MANAGEMENT RECOMMENDATIONS

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1. Size Criteria < 4cm and > 4cm

2. Lesion Stability 12 months - benign

3. Look for intracellular lipid - NECT, Contrast washout CT, Chemical Shift MR Spectroscopy

1. Size Criteria <0.5, 0.5-1.5 and >1.5cm

2. CE Pattern - benign, flash-filling and suspicious (ring enhancement)

3. Stratify according to clinical risk (see legend)

4. Note reluctance of Australian Hep-Bil Surgeons to biopsy potentially resectable lesions.

Absent nasal bone
See technical note.

An absent nasal bone (NB) in the second trimester has been estimated to have a likelihood ratio of 83 times (Bromley et al. 2002) the background risk of aneuploidy and as such, all reasonable efforts should be made to identify this marker. If this is found:

> Counselling / amniocentesis should be offered.

Nuchal fold
See technical note.

A thickened nuchal fold (NF) i.e. ≥ 6 mm from 15-20 completed weeks gestation has been associated with an increased risk of trisomy 21 with a likelihood ratio of 17 (95% CI 8-38) (Smith-Bindman et al. 2001). If this is found:

> Calculate a new risk for Down syndrome: 17 x prior risk
> If the new risk level is increased (≥ 1 in 250) counselling / amniocentesis should be offered.

Echogenic bowel
See technical note.

First trimester bleeding appears to be a common cause (presumably due to swallowed blood) but a history of first trimester bleeding does not exclude other causes which include aneuploidy, fetal infections, an association with cystic fibrosis and fetal growth restriction.

> Calculate new risk for Down syndrome: 6 x earlier risk (95% CI 3-13) (Smith-Bindman et al. 2001).

> If new risk level is increased (≥ 1 in 250) offer amniocentesis. If doing amniocentesis save fluid for microbiological analysis (Polymerase chain reaction and culture) pending maternal serology.

> Infection risk: Carry out maternal blood serology for common prenatal infections (CMV specifically). Toxoplasmosis, varicella, and parvovirus less so and more commonly present with discrete echogenic foci (commonly liver) rather than hyperechoic bowel. Serology can be considered for these if the type of echogenicity of the fetal abdomen is equivocal.

> Cystic fibrosis risk: Offer counselling and parental testing for cystic fibrosis carrier status (detects approximately 80% of carriers). If both parents are carriers, offer amniocentesis for fetal DNA analysis

> Intrauterine growth restriction risk: perform growth scan at approximately 28-32 weeks
OBSTETRIC US SOFT MARKERS FOR ANEUPLOIDY

**Shortened humerus**
Shortened humerus (< 2.5th percentile from standard charts) have both been associated with an increased risk of chromosomal abnormalities. The humerus has been shown to be a more reliable discriminator for trisomy 21 than the femur. For this reason, humerus length should be considered as part of the routine assessment at time of morphology exam.

Shortened long bones can also indicate skeletal dysplasia or early onset intrauterine growth restriction (IUGR).

- Calculate new risk for Down syndrome based on the bone which is short:
  - Short humerus – new risk for Down syndrome: 7.5 x earlier risk (95% CI 5-12)

- If new risk level is increased (≥ 1 in 250) counselling / amniocentesis should be offered.
- Consider possibility of early IUGR or skeletal dysplasia. The latter is more likely if there is: severe long bone shortening, abnormal morphology of long bones, ribs or vertebrae and/or abnormality of skull shape.

**Shortened femur**
Shortened femur (< 2.5th percentile from standard charts) has been associated with an increased risk of chromosomal abnormalities. Shortened long bones can also indicate skeletal dysplasia or early onset intrauterine growth restriction (IUGR).

- Calculate new risk for Down syndrome based on the bone which is short:
  - Short femur – new risk for Down syndrome: 2.7 x earlier risk (95% CI 5-12)

- If new risk level is increased (≥ 1 in 250) counselling / amniocentesis should be offered.
- Consider possibility of early IUGR or skeletal dysplasia. The latter is more likely if there is: severe long bone shortening, abnormal morphology of long bones, ribs or vertebrae and/or abnormality of skull shape.

**Pyelactasis**
See technical note.

Isolated mild pelviectasis is a very uncommon finding in aneuploidy. Pyelactasis has been associated with an increased risk of hydrenephrosis and postnatal urinary reflux.

