treated by total thyroidectomy and 131I ablation. For this group, we recommend the follow up protocol published in 2004 in the European Journal of Endocrinology (51) with some minor adaptations.

The follow up relies on 4 stages (see figure 1):
1. early evaluation at the time of the ablative 131I dose
2. the 3 months follow up while under T4 treatment
3. the 6-12 months follow up under TSH stimulation
4. the subsequent follow up

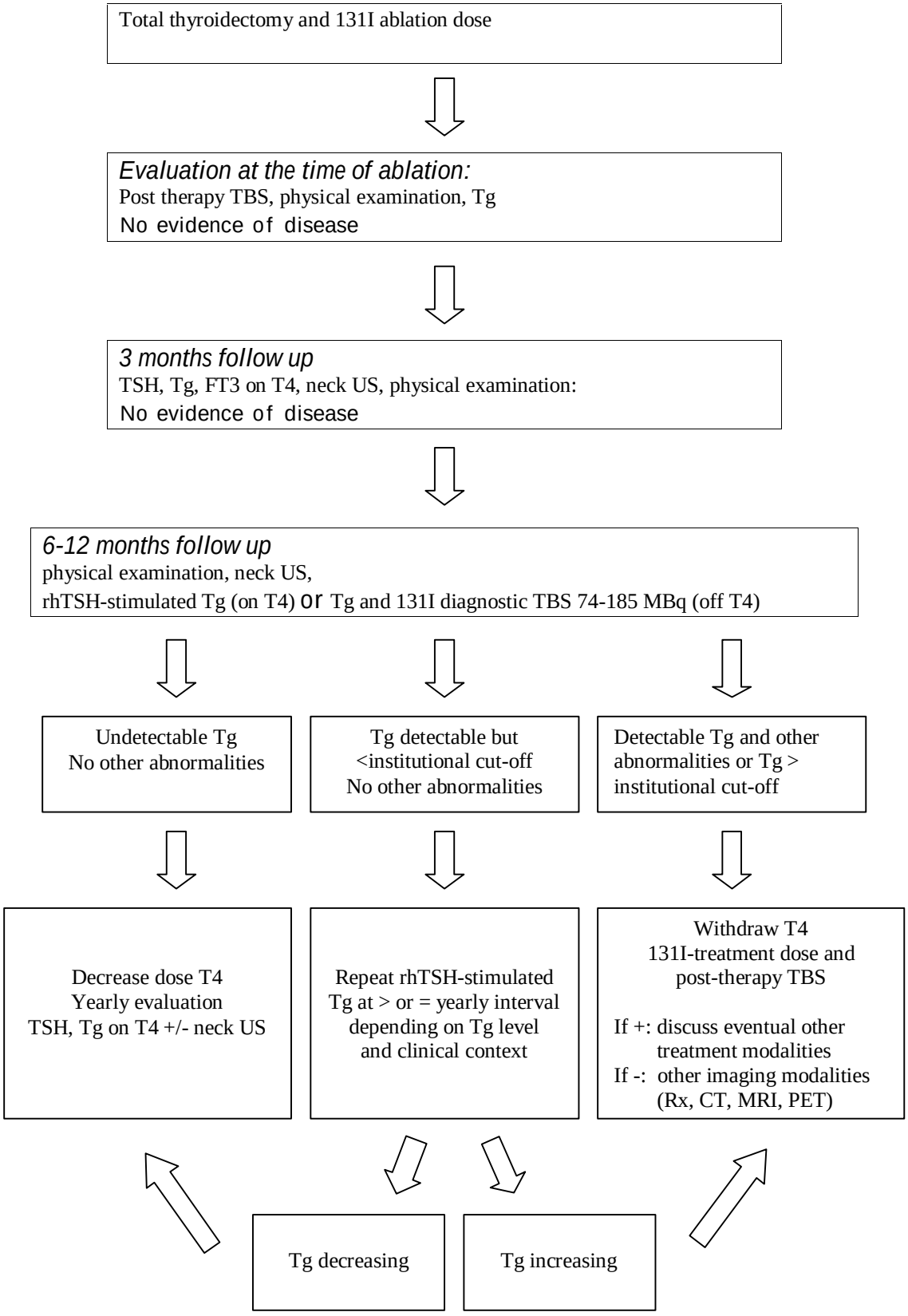

Figure 1 (adapted from (51))

1. early follow up

This consists of physical examination, a Tg measurement and a 131I TBS 3-7 days after the ablative dose dose. A low or undetectable Tg level indicates a favourable outcome, while an elevated value have an indeterminate signifcance (persistent disease versus synthesis by post-surgical residue).
If 131I TBS shows an uptake outside the thyroid bed, other modalities of investigation and treatment are warranted according to the site of uptake. Mostly, a further therapeutic 131I dose will be given.
If no uptake is seen outside the thyroid bed, T4 treatment is initiated.

