

# From cold to hot:

what everyone should know  
about thyroid nodules



# From cold to hot:

## what everyone should know about thyroid nodules

### Did you know?

- Nodules form regardless of the thyroid's size. They in many cases occur together with a goiter.<sup>1</sup>
- Thyroid nodules can grow very slowly and therefore in many cases go unnoticed for years on end.<sup>2</sup>
- Nodules do not always require treatment. In some cases (depending on their type and size), their development should merely be observed on a regular basis.<sup>3</sup>

### How do nodules form?<sup>4</sup>

When the body lacks iodine, the thyroid can no longer maintain the production of those major hormones, which play a major role in metabolic processes. The chronic shortage of iodine in the diet is the number one cause for the development of most types of nodules;<sup>5</sup> these can occur as individual (solitary) nodule, or as several (multiple) nodules.<sup>6</sup> This iodine deficiency causes a disruption in the production cycle of those thyroid hormones, which are significant to all associated metabolic processes. In order to compensate this deficiency, the thyroid cells grow; this can induce the formation of nodules in the tissue.

### Who is affected by nodules?

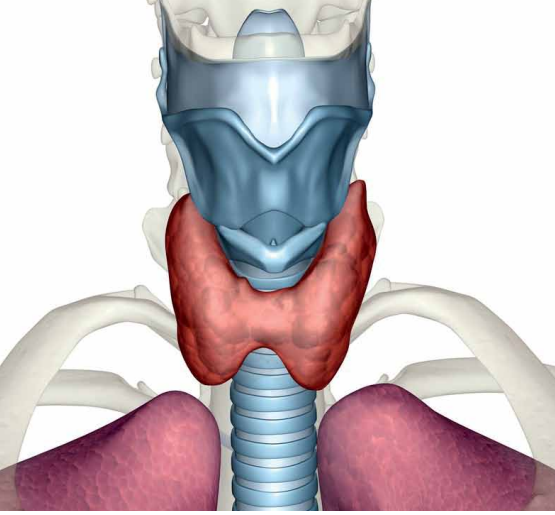
Thyroid nodules can be accompanied by a non-treated goiter – which in turn can form due to an iodine deficiency (the so-called nodular goiter). In fact, an estimated one billion people worldwide are affected by an iodine deficiency, as the United Nations World Food Program has determined.<sup>7</sup> Another known risk factor in nodule formation for example is smoking.<sup>8</sup>

### What are the potential consequences of untreated nodules?<sup>9</sup>

Thyroid nodules are differentiated as “cold” or “hot” nodules. In fact 85% of “cold” nodules and 95% of “hot” nodules are non-cancerous.<sup>10</sup> However the latter which can produce thyroid hormones in unchecked amounts can lead to hyperthyroidism. “Cold” nodules cause no overproduction of thyroid hormones – but they can grow unchecked. Therefore, it is particularly important to identify the type of nodule in order to avoid any possible risks.

### What should you look out for?<sup>13</sup>

Initially, most thyroid nodules do not cause any noticeable symptoms. Therefore, they can go undiscovered until the next routine medical examination<sup>14</sup> – if, for instance,



a particular lab test result as part of a blood test indicates an abnormal thyroid. As the thyroid nodules grow further, the following clinical signs can occur:

- Pain
- Difficulty swallowing/discomfort upon swallowing
- Laboured breathing
- Hoarseness
- Symptoms which point to an overactive thyroid (hyperthyroidism)

Upon the onset of laboured breathing, hoarseness, severe pain and/or general signs of illness such as fever and joint pain (since these symptoms are possible signs of fast-growing nodules, an enlarged thyroid or thyroid inflammation), a doctor should be consulted immediately.

### **There is help available**

In most cases thyroid nodules are non-cancerous and mostly treatable without difficulty. The determination of the particular type of nodule present is nowadays very reliable by way of modern examination methods.

## **The thyroid – know the facts**<sup>11 12</sup>

- The thyroid is a small, butterfly-shaped organ situated in the lower region of the neck in front of the windpipe.
- From iodine and other components, the thyroid produces (in the respectively necessary amounts) the hormones thyroxine (T4) and triiodothyronine (T3); these regulate all metabolic processes in the body.
- Hormone production in the thyroid is promoted by the thyroid-stimulant hormone (TSH) of the pituitary gland.
- If the thyroid lacks iodine, it partially or completely fails to produce the hormones T4 and T3 – this disrupts the sensitive metabolic cycles and in turn can lead to goiter or nodule formation in the thyroid tissue.



## Diagnosis of nodules<sup>15</sup>

Your doctor will initially perform a physical examination (feeling the area) in which he/she can determine whether larger nodules are present or the thyroid is enlarged. A lab test is necessary at this point to check whether there is a sufficient amount of thyroid-stimulant hormone (TSH) in the bloodstream. Further examination methods are:

### • Ultrasonography

Ultrasound exam which indicates whether any surrounding organs have already been affected – and shows the actual size of the nodules and/or the thyroid. In fact, numerous thyroid changes only become recognisable in the course of the ultrasound exam.

### • Thyroid scintigraphy

An examination required for all nodules which appear to have a minimum diameter of 1 cm. The patient will receive a capsule or a liquid containing a weak radioactive iodine, which accumulates in the thyroid. On the gamma-camera monitor, the radiologist can see whether the nodule has absorbed any more or less iodine than the rest of the thyroid tissue. If certain regions of the thyroid illuminate in “hot” colours such as red or yellow, that points to a “hot” nodule. If the colours are

rather “cold” (blue or violet), then a cold nodule is present.

