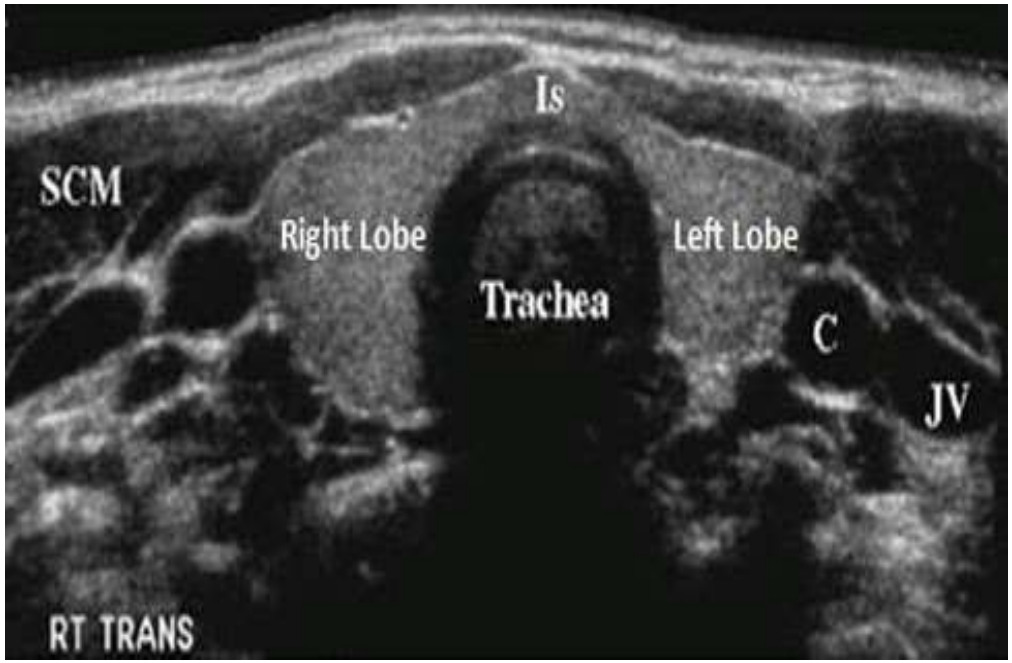
Normal thyroid gland

Normal anatomy

Ultrasound can demonstrate the following normal structures in the neck:

- Carotid arteries.
- Jugular veins.
- Thyroid gland.
- Trachea.
- Surrounding muscles.



the carotid artery and the jugular vein are behind
the sternocleidomastoid muscle and lateral to thyroid gland

The thyroid consists of two lobes, one on either side of the trachea joined in the midline by an isthmus.

the lobes should be equal in size.

On transverse scans, the section is usually triangular; on longitudinal scans, it is oval.

The thyroid gland is normally 15-20 mm thick, 20-25 mm in width, and 30-50 mm in length

Abnormal thyroid

Thyroid abnormalities may be local or diffuse, single or multiple , solid or cystic .

1- solid lesion:

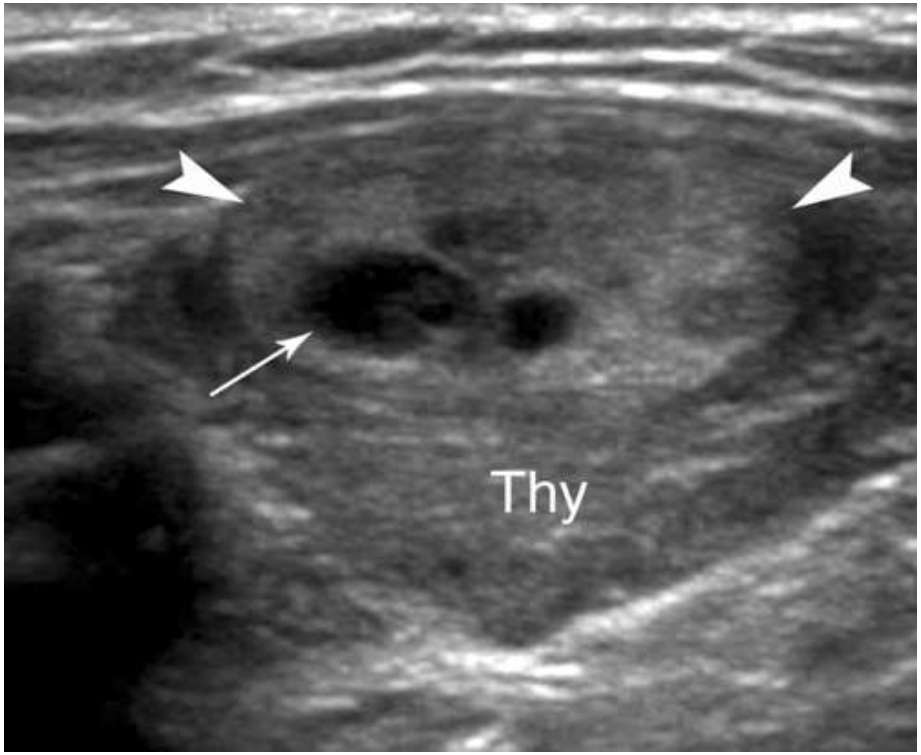
About 70% of focal lesions are thyroid nodules and over 90% of these will be adenomas

it may be impossible to differentiate between a benign thyroid adenoma and a malignant tumor.