2. 3 months follow up

It consists of TSH, free T3 and T4, Tg measurements, a neck US and physical examination. An appropriate T4 intake is denoted by a TSH concentration < 1mU/L and normal free T3 and T4 levels.
At this stage, patients can be classified in those with and those without evidence of disease. Patients are considered without disease when after a surgeon's report based complete tumor resection no uptake outside the thyroid bed on 131I TBS, undetectable Tg (<1ng/ml on T4) and no abnormality on neck US are demonstrated.
Some of the patients meeting these criteria present with large thyroid remnants shown by an important thyroid uptake (> 5-15%) and should be considered for additional surgery or further large 131I doses.
Patients with evidence of disease are referred for treatment with radioiodine and/or other modalities discussed within the multidisciplinary group.

3. 6 to 12 months follow up

For the patients without evidence of disease at 3 months, Tg measurements on T4 and on TSH stimulation, neck US (+fine needle aspiration and Tg measurement in the aspirate if suspicious) and physical examination are performed.
Serum Tg remains undetectable in more than 80 % of patients without evidence of disease at 3 months. In 15 to 20% of the patients, Tg become detectable after TSH stimulation. In this case, another assessment after T4 withdrawal is required a few months later. Serum Tg will decline or become undetectable in the absence of any treatment in 1/3 to 2/3 of the patients. In other patients, Tg level remains stable or increases, announcing a recurrence requiring the administration of a high dose 131I.
Neck US is routinely performed because the rare false negative Tg determinations are due to isolated lymph node metastases.
The rationale for using neck US instead of diagnostic 131I TBS is the recently well-documented efficacy of US in detecting neck recurrences (37,38,52). In the study of Frasoldati, neck US had a sensitivity of 94% in detecting recurrence, versus 45% for diagnostic 131I TBS. In the work of Pacini, Tg on rhTSH and neck US had a sensitivity of 96.3% and a negative predictive value of 99% for detecting active disease versus 92.7% and 99% with Tg on rhTSH and diagnostic 131I TBS.
The usefulness of routine 131I TBS control is becoming questionable since the publication of recent studies showing that diagnostic 131I TBS adds no information to that obtained by Tg

testing (33,34,38,53,54). In these studies, no negative Tg patient had a positive 131I TBS (uptake outside thyroid bed) and only a fraction of Tg positive patients had also a positive 131I TBS. Indeed, an elevated serum Tg does not guarantee iodine avidity of the tumor and there could be absence of discernible activity on the TBS if the recurrent tumor is too small and below the sensitivity of the diagnostic scan, or if a less differentiated tumor shows a dissociation between Tg synthesis and iodine-trapping mechanism.
However, in the Belgian clinical practice, many patients have significant thyroid remnants and the post-ablation 131I TBS may be poorly sensitive for detecting uptake outside the thyroid bed. Therefore subsequent diagnostic 131I TBS at 6-12 months can be indicated to ensure total thyroid ablation and to search for foci of uptake outside the thyroid bed. This test is most frequently performed after T4 withdrawal regarding the high probability to administer a second ablative dose of 131I. Another reason to use a diagnostic 131I TBS could be the lack of an experienced thyroid cancer US operator.
Also remember that in patients with persisting anti-Tg antibodies interfering with the Tg assay, it may be safe to scan with 131I since serum Tg determination cannot exclude persistent disease.

4. Subsequent follow up

Patients with undetectable Tg concentration and normal neck US at 6-12 months have a risk of recurrence of less than 0.5% (33,52,55). Clinical evaluation, neck US and serum TSH and Tg measurements are performed annually, any other testing being unnecessary as long as no abnormality is demonstrated.
If Tg is detectable at 6-12 months, the management will depend on the absolute Tg level, on the neck US findings and on the slope of Tg levels between consecutive values.
In case of suspicion of recurrence, a treatment with a high dose of 131I should be given after T4 withdrawal), followed by a TBS.
If the post-therapy 131I TBS fails to show any uptake, other imaging techniques have to be employed: Thorax X-ray, CT scan and/or MRI neck and chest, bone scintigraphy, liver US and 18-F FDG PET scan.
Non-specific tumoral tracers as 201Thallium, 99m-Tc sestamibi or 99m-Tc tetrofosmin have been proposed for the localization of recurrence with variable sensitivities and specificities depending on scan techniques and patient characteristics. They are not recommended as routine investigations in the overall follow up of patients with DTC.
The follow-up should be life-long. Indeed, recurrences occur within the first five years after initial treatment, but may also occur many years later, particularly in case of papillary carcinoma. Moreover, T4 suppressive or substitutive therapy and late side-effects of 131I need to be monitored.

