Guidelines for the Management of Incidental Findings on MRI, CT and Ultrasound
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Introduction:

This document is a compilation of ACR and professional society guidelines concerning the detection and management of incidental findings on CT, MRI and Ultrasound. They are meant to facilitate the interpretation and management of incidental findings. The goal is to integrate evidence-based recommendations into our practices and to promote uniform standards across the CDI network. They are not intended to establish a legal standard of care within CDI nor within your local communities. The recommendations may be modified in an individual patient based on comorbidities, life expectancy, patient history and patient preferences.

Contents

<table>
<thead>
<tr>
<th>Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thyroid</td>
<td>2</td>
</tr>
<tr>
<td>Lung nodules</td>
<td>3</td>
</tr>
<tr>
<td>Adrenal</td>
<td>4</td>
</tr>
<tr>
<td>Renal calculi</td>
<td>4</td>
</tr>
<tr>
<td>Renal lesions</td>
<td>5</td>
</tr>
<tr>
<td>Liver</td>
<td>6</td>
</tr>
<tr>
<td>Pancreatic lesions</td>
<td>7</td>
</tr>
<tr>
<td>Biliary and pancreatic ducts</td>
<td>7</td>
</tr>
<tr>
<td>Splenic lesions</td>
<td>8</td>
</tr>
<tr>
<td>Incidental lymph nodes</td>
<td>8</td>
</tr>
<tr>
<td>Ovary and adnexal</td>
<td>9</td>
</tr>
<tr>
<td>Endometrial canal</td>
<td>10</td>
</tr>
<tr>
<td>Vascular abnormalities</td>
<td>10</td>
</tr>
<tr>
<td>References</td>
<td>11-13</td>
</tr>
</tbody>
</table>
**Incidental Thyroid Lesions Detected on CT/MRI in Low Risk Populations:**

| Age < 35 years, No suspicious findings on MRI or CT | Solitary nodule, nonspecific on CT or MRI < 1 cm | - No further evaluation |
| Solitary nodule, nonspecific on CT or MRI ≥ 1 cm | - Ultrasound for characterization |

| Age ≥ 35 years, No suspicious findings on MRI or CT | Solitary nodule, nonspecific on CT or MRI < 1.5 cm | - No further evaluation |
| Solitary nodule, nonspecific on CT or MRI ≥ 1.5 cm | - Ultrasound characterization |
| Limited life expectancy and significant comorbidities | - No further evaluation |
| Suspicious findings on CT or MRI | - Ultrasound evaluation |

**Ultrasound Diagnostic Criteria for FNA of Thyroid Lesions in Low Risk Populations:**

**Solitary nodule** - Ultrasound criteria

- Cystic, simple
  - Benign
- Solid, microcalcifications ≥ 1 cm
  - FNA
- Solid, >1.5 cm
  - FNA
- Solid, coarse CA++ ≥ 1.5 cm
  - FNA
- Mixed, cystic/solid ≥ 2 cm
  - Consider FNA
- Mixed, cystic/solid with mural nodule
  - Consider FNA
- Mixed with suspicious features+
  - Consider FNA
- Substantial growth since a previous Ultrasound
  - Consider FNA
- Almost entirely cystic, none of the above and no growth
  - FNA prob. unnecessary

**Multiple nodules** - Consider Ultrasound and FNA of one or more dominant nodules with criteria listed for the solitary nodule.

**Nodule with cervical lymphadenopathy** – Ultrasound with FNA of nodule ipsilateral to the enlarged lymph nodes.

**Incidental nodule discovered on PET with increased uptake** should be referred for Ultrasound and FNA. 33% will be malignant and may be more aggressive cancers.

*High risk patients - family history of thyroid cancer in a first degree relative, history of external beam radiation as a child, exposure to ionizing radiation as a child/adolescent, history of thyroid cancer with hemithyroidectomy, avidity on PET scanning, calcitonen > 100pg/ml, or thyroid cancer syndrome.