Both benign and malignant tumors can be hypo or hyperecoic ; both may contain cystic components.

if the mass is well defined, with a surrounding thin, hypochoic halo, there is a 95% probability that it is a benign adenoma.

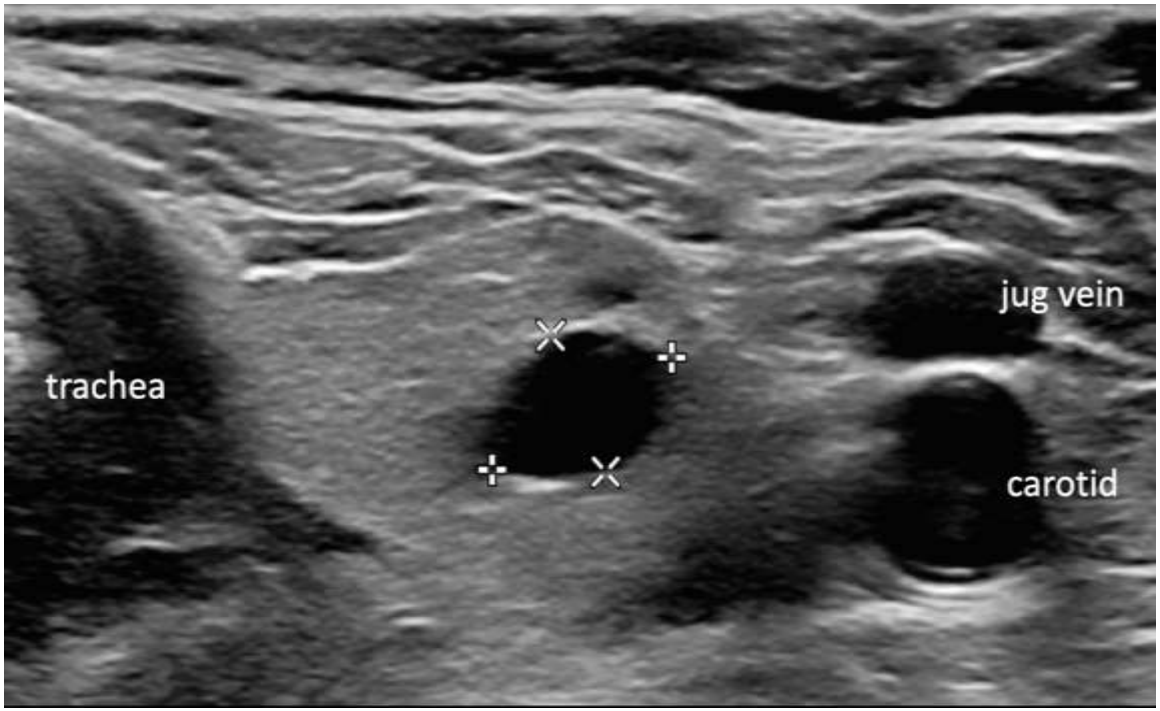
If there is central necrosis, the possibility of malignancy should be considered