References

1. Hay ID et al, Surgery 1987; 102: 1088
2. Hay ID et al, Surgery 1998;124:958
3. Hundahl SA et al, Cancer 2000; 89:202
4. Van de Velde CJH et al, Eur J Cancer Clin Oncol 1988; 24:287 **
5. Solomon BL, J Clin Endocrinol Metab 1996; 81:333
6. Grebe SKG and Hay ID, Surg Oncol Clin N Am 1996 ; 5 : 43
7. Mazzaferri EL and Jiang SM, Am J Med 1994; 97:418
8. DeGroot L et al, J Clin Endocrinol Metab 1990; 71:414
9. Schlumberger M et al, N Engl J Med 1998; 338:297
10. Schlumberger M et Pacini F. Thyroid Tumors. Paris. Editions Nucleon, 2003.
11. Samaan NA et al, J Clin Endocrinol Metab 1992; 75:714
12. Tsang RW et al, Cancer 1998; 82:375
13. Maxon HR et al, N Engl J Med 1983; 309:937
14. Morris LF, J Clin Endocrinol Metab 2001; 86:3507
15. McCowen KD et al, Am J Med 1976; 61:52
16. Ramacciotti C et al, J Nucl Med 1982; 23:483
17. Snyder J et al, J Nucl Med 1983; 24:659
18. DeGroot LJ and Reilly M,, Ann Intern Med 1982; 96:51
19. Johansen K et al, J Nucl Med 1991; 32:252
20. Kuni CC and Klingensmith WC, Radiology 1980; 137:773
21. Ramanna L et al, Clin Nucl Med 1985; 10:791
22. Doi SA and Woodhouse NJ, Clin Endocrinol 2000; 52:765
23. Gawkowska SM, Eur J Cancer 2001; 37: 39 Abs
24. Fatourechi V et al, Thyroid 2000; 10:573
25. Sherman SI et al, J Clin Endocrinol Metab 1994; 78:629
26. Schlumberger M et al, J Clin Endocrinol Metab 1986; 63:960
27. Maxon HR and Smith HS, Endocrinol Metab Clin North Am 1990;19:685
28. Sarkar SD et al, J Nucl Med 1976; 17:460
29. Schlumberger M et al, J Nucl Med 1996; 37:606
30. Pujol P et al, J Clin Endocrinol Metab 1996; 81:4318
31. Park HM, Clin Nucl Med 1992; 17:501
32. Maxon HR et al, J Nucl Med 1992; 33:1132
33. Cailleux AF et al, J Clin Endocrinol Metab 2000; 85:175
34. Pacini F et al, J Clin Endocrinol Metab 2002; 87:1499
35. Spencer CA et al, J Clin Endocrinol Metab 1998; 83:1121
36. Schlumberger M and Baudin E, Eur J Endocrinol 1998; 238:249
37. Frasoldati A et al, Cancer 2003; 97 :90
38. Torlontano M et al, Eur J Endocrinol 2003; 148:19
39. Mazzaferri EL, Kloos RT, J Clin Endocrinol Metab 2001; 86:1447
40. Dow K et al, Thyroid 1997 ;7 : 613
41. Haugen BR et al, J Clin Endocrinol Metab 1999; 84:3877
42. Robbins RJ et al, J Clin Endocrinol Metab 2001; 86:619
43. Schlumberger M et al, Eur J Endocrinol 2000; 143:557
44. Mazzaferri EL et al, J Clin Endocrinol Metab 2003 ; 88 :1433
45. Ladenson P, Semin Nucl Med 2000; 30: 98
46. Fein V et al, J Nucl Med 1996 ; 37 :1468
47. Petrich T et al, Eur J Nuc Med 2002; 29: 641
48. Wong CO and Dworkin HJ, J Nucl Med 1999; 40:993
49. Chung JK et al, J Nucl Med 1999; 40:986
50. Schluter B et al, J Nucl Med 2001; 42:71
51. Schlumberger M et al, Eur J Endocrinol 2004; 150:105
52. Pacini F et al, J Clin Endocrinol Metab 2003;88:3668
53. Mazzaferri EL and Kloos RT, J Clin Endocrinol Metab 2002; 87:1490
54. Pacini F et al, J Clin Endocrinol Metab 2001; 86:5686
55. Baudin E et al, J Clin Endocrinol Metab 2003; 88:1107

Additionnal references consulted:
UpToDate, 2002; Vol.10 N°3 Sherman SI
Meier MD et al, Procedure Guidelines for therapy of thyroid disease with 131 iodine, J Nucl Med 2002; 43:856
Guidelines for the management of thyroid cancer in adults. British Thyroid association Royal College of Physicians, March 2002