+ Suspicious features include microcalcifications, hypoechoic, increased nodular vascularity, infiltrative margins, and taller than wide on transverse views.
**Incidental Pulmonary Nodules - Fleischner Criteria:**

Low risk patients (No significant smoking history or cancer)

- < 4 mm  -  No follow up needed
- 4-6 mm  -  Follow up at 12 months, then if unchanged, no further follow up
- 6-8 mm  -  Follow up CT at 6-12 months, then at 18-24 months if no change
- > 8 mm  -  Follow up CT at 3, 9 and 24 months, dynamic enhanced CT, and/or Bx

High-risk patients

- < 4 mm  -  Follow up CT at 12 months: if unchanged, no further follow up.
- 4-6 mm  -  Follow up CT at 6-12 months, then at 18-24 months if no change
- 6-8 mm  -  Follow up CT at 3-6 months, 9-12 months, and 24 months if no change
- > 8 mm  -  Follow up CT at 3, 9 and 24 months, PET/CT, enhanced CT, and/or Bx

**Subsolid Pulmonary Nodule Detected at CT - Fleischner Criteria:**

Solitary, pure ground glass nodules (GGNs) ≤ 5 mm do not require follow-up surveillance CT.

Solitary, pure GGNs > 5 mm require an initial follow-up CT in 3 months to determine persistence, followed by yearly surveillance CT exams for a minimum of 3 years if unchanged.

Solitary part-solid GGNs, especially those in which the solid component is > 5 mm, should be considered malignant until proven otherwise provided there is growth or persistence at follow-up CT in 3 months.

Multiple well-defined GGNs all measuring 5 mm or less should be conservatively managed with follow-up CT examinations performed at 2 and 4 years.

Multiple pure GGNs with at least one measuring > 5 mm and no dominant lesion should have an initial follow-up CT in 3 months, and yearly surveillance CT for at least 3 years if persistent.

Multiple subsolid nodules with a dominant lesion, dominant lesion determines further management. If lesion persists on the initial follow-up CT at 3 months, an aggressive approach to diagnosis and management is recommended, especially for lesions with a solid component > 5 mm.
**Incidental Adrenal Mass:**

Prior imaging available - Nonspecific masses stable for >1 year is likely benign, increasing in size refer for biopsy/resection.

- Low density, < 10HU on CT - Adenoma, no follow-up
- Loss of SI on Chemical shift on MRI - Adenoma, no follow-up
- Focal macroscopic fat - Myelolipoma, no follow-up
- Fluid/fluid level, no solid - Hematoma, no follow-up

<table>
<thead>
<tr>
<th>Size/Clinical Feature</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4 cm, homogenous, low density, smooth margins</td>
<td>1 year follow up</td>
</tr>
<tr>
<td>1-4 cm, heterogeneous, necrosis, irregular margins</td>
<td>CT or CS-MR</td>
</tr>
<tr>
<td>1-4 cm, history of CA</td>
<td>PET or Bx</td>
</tr>
<tr>
<td>&gt; 4 cm</td>
<td>Evaluate/surgery</td>
</tr>
</tbody>
</table>

Clinical suspicion of a functioning adenoma - Evaluate
Clinical suspicion of a pheochromocytoma - Evaluate

**Incidental Renal Calculi:**

Mention all calculi in the body and conclusion of the report with size measurements, location and density (if > 6mm).

Referral for treatment with:

- Obstruction or evidence of infection
- Staghorn calculi
- Calculi > 4-6 mm

Calculated in patients who might consider treatment because of profession (airline pilots) or travel plans (extended stay in areas with poor or limited health care)

Referral for follow-up for calculi < 4-6 mm.
**Incidental Cystic Renal Mass:**
(Non-neoplastic causes of renal mass, e.g. infection excluded)

Low density < 1 cm - report as too small to analyze by density criteria. Assume benign if it does not exhibit any nonsimple features such as irregular margins or irregular calcifications.