Thy


Lt. Thyroid

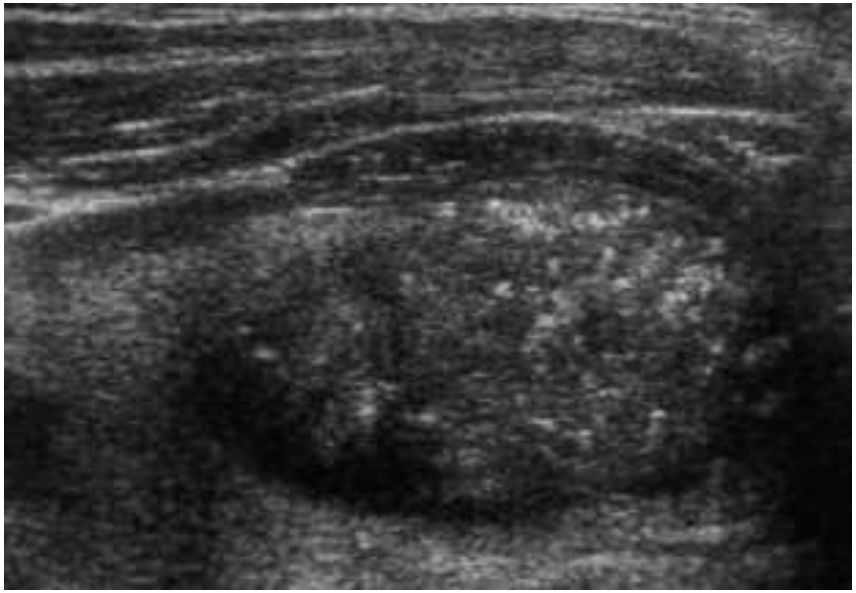
2- Cystic lesion

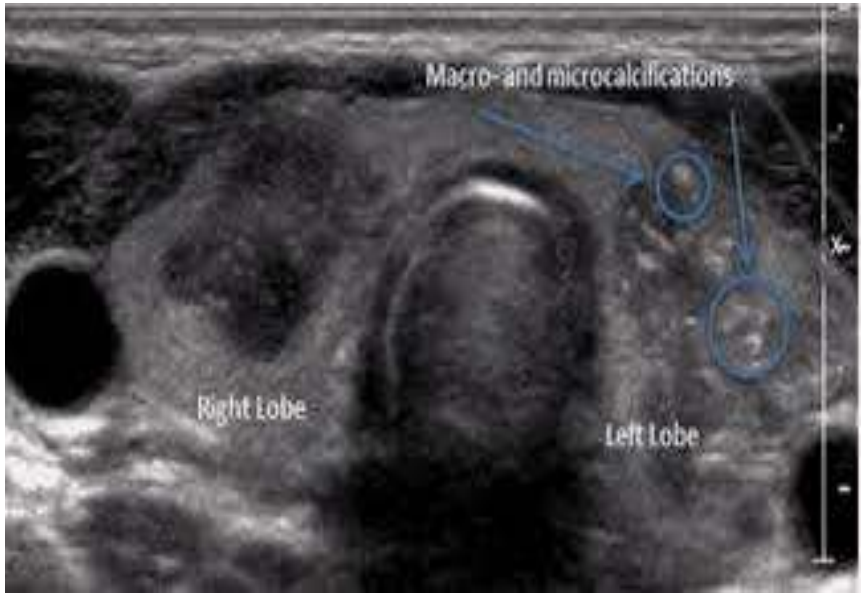
true thyroid cysts are rare. Characteristically, they are well defined, with smooth walls, and are echo-free, unless there has been haemorrhage into the cyst.



Thyroid calcification is commonly seen in adenomas, but may occur in malignant tumors.

The calcification can be isolated or in clusters, in groups or in chains.





Diffuse thyroid lesions

1- homogeneous enlargement

Enlargement may affect only part of a lobe, a whole lobe, the isthmus or both lobes. Enlargement usually homogeneous

2- Heterogeneous enlargement

the nodules may be solid or complex on ultrasound. thyroid becomes heterogeneous and may resemble a multinodular goitre.

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Heterogeneous enlargement


homogeneous enlargement

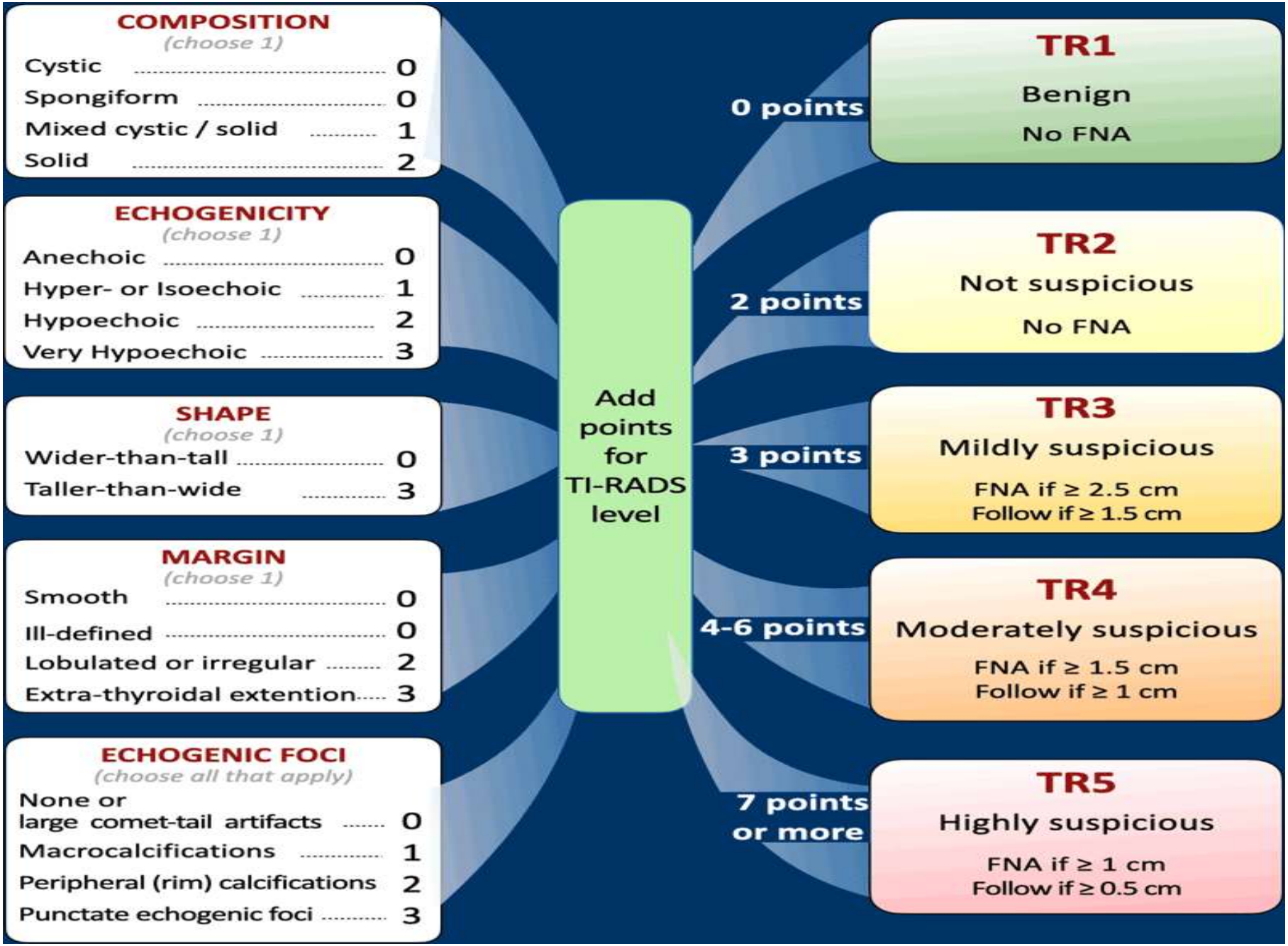
Imaging Reporting and Data System (TI-RADS)