- There is no need to discuss aneuploidy as the likelihood ratio crosses 1
- Notify the patient of the need for third trimester/early neonatal review to assess for progression to hydrenephrosis.
OBSTETRIC US SOFT MARKERS FOR ANEUPLOIDY

Single umbilical artery
Isolated single umbilical artery is a very uncommon finding in aneuploidy. There is, however, an increased risk of fetal growth restriction.
> There is no need to discuss aneuploidy
> Arrange a third trimester scan to assess fetal growth

Echogenic intracardiac focus (EIF)
The isolated finding of an EIF in a low-risk patient (i.e. < 1 in 250 risk of a chromosome abnormality at the time of first or second trimester screening or based on maternal age if screening was not performed) is unlikely to be a marker for Trisomy 21. The isolated finding can be ignored as a normal variant providing adequate views have been obtained of all structures.
A possible format for reporting an EIF found at a routine mid trimester ultrasound could be:
"An ultrasound soft marker (EIF) has been noted. The presence of this isolated soft marker has no clinical or functional significance to this fetus and does not need review."

Choroid Plexus Cyst (CPC)
The isolated finding of a CPC in a low risk patient (i.e. < 1 in 250 risk of a chromosome abnormality at the time of first or second trimester screening or based on maternal age if screening was not performed) is unlikely to be a marker for Trisomy 18. The isolated finding can be ignored as a normal variant, providing adequate views have been obtained of all structures and the fingers are seen to be open and not clenched.
A possible format for reporting an CPC found at a routine mid trimester ultrasound could be:
"An ultrasound soft marker (CPC) has been noted. The presence of this isolated soft marker has no clinical or functional significance to this fetus and does not need review."

NOTE
If more than one marker is present, these are not additive. Choose the marker with the highest likelihood ratio to recalculate the risk.

See Technical Notes in Reference to confirm technical adequacy of study prior to committing to presence of a soft marker.

*South Australian Perinatal Practice Guidelines Chapter 15 Management of ultrasound soft markers of aneuploidy*
Note post-menopausal simple cysts < 1cm are common and considered clinically important - no follow-up required.

Management of Asymptomatic Ovarian and Other Adnexal Cysts Imaged at US: Society of Radiologists in Ultrasound Consensus Conference Statement Radiology 2010
Note simple ovarian cysts <5cm in women of reproductive age do not need follow-up.

Management of Asymptomatic Ovarian and Other Adnexal Cysts Imaged at US: Society of Radiologists in Ultrasound Consensus Conference Statement Radiology 2010
OVARIAN AND ADNEXAL CYSTS - CYSTS WITH INDETERMINATE, BUT PROBABLY BENIGN CHARACTERISTICS

| Findings suggestive of, but not classic for, hemorrhagic cyst, endometrioma or dermoid | Reproductive age: 6-12 week follow-up to ensure resolution. If the lesion is unchanged, then hemorrhagic cyst is unlikely, and continued follow-up with either ultrasound or MRI should then be considered. If these studies do not confirm an endometrioma or dermoid, then surgical evaluation should be considered. Postmenopausal: Consider surgical evaluation. |
| Thin-walled cyst with single thin septation or focal calcification in the wall of a cyst | Follow-up based on size and menopausal status, same as simple cyst described above |
| Multiple thin septations (< 3 mm) | Consider surgical evaluation |
| Nodule (non-hyperechoic) without flow | Consider surgical evaluation or MRI |
| Solid nodule suggests neoplasm, but if no flow (and not echogenic as would be seen in a dermoid) this is likely a benign lesion such as a cystadenofibroma |

Presence of multiple thin septations or a solid avascular nodule suggests surgical evaluation required.

*Management of Asymptomatic Ovarian and Other Adnexal Cysts Imaged at US: Society of Radiologists in Ultrasound Consensus Conference Statement Radiology 2010*
Thick (>3mm) or irregular septations and/or vascularised intracystic nodule is highly suggestive of malignancy.

*Management of Asymptomatic Ovarian and Other Adnexal Cysts Imaged at US: Society of Radiologists in Ultrasound Consensus Conference Statement Radiology 2010*
1. Size criteria <2, 2-3, >3cm

2. Don’t try and characterise cystic mass <2cm in size - 12 month follow-up.

3. 2-3cm size should be characterised with dual phase CT or MRCP

4. >3cm size, consider EUS cyst aspiration.