Appendix 1

Drug interactions with 131I

Type of medication	recommended time of withdrawal
Thyroxine	4 to 6 w
Triiodothyronine	2 w
Multivitamins containing iodide	7 d
Some iodine-containing expectorants	6 w
Lugol's solution	6 w
topical iodine (surgical skin preparations)	6 w
radiographic contrast agents	1 to 3 m
amiodarone	3 to 6 m or longer

Low iodide diet

To be followed 2 weeks before 131-I administration and 1 to 3 days thereafter

Iodized salt
Milk/dairy products
Eggs
Liver
Seafood
Chocolate
Food containing red dye E-127 (erythrosine) (red colored sweeties, some syrups)

Appendix 2

Document from « Conseil Supérieur de l'Hygiène/ Hooge GezongheidsRaad »

MINISTERE DES AFFAIRES SOCIALES, DE LA SANTE PUBLIQUE
ET DE L'ENVIRONNEMENT.

GROUPE CONJOINT « CONSEIL SUPERIEUR D'HYGIENE (SECTION RADIATIONS).
JURY MEDICAL DE LA COMMISSION SPECIALE.

Recommandations aux médecins concernant les instructions à délivrer au patient ou à son responsable légal après traitement au radio-iode.

Ce document fait suite aux recommandations du 18 janvier 1996 relatives aux conditions et aux critères d'hospitalisation et de sortie des patients traités au moyen de radionucléides par voie métabolique.

Pour rappel, ces recommandations comprenaient, tant dans le cadre des conditions de traitement ambulatoire que dans celui des conditions de sortie après hospitalisation, une disposition demandant que le médecin qui a administré le traitement, donne au patient ou à son responsable légal des instructions écrites auxquelles celui-ci devra se conformer lorsqu'il aura quitté l'hôpital.

Les présentes recommandations portent sur la nature des instructions à délivrer après traitement au radio-iode et sur la durée d'application des mesures envisagées. Un modèle d'instructions figure en annexe I; les rubriques concernant la durée d'application doivent être complétées par le médecin en fonction de la pathologie, de l'activité administrée, de la fixation du radionucléide, de l'état clinique, des conditions socioéconomiques et de travail du patient et de son degré d'instruction. Des recommandations sur les durées d'application qui sont généralement appropriées sur la base des trois premiers paramètres cités ci-dessus, sont fournies en annexe II.

En ce qui concerne la durée des mesures de restriction pour le travail professionnel, il y a lieu en pratique de distinguer 4 catégories de travaux:

- le travail avec des enfants en-dessous de 10 ans (écoles primaires et maternelles, crèches, ...) pour lequel la durée des restrictions sera
  semblable à celle concernant les enfants à domicile;

- les travaux où il n'est pas possible de maintenir la plupart du temps une
  distance de 2 mètres vis-à-vis du public ou des collègues de travail : dans ce cas, la durée des restrictions est semblable à celle concernant les lieux
  publics.

- les travaux où il est possible de maintenir une distance de 2 mètres au moins vis-à-vis du public ou des collègues : le congé de maladie durera au minimum 2 jours (càd pendant la phase d'excrétion rapide du radionucléide administré, et ce vu les risques de contamination).

- les travaux affectés par la présence de radioactivité résiduelle (radioimmunoassays, industrie photographique,...) demander avis à un expert.

ANNEXE I

Instructions à délivrer au patient ou à son responsable légal après traitement au radio-iode.

Modèle recommandé.

Madame, Monsieur,

Lorsque vous quitterez ce jour le service, vous serez encore porteur d'une certaine quantité de radio-iode résiduel.
Comme convenu lors de nos entretiens, il vous est dès lors vivement recommandé de suivre, dans les jours à venir, une série d'instructions destinées à protéger votre entourage, le public et l'environnement en général.

C 'est ainsi que :

· D'une façon générale:

Il faudra veiller à vous tenir autant que possible à une distance d'au moins 1 mètre (2 mètres si le contact se prolonge au delà d'1 heure) des personnes que vous allez côtoyer à domicile ou ailleurs.
Si des contacts plus rapprochés sont indispensables, il faudra faire en sorte que la durée de ceux-ci soit aussi courte que possible et n'excède en tout cas pas une demi-heure par jour.
Ces mesures générales de prudence doivent être suivies pendant…….. ; après la sortie du service; en ce qui concerne les contacts avec les femmes enceintes et les enfants de moins de 10 ans, les recommandations seront suivies pendant une durée plus longue, à savoir pendant…….