The Thyroid Imaging Reporting and Data System (TI-RADS) of the American College of Radiology (ACR) was designed in 2017

The five ultrasound features of thyroid nodules used in TI-RADS are as follows:

- **Composition**
- **Echogenicity**
- **Shape**
- **Margin**
- **punctate echogenic foci**

Each item is given point.

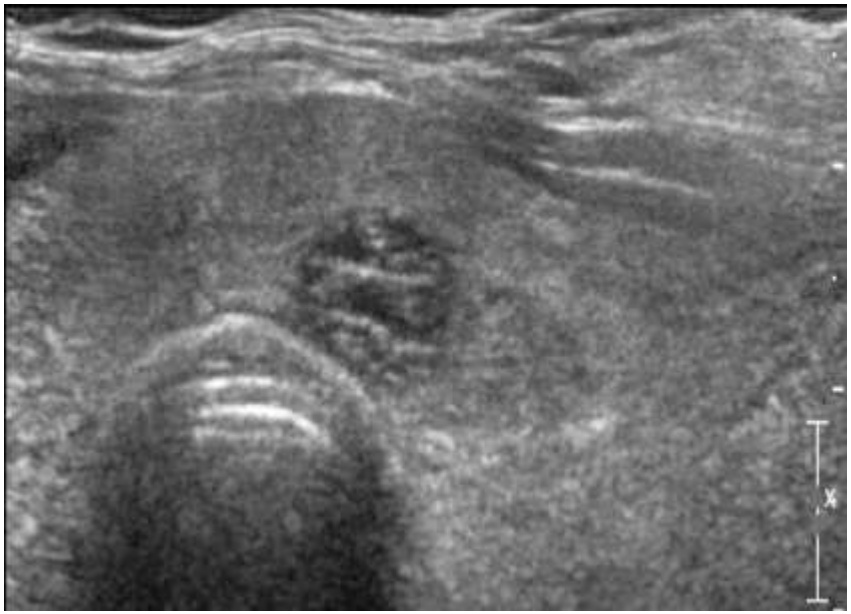

COMPOSITION
(choose 1)
Cystic 0
Spongiform 0
Mixed cystic / solid 1
Solid 2
ECHOGENICITY
(choose 1)
Anechoic 0
Hyper- or Isoechoic 1
Hypoechoic 2
Very Hypoechoic 3
SHAPE
(choose 1)
Wider-than-tall 0
Taller-than-wide 3
MARGIN
(choose 1)
Smooth 0
Ill-defined 0
Lobulated or irregular 2
Extra-thyroidal extention 3
ECHOGENIC FOCI
(choose all that apply)
None or large comet-tail artifacts 0
Macrocalcifications 1
Peripheral (rim) calcifications 2
Punctate echogenic foci 3
Add points for TI-RADS level
0 points
2 points
3 points
4-6 points
7 points or more
TR1
Benign
No FNA
TR2
Not suspicious
No FNA
TR3
Mildly suspicious
FNA if ≥ 2.5 cm
Follow if ≥ 1.5 cm
TR4
Moderately suspicious
FNA if ≥ 1.5 cm
Follow if ≥ 1 cm
TR5
Highly suspicious
FNA if ≥ 1 cm
Follow if ≥ 0.5 cm

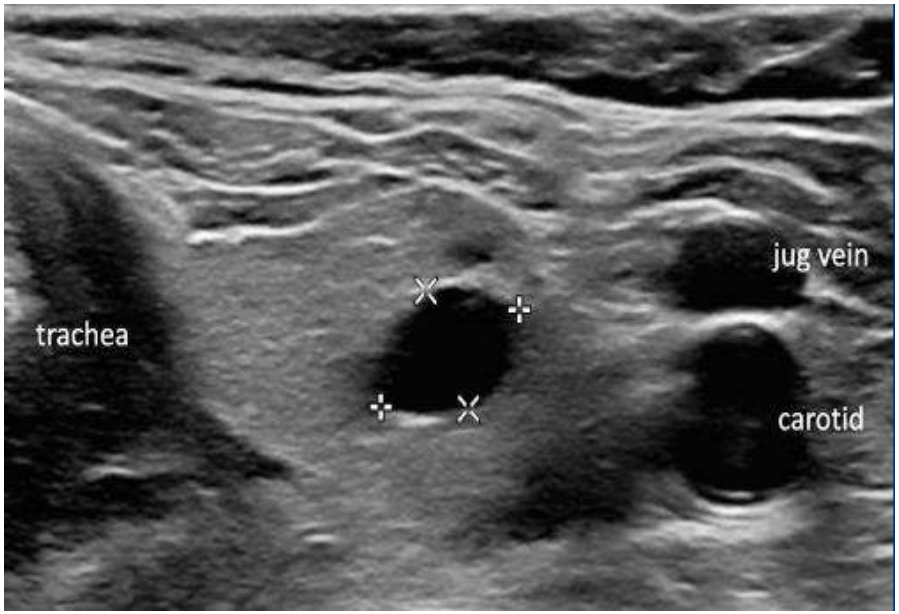
1- Composition

Cystic lesions or lesions that are almost completely cystic are benign and no further points will be added (TI-RADS 1).
This is also true for spongiform lesions