**Cystic > 1 cm**

- Bosniak 1 – Simple, thin wall, with density equal to water and no septa, calcifications, or solid components. Does not enhance with contrast (<20HU change on CT). Benign, no further work up needed.

- Bosniak 2 – Minimally complex well-marginated with single thin (<1 mm) septations or thin Ca++, and no enhancement. High attenuation nonenhancing renal lesions <3 cm. Benign, no further work up required.

- Bosniak 2F – Minimally complex, with increased number of septa (minimally thickened or with mild enhancement), thick or nodular calcifications, and no enhancing soft tissue components. Hyperdense nonenhancing mostly intrarenal (<25% of the wall visible) cysts > 3 cm. Need Ultrasound or CT Follow up.

- Bosniak 3 – Thick or multiple septations, mural nodule, with enhancement. Hyperdense lesions not fitting into 2f. Refer for biopsy or surgical evaluation.

- Bosniak 4 – Clearly malignant, solid mass with cystic spaces. Refer for surgical evaluation.

**Incidental Renal Solid Mass:**

<table>
<thead>
<tr>
<th>Macroscopic fat</th>
<th>Angiomyolipoma, no follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Be careful for fat containing RCC, e.g. large tumor engulfing perirenal or sinus fat. Look for lymphadenopathy or venous invasion, or intratumoral ossification.)</td>
<td></td>
</tr>
</tbody>
</table>

- Solid < 1 cm – CT/MRI at 6-12 months then yearly for 5 years.
- Solid 1-3 cm – Consider MRI, follow-up, biopsy or resection.
- Solid > 3 cm – Refer for possible resection.
**Incidental Hepatic Lesions on CT:**

- **< 5 mm**
- **< 5 mm, history of CA**
- **Follow up in 6 months**

**Low attenuation, benign features**
(< 20 HU, homogenous, sharp margins)

- **Benign**

**Low attenuation, suspicious features**
(ill-defined margins, heterogeneous,
> 20 HU enhancement, enlargement)

<table>
<thead>
<tr>
<th>Size</th>
<th>Follow up</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 - 1.5 cm</td>
<td>Follow up in 6 months</td>
<td>-</td>
</tr>
<tr>
<td>&gt; 1.5 cm</td>
<td>-</td>
<td>Multiphasic MRI</td>
</tr>
<tr>
<td>History of hepatitis, cirrhosis, cholangitis</td>
<td>-</td>
<td>Biopsy</td>
</tr>
</tbody>
</table>

**Flash filling, 0.5 - 1.5 cm, low risk**

- **Benign**

**Flash filling, > 1.5 cm, low risk, features compared with hemangioma**

- **Benign**

**Flash filling, > 1.5 cm, low risk, benign features**

- **Multiphasic MRI**

**Flash filling, > 1.5 cm, low risk, no benign features**

- **MRI or biopsy**

**Flash filling, 0.5 - 1.5 cm, and high risk**

- **Multiphasic MRI**

**Flash filling, > 1.5 cm, high risk**

- **MRI or biopsy**

(history of cirrhosis, hepatitis, cholangitis, hemochromatosis, etc.)
**Incidental Pancreatic Cystic Lesions in Low Risk Populations:**

- **< 2 cm**  
  (elderly or ill with a small simple cyst probably does not need follow up)  
  Follow up 1 year

- **2-3 cm**  
  - MRI pancreas/MRCP

- **> 3 cm**  
  - Refer for possible bx/resection

Sahni et al. is a reference outlining the management and surveillance of cystic pancreatic lesions after characterization.