· Plus spécifiquement:

è *à titre personnel :*

- vous suivrez les instructions concernant les précautions à prendre lorsque vous allez aux toilettes pendant…….. ;
  pour rappel: s'asseoir pour uriner (même les hommes); utiliser du papier toilette (même après avoir seulement uriné); il est recommandé de mettre des gants en plastique jetables; tirer 2 fois la chasse; se laver les mains, et ce si possible dans les toilettes; utiliser un essuie personnel.
- en cas de vomissement, vous contacterez immédiatement le
  Docteur……..., afin de vous renseigner quant aux
  mesures à prendre
  tél. :……
  Il en est de même en cas d'urgence nécessitant une hospitalisation.

è *vis-à -vis de votre partenaire* :

- vous dormirez dans une chambre séparée ou dans des lits éloignés l'un de l'autre d'au moins 2 mètres pendant…….. : ne pas placer les deux lits de part et d'autre d'un même mur (chambres contiguës) car le mur n'absorbe pas tous les rayonnements;

- pendant la même période, il est recommandé de s'abstenir de rapports sexuels;

- il faut éviter toute procréation pendant une durée de six mois au moins pour les hommes comme pour les femmes;

- si votre partenaire est enceinte, il est recommandé de suivre les recommandations avec rigueur (ou, mieux, de ne pas demeurer sous le même toit) pendant…… .

è *vis-à-vis de vos enfants* :

- il est vivement recommandé que les enfants de moins de 10 ans demeurant chez vous ne restent pas sous le même toit; si cela est impossible, il faudra en tout cas absolument veiller à ce que les enfants, et particulièrement les tout jeunes enfants, soient soignés et pris en charge par quelqu'un d'autre, afin de minimiser les temps de contact rapprochés. Les enfants dormiront impérativement dans une chambre séparée. Ces mesures vis-à-vis des enfants doivent être maintenues pendant…….. ;

- un allaitement éventuel sera stoppé avant le traitement et ne sera pas repris après le retour à domicile.

è *vis-à-vis de vos visiteurs* :

- la visite de femmes enceintes et d'enfants de moins de 10 ans est interdite pendant…….. ;

- les visites qui ne sont pas indispensables sont déconseillées pendant…… ;
- pour les autres visites, il y a lieu de respecter les règles générales de distance et de limitation de la durée des contacts rapprochés; il est à noter que des contacts rapprochés de très courte durée (par exemple: serrer la main,…..) sont inoffensifs.

è *ustensiles de cuisine et de toilette* :

- vu la contamination de la salive, les couverts, tasses, verres,…….. que vous utilisez ne seront pas employés par d'autres; après lavage toutefois, ils peuvent être utilisés normalement par n'importe qui; la lavage se fait comme pour la vaisselle ordinaire;

- les ustensiles de toilette (gants, essuies, brosse à dents, ...) seront strictement individuels; ici aussi, après lavage ordinaire, ils
pourront être utilisés par d'autres.

è *vis-à-vis des lieux publics* :

- vous éviterez les lieux très fréquentés où le respect des règles de distance est difficile et où vous pourriez côtoyer des personnes à risque telles que des femmes enceintes ou des jeunes enfants (cinéma, théâtre, restaurant, grandes surfaces,...) et ce pendant …….. ;

- vous éviterez les trajets en transports publics pendant la même période; en cas de nécessité majeure, vous veillerez à ce que le trajet ne dépasse en aucun cas une durée d'une heure ; s'asseoir aussi loin que possible des autres passagers ou du conducteur de taxi.

è *sur le plan professionnel* :

- vous resterez en incapacité de travail pendant…… ;

- lorsque vous reprendrez votre travail, vous respecterez les règles générales de distance et de limitation de la durée des contacts rapprochés pendant…….. .

ANNEXE II

Durée des restrictions après traitement au radio-iode.

1.Traitement pour Hyperthyroïdie.

Activité administrée*	Durée des restrictions (contrainte de dose en mSv = c.d.)			
	Mesures vis-à-vis du partenaire (lits séparés,...) (cd. : 5 mSv/an)	Mesures vis-à-vis du public et des collègues de travail à domicile ou au travail (c.d. : 0,5 mSv/an)	Mesures vis-à-vis des femmes enceintes et des enfants < 10 ans à domicile ou au travail (c.d. : 0,5 mSv/an)	
			£ 2ans f.enceinte	3-10 ans
200 MBq	3 j.	3 j.	2 sem.	1 sem.
400 MBq	1 sem.	1 sem.	3 sem.	2 sem.
600 MBq**	2 sem.	2 sem.	3 sem.1/2	3 sem.
800 MBq (avec hospitalisation)	2 sem.	2 sem.	3 sem.1/2	3 sem.