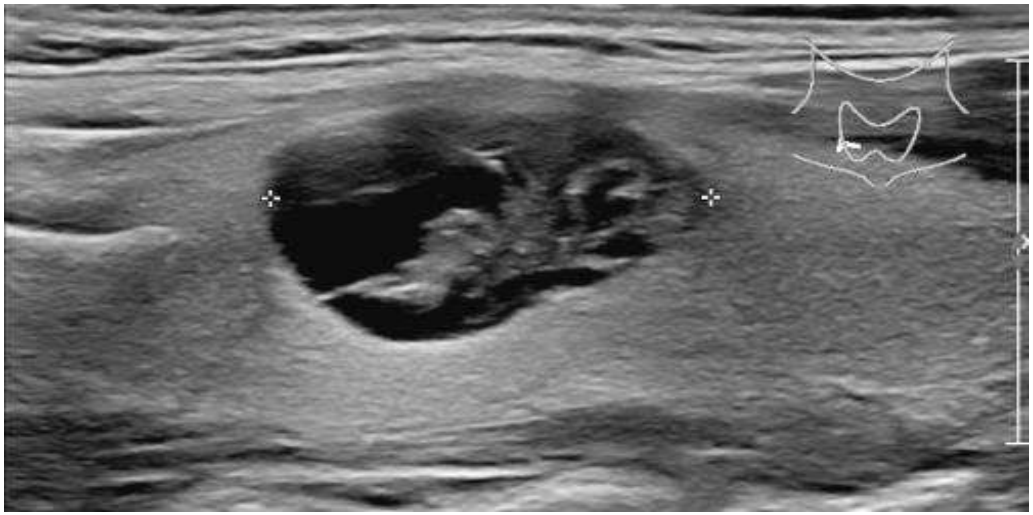
COMPOSITION (choose 1)	
Cystic	0
Spongiform	0
Mixed cystic / solid	1
Solid	2

} TR1 = benign
no further characterization

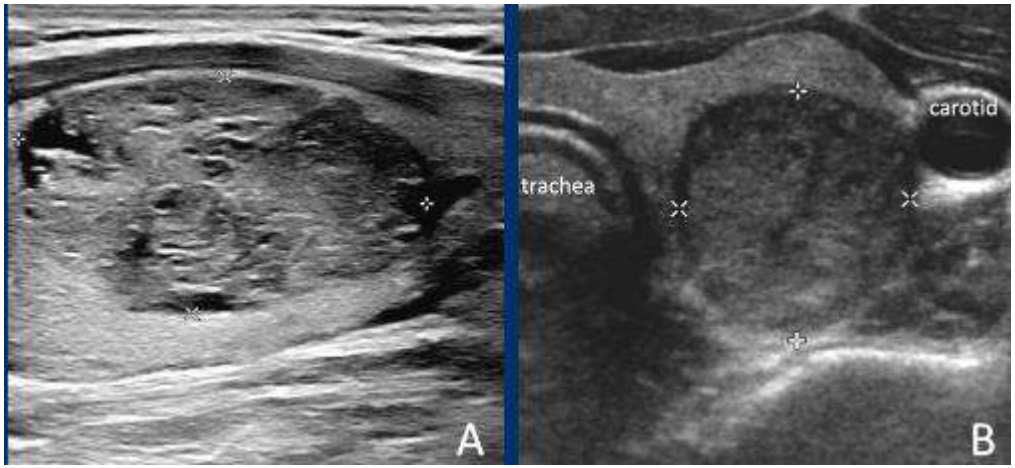




mixed cystic/solid lesions . **This lesion gets 1 point**



Solid lesions In solid nodules at least 95% of the nodule should be solid. **Gets 2 point**