5. Do not mistake necrotic carcinoma for cystic neoplasm.

6. Presence of pancreatic related signs and symptoms changes the rules.

Abnormal findings on chest radiograph clear more slowly than do clinical signs of pneumonia. For those less than 50 years old, and otherwise healthy, *S. pneumoniae* pneumonia will clear radiographically by 4 wk in only 60% of patients. If the patient is older, has bacteremic pneumonia, COPD, alcoholism, or underlying chronic illness, radiographic clearing is even slower, and only 25% will have a normal radiograph at 4 wk. *Mycoplasma pneumoniae* infection can clear radiographically more rapidly than pneumococcal infection, while pneumonia due to *Legionella sp.* will clear more slowly.

The radiograph often worsens initially after therapy is started, with progression of the infiltrate and/or development of a pleural effusion. If the patient has mild or moderate pneumonia or is showing an otherwise good clinical response, this radiographic progression may have no significance. However, radiographic deterioration in the setting of severe community-acquired pneumonia has been noted to be a particularly poor prognostic feature, highly predictive of mortality.

In uncomplicated pneumonia responsive to therapy, repeat radiograph is recommended during approximately 4 to 6 wk post Rx, to establish a new radiographic baseline and to exclude the possibility of malignancy associated with community-acquired pneumonia particularly in older smokers.

**PULMONARY NODULES**

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**Recommendations for Follow-up and Management of Nodules Smaller than 8 mm Detected Incidentally at Nonscreening CT**

<table>
<thead>
<tr>
<th>Nodule Size (mm)*</th>
<th>Low-Risk Patient†</th>
<th>High-Risk Patient‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤4</td>
<td>No follow-up needed§</td>
<td>Follow-up CT at 12 mo; if unchanged, no further follow-up§</td>
</tr>
<tr>
<td>&gt;4–6</td>
<td>Follow-up CT at 12 mo; if unchanged, no further follow-up§</td>
<td>Initial follow-up CT at 6–12 mo then at 18–24 mo if no change¢</td>
</tr>
<tr>
<td>&gt;6–8</td>
<td>Initial follow-up CT at 6–12 mo then at 18–24 mo if no change</td>
<td>Initial follow-up CT at 3–6 mo then at 9–12 and 24 mo if no change</td>
</tr>
<tr>
<td>&gt;8</td>
<td>Follow-up CT at around 3, 9, and 24 mo, dynamic contrast-enhanced CT, PET, and/or biopsy</td>
<td>Same as for low-risk patient</td>
</tr>
</tbody>
</table>

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**Note.**—Newly detected indeterminate nodule in persons 35 years of age or older.

* Average of length and width.
† Minimal or absent history of smoking and of other known risk factors.
‡ History of smoking or of other known risk factors.
§ The risk of malignancy in this category (<1%) is substantially less than that in a baseline CT scan of an asymptomatic smoker.
¶ Nonsolid (ground-glass) or partly solid nodules may require longer follow-up to exclude indolent adenocarcinoma.

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No follow-up CT required for pulmonary nodule ≤4 mm in a low-risk patient.

RENAL MASSES - CYSTIC

1. Size criteria <1, 1-3, >3cm

2. Consider minimal fat content angiomyolipoma if hyperenhancing homogeneous solid mass.

### TABLE 1
**US Features Associated with Thyroid Cancer**

<table>
<thead>
<tr>
<th>US Feature*</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Positive Predictive Value (%)</th>
<th>Negative Predictive Value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcalcifications (1–5)</td>
<td>26.1–59.1</td>
<td>85.8–95.0</td>
<td>24.3–70.7</td>
<td>41.8–94.2</td>
</tr>
<tr>
<td>Hypoechoogenicity (2–5)</td>
<td>26.5–87.1</td>
<td>43.4–94.3</td>
<td>11.4–68.4</td>
<td>73.5–93.8</td>
</tr>
<tr>
<td>Irregular margins or no halo (2–5)</td>
<td>17.4–77.5</td>
<td>38.9–85.0</td>
<td>9.3–60.0</td>
<td>38.9–97.8</td>
</tr>
<tr>
<td>Solid (4–6)</td>
<td>69.0–75.0</td>
<td>52.5–55.9</td>
<td>15.6–27.0</td>
<td>88.0–92.1</td>
</tr>
<tr>
<td>Intranodule vascularity (3, 6)</td>
<td>54.3–74.2</td>
<td>78.6–80.8</td>
<td>24.0–41.9</td>
<td>85.7–97.4</td>
</tr>
<tr>
<td>More tall than wide (2)</td>
<td>32.7</td>
<td>92.5</td>
<td>66.7</td>
<td>74.8</td>
</tr>
</tbody>
</table>