* Ce tableau part de l'hypothèse d'une fixation moyenne maximum d'environ 60 à 70 %. Il est recommandé de réaliser une courbe de fixation thyroïdienne avant le traitement. Lorsque ce n'est pas possible, il est conseillé de faire revenir le patient après 24 heures et de pratiquer une mesure de débit de dose à I mètre à hauteur de la thyroïde, après miction préalable.

Si on mesure:
- 15 à 20 µSv/h, se référer aux instructions pour activité administrée de 600 MBq;
- 10 à 15 µSv/h, se référer aux instructions pour activité administrée de 400 MBq;
- < 10 µSv/h, se référer aux instructions pour activité administrée de 200 MBq.

** Pour rappel : normalement, l'hospitalisation est requise pour des activités administrées égales ou supérieures à 400 MBq; l'administration d'activités allant jusqu'à 600 MBq, est cependant autorisée en ambulatoire si la fixation thyroïdienne maximum ne dépasse pas 70

2.Traitement pour cancer de la thyroïde.

Tableau clinique*	Durée des restrictions** (contrainte de dose en mSv = c.d.)			
	Mesures vis-à-vis du partenaire (lits séparés,...) (c.d. : 5 mSv/an)	Mesures vis-à-vis du public et des collègues de travail (c.d. : 0,5 mSv/an)	Mesures vis-à-vis des femmes enceintes et des enfants < 10 ans à domicile ou au travail £ 2ans / f. enceinte (c.d. : 0,5 mSv/an)	3-10 ans
1ère dose ablative pour résidu thyroïdien significatif	2 sem.	2 sem.	3 sem.1/2	3 sem.
localisation métastatique identifiée	2 sem.	2 sem.	3 sem. 1/2	3 sem.
petit(s) foyer(s) résiduel(s)	1 sem.	1 sem.	3 sem.	2 sem.

* Pour rappel, tout ceci suppose un malade collaborant et autonome (cfr. document du 18janvier 1996).

** Ces durées se rapportent à des malades pour lesquels le débit de dose mesuré à la sortie est de 20 µSv/h à 1 mètre.

MINISTERIE VAN SOCIALE ZAKEN, VOLKSGEZONDHEID EN

LEEFMILIEU.

GEMEENSCHAPPELIJKE GROEP "HOGE GEZONDHEIDSRAAD" (sectie stralingen)MEDISCHE JURY VAN DE SPECIALE COMMISSIE IONISERENDE STRALINGEN

Aanbevelingen aan de geneesheren inzake de instructies die aan de patiënt of diens wettelijk verantwoordelijke dienen te worden gegeven na behandeling met radioactief jodium[*].

Dit document is een vervolg op de aanbevelingen van 16 mei 1997 met betrekking tot de voorwaarden en criteria van hospitalisatie en ontslag van patiënten die langs metabole weg met radioisotopen worden behandeld.

Ter herinnering, deze aanbevelingen bevatten, zowel in het kader van de voorwaarden voor ambulante behandeling als in dit van de voorwaarden van ontslag na hospitalisatie, een bepaling die stelt dat de geneesheer die de behandeling heeft toegediend aan de patiënt of diens wettelijk verantwoordelijke geschreven instructies moet geven, waarnaar deze laatste zich dient te schikken na ontslag uit het ziekenhuis.

De huidige aanbevelingen hebben betrekking op de aard van de na behandeling met radioactief jodium te geven instructies en op de tijdsspanne gedurende dewelke de beschouwde maatregelen moeten worden toegepast. Een voorbeeld van instructies is weergegeven in bijlage I ; de rubrieken met betrekking tot de toepassingsduur moeten door de geneesheer worden vervolledigd in functie van de pathologie, de toegediende activiteit, de fixatie van het radioisotoop, de klinische toestand, de socio-economische~ en werkvoorwaarden van de patiënt en zijn opleidingsniveau. Aanbevelingen met betrekking tot de toepassingsduur die meestal aangewezen is, op basis van de eerste drie hogergenoemde parameters, worden gegeven in bijlage Il.

In verband met de duurtijd van de beperkende maatregelen voor de beroepswerkzaamheden, moeten in de praktijk 4 categorieën werkzaamheden worden onderscheiden :

- het werken met kinderen van minder dan 10 jaar (kleuter~ en lagere scholen, crèches,...)waarbij de duurtijd van de beperkende maatregelen vergelijkbaar zal zijn met deze in verband met kinderen thuis ;

- werk waarbij het niet mogelijk is meestentijds een afstand van 2 meter te bewaren ten opzichte van collega's of publiek : in dit geval is de duurtijd van de beperkende maatregelen vergelijkbaar met wat geldt voor publieke plaatsen.