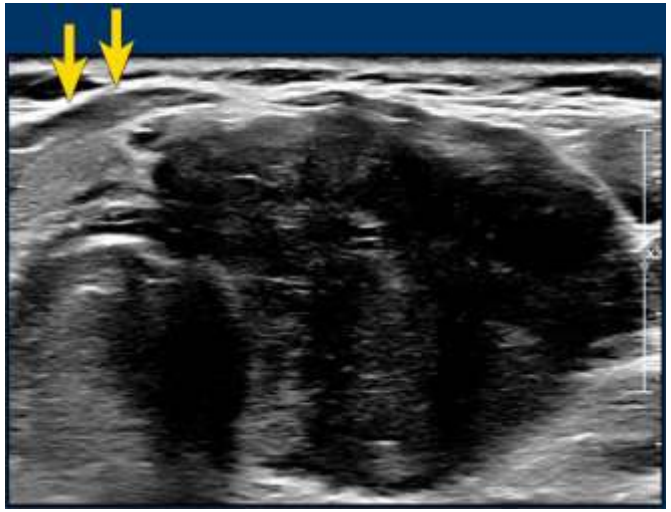
2- Echogenicity

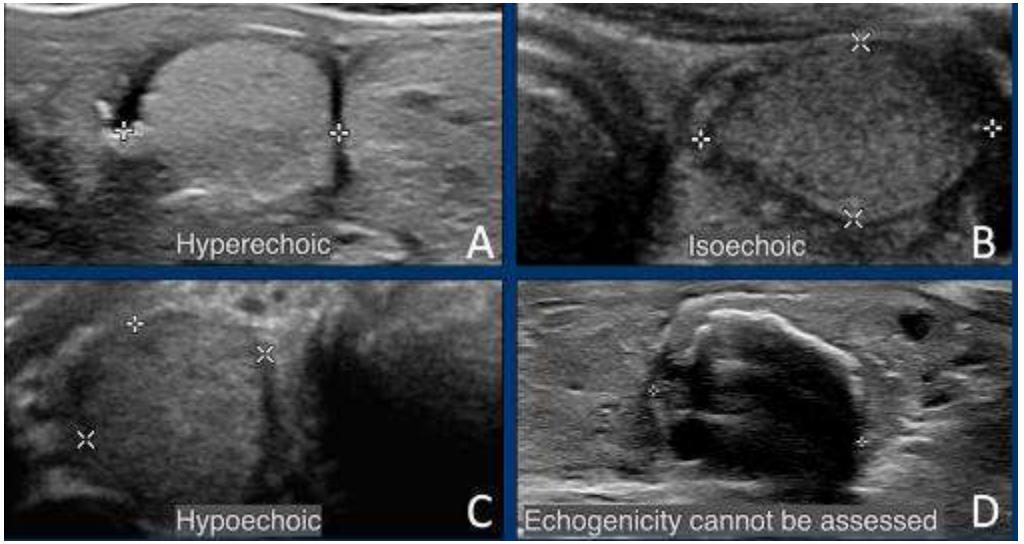
The echogenicity is compared with normal thyroid parenchyma

ECHOGENICITY (choose 1)	
Anechoic	0
Hyper- or Isoechoic	1
Hypoechoic	2
Very Hypoechoic	3

= cystic
no further characterization

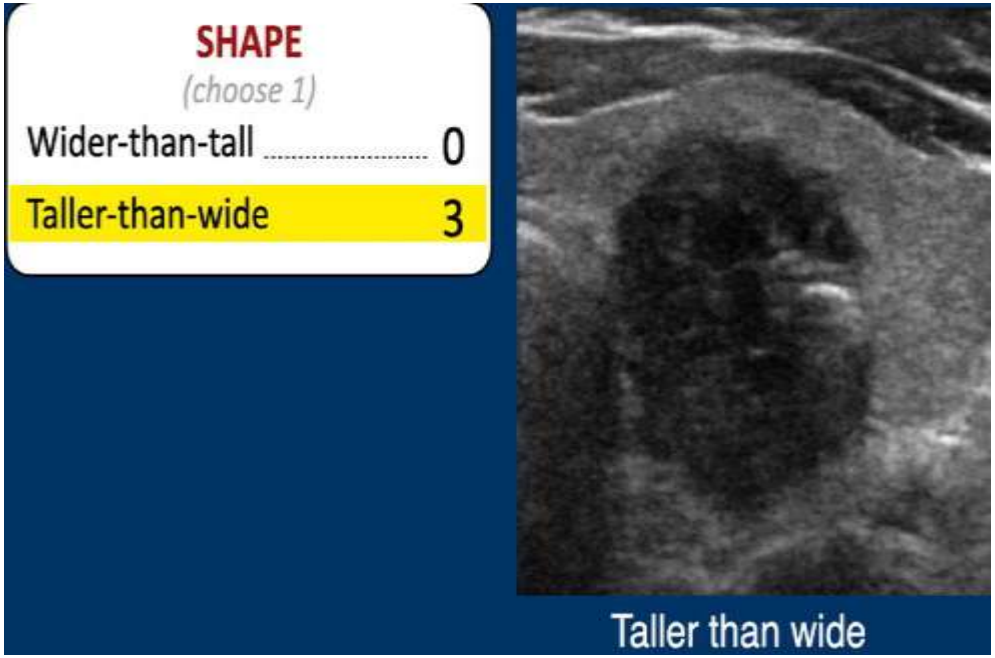
. If the echogenicity cannot be assed, for example because of calcifications, 1 point is given for the echogenicity