* Numbers in parentheses are reference numbers.

### TABLE 2
**Recommendations for Thyroid Nodules 1 cm or Larger in Maximum Diameter**

<table>
<thead>
<tr>
<th>US Feature</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solitary nodule microcalcifications</td>
<td>Strongly consider US-guided FNA if ≥1 cm</td>
</tr>
<tr>
<td>Solitary nodule solid (or almost entirely solid)</td>
<td>Strongly consider US-guided FNA if ≥1.5 cm</td>
</tr>
<tr>
<td>Mixed solid and cystic or almost entirely cystic</td>
<td>Consider US-guided FNA if ≥2 cm</td>
</tr>
<tr>
<td>Mixed solid and cystic with solid mural component</td>
<td>Consider US-guided FNA</td>
</tr>
<tr>
<td>None of the above but substantial growth since</td>
<td>US-guided FNA probably unnecessary</td>
</tr>
<tr>
<td>prior US examination</td>
<td></td>
</tr>
<tr>
<td>Almost entirely cystic and none of the above</td>
<td>Consider US-guided FNA of one or more nodules, with</td>
</tr>
<tr>
<td>and no substantial growth (or no prior US)</td>
<td>selection prioritized on basis of criteria (in order</td>
</tr>
<tr>
<td>Multiple nodules</td>
<td>listed) for solitary nodule*</td>
</tr>
</tbody>
</table>

Note.—FNA is likely unnecessary in diffusively enlarged gland with multiple nodules of similar US appearance without intervening parenchyma. Presence of abnormal lymph nodes overrides US features of thyroid nodule(s) and should prompt US-guided FNA or biopsy of lymph node and/or ipsilateral nodule.

* Panel had two opinions regarding selection of nodules for FNA. The majority opinion is stated here.

Management of Thyroid Nodules Detected at US: Society of Radiologists in Ultrasound Consensus Statement Radiology 2005;237:794-800
Abdominal Aortic Aneurysms

3.0-3.9cm diameter: Annual US surveillance recommended

4.0-4.9cm diameter: 6 month US surveillance recommended

5.0+cm: Recommendation for elective aneurysm repair in appropriate surgical candidates

ACC/AHA 2005 Practice Guidelines for the Management of Patients With Peripheral Arterial Disease pp 582

Visceral Artery Aneurysms (Splenic, renal, mesenteric)

Open repair or catheter-based intervention is indicated for visceral aneurysms measuring 2.0 cm in diameter or larger in women of childbearing age who are not pregnant and in patients of either gender undergoing liver transplantation. (Level of Evidence: B)

Open repair or catheter-based intervention is probably indicated for visceral aneurysms 2.0 cm in diameter or larger in women beyond childbearing age and in men. (Level of Evidence: B)

Risk of rupture splenic artery aneurysm very low for small (<2.0cm aneurysm) in post-menopausal woman

ACC/AHA 2005 Practice Guidelines for the Management of Patients With Peripheral Arterial Disease pp 600
Risk Factors for Malignancy

1. age over 60,
2. sessile morphology,
3. size > 10mm,
4. solitary sessile lobulated polyp,
5. background of primary sclerosing cholangitis

Polyps not resected should be followed with serial ultrasound examinations. Clear guidelines for screening are not available and individual patient characteristics need to be considered. Recent studies suggest US screening interval of every 6-12 months continued for as long as 10 years.

New research suggests EUS may be of benefit in further characterisation.

See INTRANET for electronic copy and cited references.

http://share.bensonradiology.com.au

Look for Radiologist Folder
Look for “Management Recommendations”

(accessed from inside Benson Radiology Computer Network)