**Incidental Common Bile Duct (CBD) and Pancreatic Duct Enlargement in Asymptomatic Patients:**

- **Isolated CBD dilatation**  
  (> 6-7 mm with gallbladder or > 10 mm if gallbladder is absent or elderly)  
  Small risk of cancer, e.g. 4-5% in subjects with unexplained CBD dilation.  
  - Consider MRI pancreas/MRCP

- **Isolated dilatation main pancreatic duct**  
  (>3 mm head and >2 mm tail) without chronic pancreatitis.  
  30% malignancy.  
  - MRI pancreas/MRCP, MDCT or ERCP

- **Double duct sign**  
  (dilated CBD/intrahepatic biliary duct and main pancreatic duct).  
  66% chance of malignancy.  
  - MRI pancreas/MRCP, MDCT, or ERCP
Incidental Splenic Lesions on MRI or CT:

Simple cyst
(<10 HU, imperceptible wall, no enhancement)

- No follow-up

Features compared with a hemangioma
(discontinuous peripheral enhancement, centripetal filling in on delayed images)

- No follow-up

Benign features
(<20 HU, homogeneous, no enhancement, smooth margins)

- No follow-up

Indeterminate features with prior imaging
Stable for 1 year
- No follow-up

Increase in size c/w prior imaging
- PET v. MRI v. biopsy

Nondiagnostic features without prior imaging, without history of cancer
Indeterminate features
- Follow-up MRI/CT in 6-12 months

Suspicious features
- PET v. MRI v. biopsy

(Heterogeneous, enhancement, irregular margins, necrosis, and vascular invasion),

Nondiagnostic features without prior imaging, + history of cancer
<1cm
- Follow-up MRI in 6-12 months

≥1cm
- PET v. MRI v. biopsy

Incidental Lymph Node Findings on MRI or CT:

Benign features
(< 1cm in retroperitoneum, fatty hilum and elongated)

- Benign, no follow-up

Suspicious imaging features,
(≥ 1cm in retroperitoneum, round, indistinct Hilum, enhancement/necrosis, clustered

No history of malignancy, clinical/lab compared with lymphoproliferative
- Biopsy or PET/CT

No history of malignancy, clinical/lab suggesting benign
- 3 month follow-up CT or MRI

History of malignancy
- Biopsy or PET/CT
**Incidental Ovarian Lesions in Low Risk, Nonpregnant, Postmenarchal Populations:**

**Premenopausal women (or <50)**

<table>
<thead>
<tr>
<th>Cyst Size</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 3 cm</td>
<td>Normal</td>
</tr>
<tr>
<td>3-5 cm</td>
<td>Describe in report</td>
</tr>
<tr>
<td>&gt;5-10 cm</td>
<td>Follow up ultrasound 6-12 months</td>
</tr>
<tr>
<td>&lt; 3 cm</td>
<td>No follow-up</td>
</tr>
<tr>
<td>3-5 cm</td>
<td>Ultrasound follow-up at 6-12 months</td>
</tr>
<tr>
<td>&gt;5 cm</td>
<td>Prompt ultrasound</td>
</tr>
<tr>
<td>1-5 cm</td>
<td>Ultrasound follow-up for resolution</td>
</tr>
<tr>
<td>&gt;10 cm or greater</td>
<td>MRI or Gyn referral</td>
</tr>
</tbody>
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**Early postmenopausal women (first 5 years or 50-55)**

<table>
<thead>
<tr>
<th>Cyst Size</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 cm</td>
<td>Benign</td>
</tr>
<tr>
<td>1-3 cm</td>
<td>Describe in report</td>
</tr>
<tr>
<td>&gt;3-5 cm</td>
<td>Follow up ultrasound in 6-12 months</td>
</tr>
<tr>
<td>&gt;5-10 cm</td>
<td>Prompt ultrasound</td>
</tr>
<tr>
<td>&lt; 3 cm</td>
<td>No follow-up</td>
</tr>
<tr>
<td>&gt;3 cm</td>
<td>Prompt ultrasound</td>
</tr>
<tr>
<td>&gt;1 cm</td>
<td>Ultrasound follow-up for resolution</td>
</tr>
<tr>
<td>&gt;10 cm</td>
<td>MRI or Gyn referral</td>
</tr>
</tbody>
</table>