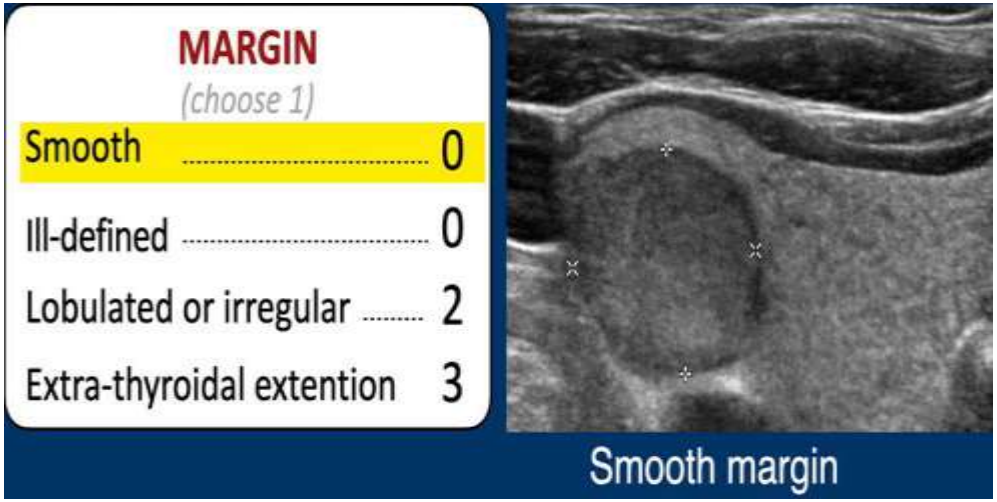
2- Shape

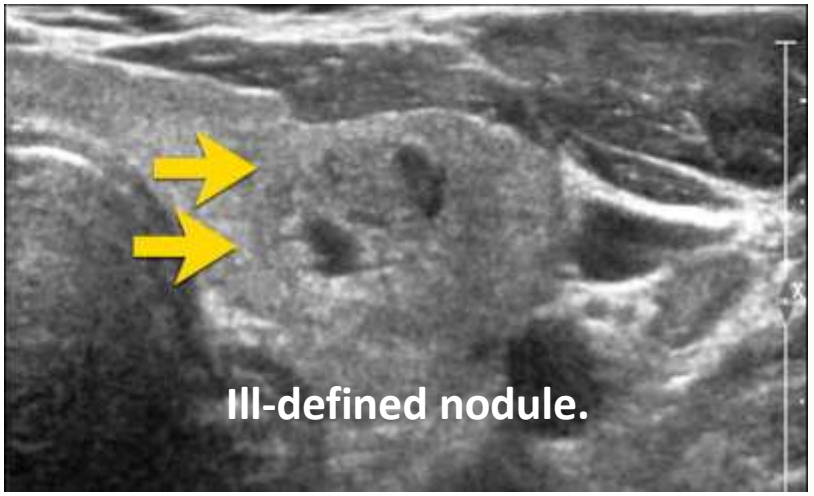
The shape should be assessed in the axial plane