- werk waarbij het mogelijk is een afstand van minstens 2 meter te bewaren ten opzichte van collega 's of publiek : het ziekteverlof zal minimaal 2 dagen duren (t.t.z. gedurende de snelle excretiefase van het toegediend radioisotoop, en dit gezien de besmettingsrisico's).

- werkzaamheden die door de aanwezigheid van residuele radioactiviteit worden beïnvloed (radioimmunoassays, industriële fotografie, ...) : raad vragen aan een deskundige.

[*] Document goedgekeurd door de Hoge Gezondheidsraad (Afdeling stralingen) op 16 mei 1997

BIJLAGE I

Instructies die aan de patiënt of diens wettelijk verantwoordelijke moeten worden gegeven na behandeling met radioactief jodium.

Aanbevolen model.

Mevrouw, Mijnheer,

Wanneer U vandaag de dienst zal verlaten, zal U nog een zekere hoeveelheid overblijvend radioactief jodium in U dragen.
Zoals vroeger reeds met U besproken, raden wij U dan ook stellig aan gedurende de volgende dagen een reeks instructies te volgen, bedoeld ter bescherming van uw omgeving, het publiek en het leefmilieu in het algemeen.

Daarom moet U :

· In het algemeen :

Er zorg voor dragen in de mate van het mogelijke een afstand van minstens 1 meter in acht te nemen (2 meter indien het contact langer dan 1 uur duurt) tegenover personen die U thuis of elders ontmoet.
indien meer nabije contacten onmisbaar zijn, moet U deze zo kort mogelijk houden en ervoor zorgen dat zij in geen geval langer duren dan een half uur per dag.
Deze algemene voorzorgsmaatregelen moeten worden nageleefd gedurende...
na ontslag uit de dienst; voor wat betreft contacten met zwangere vrouwen of kinderen van minder dan 10 jaar, moeten deze aanbevelingen langer worden opgevolgd, en wel gedurende...

· Meer bepaald :

è *te persoonlijken titel :*

- volgt U de instructies op met betrekking tot de voorzorgen bij het naar het toilet gaan gedurende....;
  ter herinnering : gaan zitten om te wateren (ook de heren); toiletpapier gebruiken, zelfs na wateren alleen; het is aan te bevelen plastic wegwerphandschoenen aan te trekken; toilet 2 maal doortrekken; handen wassen, indien mogelijk in de lavabo van het toilet; een persoonlijke handdoek gebruiken.

- in het geval U zou moeten braken, neemt U onverwijld contact op met Dokter... , telefoonnummer..... , die U zal inlichten over de te nemen maatregelen.
  Hetzelfde geldt indien een noodgeval een ziekenhuisopname noodzaakt.

è *tegenover uw partner :*

- U dient te slapen in gescheiden kamers of in bedden die minstens 2 meter van elkaar verwijderd zijn gedurende...; plaats niet twee bedden in aangrenzende kamers en aan weerszijden van eenzelfde muur, want de muur slorpt niet alle stralen op;

- gedurende dezelfde periode is het aangewezen zich te onthouden van geslachtsverkeer;

- het voortbrengen van kinderen moet gedurende minstens zes maanden vermeden worden, zowel door mannen als door vrouwen;

- indien uw partner zwanger is, is het aangewezen deze

aanbevelingen strikt na te volgen (of, beter nog, niet onder hetzelfde dak te verblijven) gedurende...

è *tegenover uw kinderen :*

- het is ten zeerste aan te bevelen kinderen van minder dan tien jaar die gewoonlijk bij U verblijven, niet onder hetzelfde dak te houden; wanneer dat onmogelijk is moet U er absoluut over waken dat de kinderen, in het bijzonder de zeer jonge kinderen, door iemand anders kunnen worden verzorgd en bewaakt om de duurtijd van nabije contacten zo klein mogelijk te houden. Kinderen moeten gebiedend in een afgescheiden kamer slapen.
  Deze maatregelen ten overstaan van kinderen moeten worden aangehouden gedurende... ;

- een eventuele borstvoeding moet worden stopgezet voor de behandeling en zal niet worden hernomen na terugkeer naar huis.

è *tegenover uw bezoekers :*

- bezoeken van en aan zwangere vrouwen en kinderen van minder dan 10 jaar is verboden gedurende... ;
  Niet-noodzakelijke bezoeken zijn afgeraden gedurende... ;

- voor andere bezoeken moeten de algemene regels over afstand en beperking van de tijdsduur van nabije contacten worden nageleefd; het moet worden opgemerkt dat nabije contacten van zeer korte duur (bijvoorbeeld: iemand een hand geven) ongevaarlijk zijn.