**Late Postmenopausal women (more than 5 years or >55)**

<table>
<thead>
<tr>
<th>Cyst Size</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 1cm</td>
<td>Benign</td>
</tr>
<tr>
<td>≤ 3 cm</td>
<td>Describe in report</td>
</tr>
<tr>
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</tr>
<tr>
<td>&lt; 1 cm</td>
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<td>&gt;1 cm</td>
<td>Prompt ultrasound</td>
</tr>
<tr>
<td>&gt;10 cm</td>
<td>Gyn referral</td>
</tr>
<tr>
<td>&gt;10 cm</td>
<td>MRI or Gyn referral</td>
</tr>
</tbody>
</table>

*angulated margins, not round or oval in shape, portion of cyst poorly imaged, poor contrast with decreased signal to noise or no contrast used.
**Incidental Thickening of the Endometrium:**

- Premenopausal > 16 mm - Ultrasound
- Postmenopausal > 6 mm - Ultrasound
- Postmenopausal with hormone replacement > 8 mm - Ultrasound

**Vascular Abnormalities:**

**Abdominal Aortic Aneurysm**

Incidentally detected asymptomatic abdominal Aneurysm; Ultrasound for characterization and follow-up, CT with IV contrast for symptomatic aneurysm or suspected dissection.

- 3.0-3.4 cm - Ultrasound or CT every 3 years
- 3.5-3.9 cm - Ultrasound or CT every 2 years
- 4.0-4.4 cm - Ultrasound or CT at 1 year intervals
- 4.5-4.9 cm - Ultrasound or CT at 6 months, then at 12 month intervals
- >5 cm - Referral to vascular subspecialist

For women, consider referral to a vascular subspecialist for >4.5 cm. The rupture rate for women is 4x higher than that for men, and the rupture rate of a 4.5 cm AAA in women is equal to that of a 5.5 cm aneurysm in men.

- Increased diameter by ≥0.5 cm in 6 months - Referral to a subspecialist
- Perforating Aortic Ulcer - CT at 1 year intervals
  (Disruption of atherosclerotic plaques with penetration of luminal blood for variable distances into the aortic wall.)

Intimal Dissection/Crescent sign and retroperitoneal leakage/bleeding is almost always symptomatic and warrants an urgent subspecialty referral.

**Iliac Artery Aneurysm**

Incidentally and asymptomatic iliac artery aneurysm

- 3.0-3.5 cm - CT at 6 months initially, then at 12 months
- > 3.5 cm - Refer for possible surgery or endovascular treatment

**Visceral Aneurysms**

Splenic artery aneurysms and renal artery aneurysms.

- < 20 mm - CT at one year intervals
- ≥ 20 mm - Refer to a vascular subspecialist

Pancreaticoduodenal aneurysms should all be referred to a vascular subspecialist.
References:

ACR White Papers:


Thyroid:


Cooper DS, Doherty GM, Haugen BR et al. Revised American Thyroid Association Management Guidelines for Patients with Thyroid Nodules and Differentiated Thyroid Cancer. Thyroid 2009;19:1-47.


Lung:


Adrenal:


Pancreas/biliary ducts:


Ovarian/Adnexal:


Uterus:

AAA:


This is a guideline, not a policy. It is a summary and distillation of relevant literature and subspecialty guidelines. The purpose of the CDI Quality Institute guidelines is to promote quality and continuity, where appropriate for medical practices within the CDI/Insight enterprise, and to provide relevant and up to date background information to support the development of policies within each individual practice. Guidelines should be adjusted for local standards of care, associated hospital or network policies, hospital versus outpatient settings, different patient populations and your own risk tolerance. Guidelines should also be modified to account for new information or publications that become available between revisions.