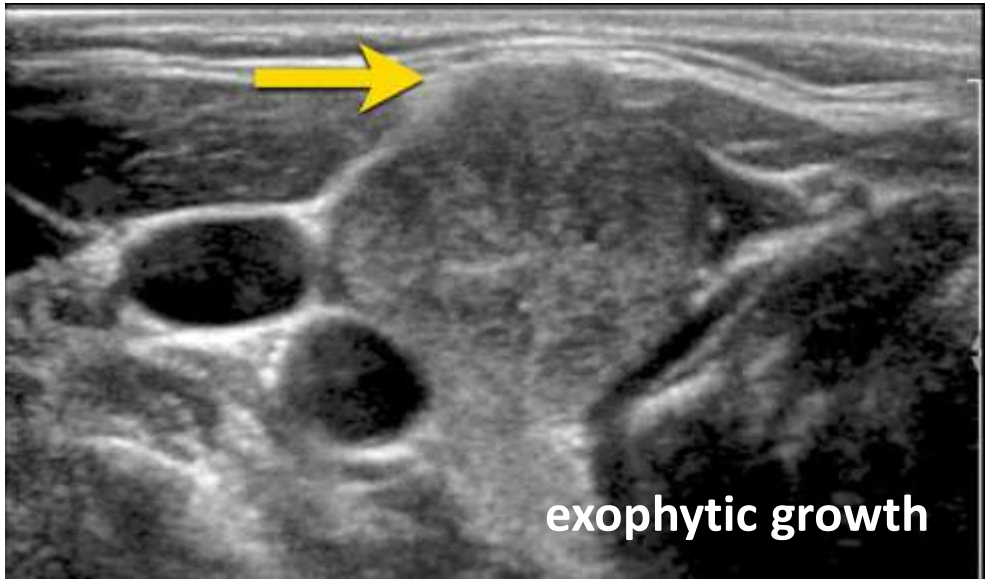


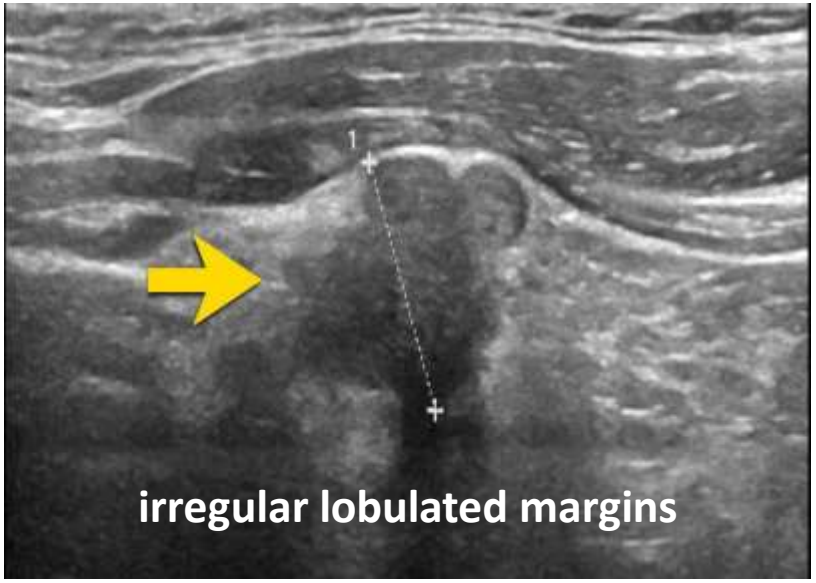
3- Margin

The margin is often best assessed on the anterior side





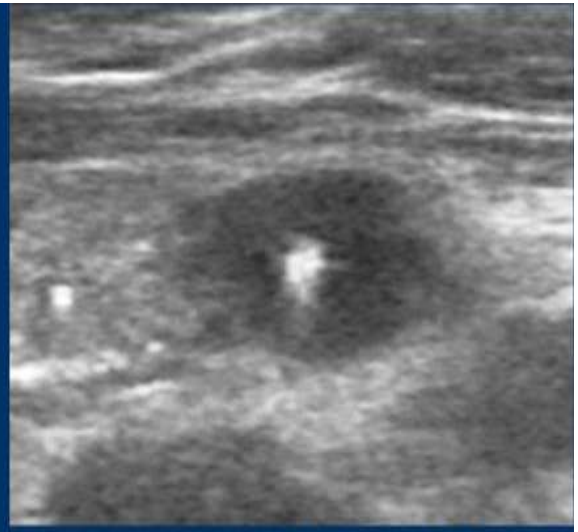




4- Echogenic foci

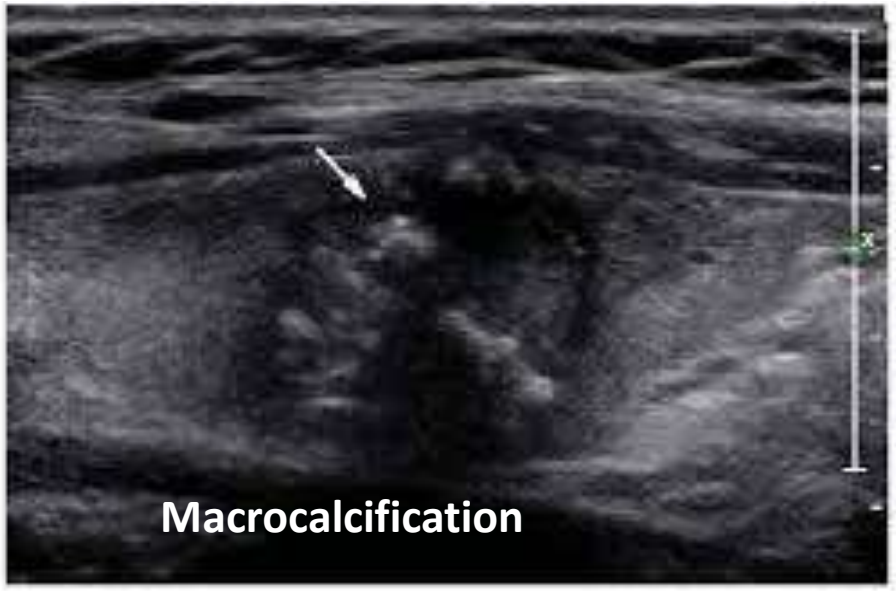
ECHOGENIC FOCI
(choose all that apply)

None or
large comet-tail artifacts 0
Macrocalcifications 1
Peripheral (rim) calcifications 2
Punctate echogenic foci 3

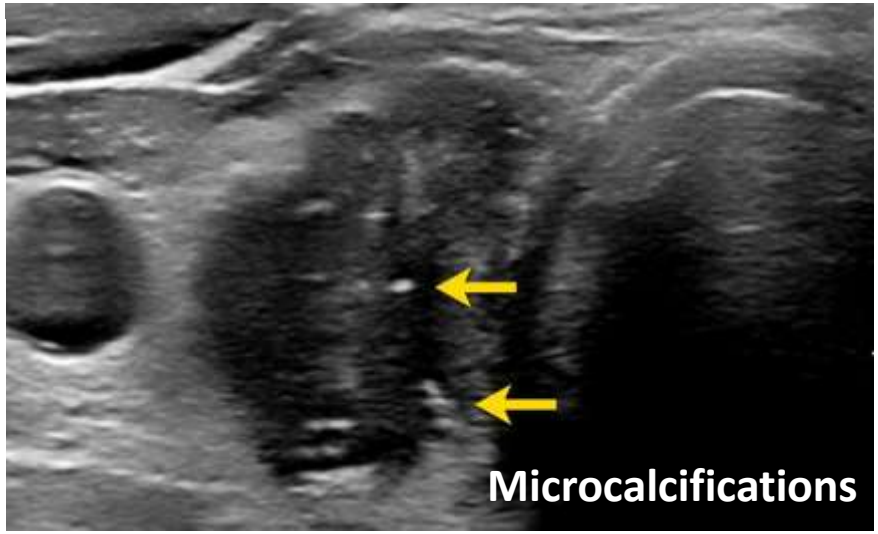


Large comet-tail artefact

Rim calcification



Macrocalcification



Microcalcifications

Thank you