è *keuken- en toiletgerei :*

- gezien de besmetting van het speeksel zullen het door U gebruikte bestek, tassen, glazen,.... niet door anderen worden gebruikt; na afwassen echter, kunnen ze gewoon door eender wie worden gebruikt; het afwassen gebeurt zoals bij de gewone afwas;

- toiletgerei (washandje, handdoek, tandenborstel,...) moet strikt individueel zijn; ook dit mag, na een gewone wasbeurt, door anderen worden gebruikt.

è *ten overstaan van openbare plaatsen :*

- U dient drukbezochte plaatsen te vermijden, waar het moeilijk is de afstandsregels in acht te nemen en waar U personen met verhoogd risico, zoals zwangere vrouwen of jonge kinderen, kan ontmoeten (bioscoop, theater, restaurant, supermarkt,....), en dit gedurende.... ;

- gedurende dezelfde periode dient U ook te vermijden gebruik te maken van het openbaar vervoer; in geval van dwingende noodzaak dient U erop te letten dat het traject in geen geval langer is dan een uur; zet U zo ver mogelijk van andere passagiers of van de taxibestuurder.

è *op professioneel vlak :*

- U zal arbeidsongeschikt blijven gedurende .... ;

- wanneer U het werk herneemt, zal U de algemene regels i.v.m. het bewaren van voldoende afstand en het beperken van de tijdsduur van nabije contacten dienen te eerbiedigen gedurende .... .

BIJLAGE II

Duur van de beperkingen na behandeling met radioactief jodium

1. Behandeling voor Hyperthyroïdie.

Toegediende activiteit*	Duur van de beperkingen (dosisbeperkingen in mSv=d.b.)		
	maatregelen t.o.v partner (scheiding van bed,...) (d.b. : 5 mSv/j)	maatregelen t.o.v. publiek en collega's (d.b. : 5mSv/j)	maatregelen t.o.v. zwangeren + kinderen < 10 j. thuis of op het werk £ 2j. 3 – 10 j. zw (d.b.: 5mSv/j)
200 Mbq	3 d	3 d	2w*** 1w
400 Mbq	5 d	1w	3w*** 2w
600 Mbq** (met hospitalisatie)	10d	2w	3,5w*** 3w
800 MBq (met hospitalisatie)	10d	2w	3,5w*** 3w

*Deze tabel gaat uit van de hypothese van een gemiddelde maximale binding van 60 tot 70%. Het is aangewezen een schildklierbindingscurve te bepalen voorafgaand aan de behandeling. Wanneer dit niet mogelijk is, wordt aangeraden de patiënt na 24 uur te laten terugkeren en een meting uit te voeren van het dosisdebiet op 1 meter afstand, ter hoogte van de schildklier, na voorafgaande mictie.

Meet men:
- 15 tot 20 microSv/u, dan houdt men zich aan de richtlijnen voor een toegediende dosis van 600 MBq;
- 10 tot 15 microSv/u, dan houdt men zich aan de richtlijnen voor een toegediende dosis van 400 MBq;
- <10 microSv/u, dan houdt men zich aan de richtlijnen voor een toegediende dosis van 200 MBq.

**Ter herinnering : normaal wordt een ziekenhuisopname vereist voor toegediende activiteiten gelijk aan of groter dan 400 MBq; de toediening van activiteiten gaande tot 600 MBq is evenwel in ambulante behandeling toegestaan indien de maximale schildklierbinding de 70% niet overschrijdt.

***Tijdens de laatste week blijven de maatregelen tegenover zwangere vrouwen en kinderen onder de 2 jaar beperkt tot het vermijden van onnodige nabije contacten.

Behandeling van schildklierkanker

Klinisch beeld*	Duur van de beperkingen** (dosisbeperkingen in mSv= d.b.)		
	maatregelen t.o.v partner (scheiding van bed,...) (d.b. : 5 mSv/j)	maatregelen t.o.v. publiek en collega's (db. : 5mSv/j)	maatregelen t.o.v. zwangeren + kinderen < 10 j. thuis of op het werk £ 2 j. 3 – 10 j. zw (d.b. : 5mSv/j)
1e ablatieve dosis voor belangrijk restletsel in de schildklier	1 w	1 w	1-2w 1 w
Geïdentificeerde metastatische localisatie	1 w	1 w	1-2w 1 w
Klein(e) resthaartje(s)	2 d	5 d	5 d 5 d

*Ter herinnering : dit alles veronderstelt een zelfredzame en medewerkende patiënt (cfr. document 18 jan.1996).

**Deze duurtijden gelden voor zieken waarbij het bij ontslag gemeten dosisdebiet op 1 meter maximaal: 20 microSv/u bedraagt.