### • Fine-needle biopsy

In order to rule out or prove the malignancy of nodules, tissue is extracted with the aid of a fine needle.

## Treatment of nodules<sup>16</sup>

Not every nodule requires treatment. Depending on their type and size (in some cases), their further development should merely be regularly observed.<sup>17</sup> In general, there are three various treatment options. The particular form of therapy, which is the best option for the affected person, is decided in each individual case, after all exam results are available. The aim of all three treatment methods is the reduction of the size of the thyroid and the nodules.

This therapy is always based on the type and size of the nodule and varies among individual affected persons. In some cases, regular observation is sufficient.





- **Treatment with medication(s)**

For nodules which occur due to an iodine deficiency, treatment with iodine tablets alone or in combination with levothyroxine can be effective.

- **Radioiodine therapy**

For “hot” nodules, therapy with the radioactive form of iodine (a natural trace element) is an option. It is administered on a one-off basis, in the form of a capsule or as a liquid. It then enters the thyroid, via the bloodstream, where it is stored – and prompts the shrinkage of the nodular thyroid tissue due to the short-range radiation.

- **Thyroid surgery**

When the occurrence of a malignant growth in the thyroid is detected, the whole thyroid gland should be removed via surgery and if nodules cause immense discomfort the thyroid gland can be partially/completely removed. Following such a procedure, treatment with substitution therapy (levothyroxine) is required to replace the lacking thyroid hormone production.

Thyroid Federation International and Merck Serono, a division of Merck KGaA, make no warranties. The information contained in this material is intended for general reference only. As a result of ongoing medical advances and developments, the information in this material may not always be completely up to date and, for this reason, such information is provided on an “as is” and “as available” basis. Merck Serono makes no warranties, representations or gives any undertakings either express or implied about any of the content of this material. It may refer to pharmaceutical products, therapeutics or indications not yet registered or approved in a given country. This information should not be used to diagnose, treat, cure or prevent any disease without the advice of a qualified medical professional, and does not replace medical advice or a medical examination.

**You must consult a suitably qualified healthcare professional on any problem or matter which is covered by any information in this material before taking any action.**

## For further information

If you would like to find out more detailed information on thyroid disorders, you can visit these websites:

[www.thyroidweek.com](http://www.thyroidweek.com) [www.thyroid-fed.org](http://www.thyroid-fed.org)

© Thyroid Federation International and Merck Serono, 2011.  
Each has the right to use and distribute this material for education and information purposes and to amend the material for use without reference to the other. All other rights reserved. Production Date: May 2011

- 1 Henderson K.E.: The Washington manual endocrinology subspecialty consult. Lippincott Williams & Wilkins; Second edition (2008)
- 2 Kawamura D.M.: Diagnostic Medical Sonography: Abdomen and superficial structures. Lippincott Williams & Wilkins; Second edition (1997)
- 3 Skugor M., Wilder J.B.: Thyroid Disorders: A Cleveland Clinic Guide. Cleveland Clinic Press (2006)
- 4 Fletcher C.D.M.: Diagnostic Histopathology of Tumors. Churchill Livingstone; 3 edition (2007)
- 5 McDougall I.R.: Management of Thyroid Cancer and Related Nodular Disease. Springer; 1st Edition (2005)
- 6 Cf. Source<sup>3</sup>
- 7 United Nations System Standing Committee on Nutrition (SCN) 5th Report on the World Nutrition Situation, Nutrition for improved Development Outcomes – March 2004. URL [www.unscn.org/layout/modules/resources/files/rwns5.pdf](http://www.unscn.org/layout/modules/resources/files/rwns5.pdf) (Accessed October 2010)
- 8 Derwahl K.M., Duntas L.H., Butz S.: The Thyroid and Cardiovascular Risk: Merck European Thyroid Symposium, Berlin, 10-13 June, 2004. Thieme; 1 edition (2005)
- 9 Talreja R. et al.: The Internal Medicine Peripheral Brain. Lippincott Williams & Wilkins; 1 edition (2004)
- 10 EndocrineWeb. Fine Needle Biopsy of Thyroid nodules. URL [www.endocrineweb.com/conditions/thyroid/fine-needle-biopsy-thyroid-nodules](http://www.endocrineweb.com/conditions/thyroid/fine-needle-biopsy-thyroid-nodules). (Accessed April 2011)
- 11 American Thyroid Association. Thyroid Function Tests. 2005 URL [www.thyroid.org/patients/brochures/FunctionTests\\_brochure.pdf](http://www.thyroid.org/patients/brochures/FunctionTests_brochure.pdf) (Accessed October 2010)
- 12 Preedy V.R., Burrow G.N., Watson R.R.: Comprehensive Handbook of Iodine: Nutritional, Biochemical, Pathological and Therapeutic Effects. 1 edition. Academic Press (2009)
- 13 Cf. Source<sup>10</sup>
- 14 McDougall I.R.: Thyroid Cancer in Clinical Practice. Springer; 1st Edition (2007)
- 15 Becker K.L.: Principles and practice of endocrinology and metabolism. Lippincott Williams & Wilkins; Third edition (2001)
- 16 Lavin N.: Manual of Endocrinology and Metabolism. Lippincott Williams & Wilkins; Fourth edition (2009)
- 17 Skugor M., Wilder J.B.: Thyroid Disorders: A Cleveland Clinic Guide. Cleveland Clinic Press (2006)

*an initiative supported by*

