The use of direct smears (for immediate assessment) in FNA services

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“What a lovely thing a ROSE is!”
Conflict of interest

Dr Dixon has no conflict of interest
• HCA (Hospital Corporation America) is the world’s largest independent hospital company
  o HCA Healthcare UK operates six world-class hospitals in Central London
  o A number of private consultation, outpatient and diagnostic facilities in London, South East England and Manchester

• There is clinical and patient demand for high quality, rapid diagnosis, supported by a network of sub-specialist MDT meetings
FNA Services in Central London
Direct Smears in FNA Services

The role of Rapid On-Site Evaluation (ROSE)

- The use of direct smears and ROSE is highly effective in many clinical settings
  - Ultrasound-Guided FNA e.g. head and neck lumps and thyroid nodules (OSHNC)
  - Endoscopy-Guided Ultrasound FNA (EBUS, EUS)
  - Computed Tomography (CT)-Guided FNA
  - Palpable FNA by pathologist
  - Touch imprint cytology of breast core biopsies and FNA breast/axilla (OSBC)

- ROSE should be largely clinician driven
  - Concierge service
  - Team of specialist consultant cytopathologists
Direct Smears in FNA Services

Advantages of direct smears:

• Simple and rapid procedure
  o Smear preparation can be taught quickly but requires experience
  o Diff-Quik staining is a straightforward technique

• Rapid answers
  o Adequacy assessment
  o Retention of important background clues
  o Rapid provisional or definitive diagnosis

• Immediate clinical discussion
  o Mini-MDM completed on-site
Direct Smears in FNA Services – Radiology & Pathology

U1 - U5 classification or TIRADS

Thy 1 - Thy 5 classification
Direct Smears in FNA Services – What to avoid

Unpleasant contaminants

- Avoid ultrasound gel – always use a probe cover
- Avoid aspiration of local anaesthetic (lidocaine)
- Avoid exposure of direct smears to formalin - FNA smears should be submitted in a separate container from formalin-fixed samples (formalin leaches through capped or screw-top lids and affects staining quality)

Inappropriate air drying

- Do not just leave the slides to dry
- Actively air dry by wafting or using a hairdryer on the cold setting
Direct Smears in FNA Services – Thyroid Ultrasound (U2)
In benign thyroid disease, the presence, amount and quality of colloid is usually easily assessed in air dried direct smears as well as other components such as macrophages, cholesterol crystals and follicular cells.
Direct Smears in FNA Services – Thyroid Ultrasound (U5)
Direct Smears in FNA Services – Papillary Thyroid Carcinoma (Thy 5)
Direct Smears in FNA Services – Papillary Thyroid Carcinoma (Thy 5)

Architectural and nuclear features and other cytological indicators of papillary thyroid carcinoma are easily appreciated in actively air dried Diff-Quick stained direct smear preparations.
Direct Smears in FNA Services – Thyroid Ultrasound (U3)
Direct Smears in FNA Services – Follicular Neoplasm (Thy 3f)

Follicular neoplasm:
- Follicular adenoma
- Follicular carcinoma
- FVPTC
- NIFTP
- Parathyroid adenoma
Direct Smears - Imprint Cytology of Fibroadenoma (C2)

- Ductal epithelial cell clusters with staghorn pattern
- Stripped bipolar myoepithelial nuclei
- Lobulated fibrous stroma

The patient receives a benign diagnosis within 20-30 minutes of having her breast core biopsy.

Typical fibroadenoma histopathology
Direct Smears - Imprint Cytology of Carcinoma (C5)

Intracytoplasmic mucin vacuoles – “signet ring” type malignant cells

Typical lobular carcinoma histopathology – “Indian-file” pattern

The surgeon is informed of a malignant diagnosis less than 30 minutes after the patient's core biopsy procedure
“Our last audit shows imprint cytology of ultrasound guided core needle biopsy provides a rapid and reliable preliminary diagnosis for breast lesions. The overall sensitivity and specificity of imprint cytology are 93.02% and 99.24% respectively. The overall accuracy is 97.7%. The service often alleviates patient anxiety, as the majority of results are benign, and also allows for immediate discussion and planning of further tests or treatments at one visit for women with breast cancer”. 
Direct Smears - Summary and the Future

Direct smears and ROSE in FNA Services
- Rapid technique
- Rapid adequacy assessment
- Rapid answers
- Rapid mini-MDM with radiologist and clinician
- Rapid decision on need for alcohol fixed smears/LBP/cell block
- Rapid assessment for ancillary testing
- Rapid direction of further samples for immunocytochemistry, flow cytometry, microbiology, FISH and NGS

Future Developments
- Increase in use of molecular testing for indeterminate Thy 3a/Thy 3f/Thy 4 cases
- Digital pathology solutions and remote reporting in FNA services