Taskforce For Lung Health - Call for evidence to identify what needs to change in how we prevent, diagnose and treat lung disease

Joint Response from the Royal College of Radiologists and the British Society of Thoracic Imaging

SUGGESTION ONE

CT lung biopsy on disease progression to guide drug treatment

Genetic diversity within a tumour allows cancer cells to evolve during the course of treatment, providing a major challenge to improving lung cancer outcomes (1; TRACERx study). Genetic evolution of tumours is a mechanism that enables tumours to metastasise and develop resistance to therapy. In the era of molecular profiling, the demand for repeat biopsy of tumours upon disease progression is increasing exponentially. This is becoming pivotal in enabling oncologists to adapt treatments for their patients, especially in cases of acquired resistance (eg T790M resistance mutation in EGFR Tyrosine Kinase Inhibitor (TKI) therapy) where there may well be a novel therapy that enables disease control to be re-attained (2, 3).

As such, rapid access to CT-guided lung biopsy will form one of the cornerstones for patient oncological management, enabling ongoing genetic tumour profiling through the course of therapy and permitting rapid access to novel gene-targeted treatments contingent on tissue diagnosis. Obtaining adequate tissue material for histological diagnosis and molecular testing is thereby crucial to individual treatment decisions.

Key stakeholders in providing the necessary training to allow an expanded NHS lung biopsy infrastructure are Royal College of Radiologists (RCR), and its special interest group the British Society of Thoracic Imaging (BSTI). New lung biopsy guidelines, wider implementation of early discharge lung biopsy and the creation of dedicated complex lung biopsy units would permit the expansion of lung biopsy services, allowing a wider range of patients to access these novel therapies.

Recommendation:

Image-guided re-biopsy of lung cancer on disease progression can be used to predict therapeutic resistance and consequently redirect newer targeted therapies that are increasingly available. Re-biopsies should be performed on lung lesions that were inadequately sampled by an initial biopsy, when new metastatic lesions or relapses occur, in order to confirm the nature of the lesions and select the optimal targeted therapy.

RCR and BSTI led expansion of the lung biopsy infrastructure through the NHS will be pivotal to cater for this increasing oncological demand.

References:

1. Tracking the Evolution of Non–Small-Cell Lung Cancer - N Engl J Med 2017; 376:2109-2121
2. Novel mutant-selective EGFR kinase inhibitors against EGFR T790M Nature 2009, 462; 1070–1074
3. www.nice.org.uk/News/Article/nice-recommends-new-drug-osimertinib-for-hundreds-of-people-with-lung-cancer
4. www.nice.org.uk/guidance/ta416/evidence
5. Re-biopsy status among non-small cell lung cancer patients in Japan: A retrospective study - Lung Cancer 2016; 101; 1-8
6. Role of Rebiopsy in Relapsed Non-Small Cell Lung Cancer for Directing Oncology Treatments - Journal of Oncology 2015, Article ID 809835, http://dx.doi.org/10.1155/2015/809835

SUGGESTION TWO

Imaging as a tool to monitor therapeutic response

Imaging and accurate imaging interpretation are important not just for the diagnosis of lung diseases, but increasingly so for the evaluation of treatment response. The increasing role of imaging in treatment monitoring requires sufficient numbers of radiologists trained in thoracic imaging interpretation.

CT and PET/CT are widely used to determine the response to treatment for patients with lung cancer in response to chemotherapy, radiotherapy and surgery. Standardised evaluation methods have long been used for evaluating the success or failure of drug treatments both in clinical practice and in research trials using so-called “RECIST” criteria (Eisenhauer et al 2009). Recently, there has also been an increasing role for the use of CT in monitoring other non-malignant lung diseases. For example, CT or MRI is recommended to have a role as a surveillance tool for bronchiectasis (BTS guidelines), fungal lung disease (Infectious Diseases Society of America), cystic fibrosis (National Institute for Clinical Excellence) and pulmonary fibrosis (Fleischner Society).

References:

1. Eisenhauer et al. New response evaluation criteria in solid tumours: revised RECIST guideline (version 1.1) Eur J Cancer. 2009 Jan;45(2):228-4
2. British Society of Thoracic Imaging guidelines for Bronchiectasis in Adults. https://www.brit-thoracic.org.uk/document-library/clinical-information/bronchiectasis/bts-guideline-for-bronchiectasis-in-adults/
3. Patterson et al. Practice Guidelines for the Diagnosis and Management of Aspergillosis: 2016 Update by the Infectious Diseases Society of America. Clinical Infectious Diseases 2016;63(4):e1–60
4. NICE guidelines for cystic fibrosis diagnosis and management. https://www.nice.org.uk/guidance/ng78/chapter/Recommendations#annual-and-routine-reviews
5. CT staging and monitoring of fibrotic interstitial lung diseases in clinical practice and treatment trials: a Position Paper from the Fleischner society. Volume 3, No. 6, p483–496, June 2015

SUGGESTION THREE

Image-guided ablation of lung cancer

What is lung ablation therapy?
Radiofrequency ablation (RFA) – currently the most common, microwave ablation (MA) (becoming more common), laser ablation and cryoablation, uses CT-guidance to place a needle electrode through the skin directly into a lung tumour. Tumour cells are then destroyed by the application of either intense heat or cold (ablation). This provides an alternative, minimally invasive treatment option

to both surgery & stereotactic ablative radiotherapy (SABR) – most notably in patients with reduced lung function (eg COPD, fibrosis), and to patients with lesions where SABR is contraindicated.

Some advantages of RFA or MA

- Can be performed in patients who might have difficulty with open surgery as it is much less invasive.
- It is much less invasive than open surgery & has much shorter recovery times. It can effectively be performed as a day case procedure under conscious sedation rather than general anaesthetic.
- Patients with small lung tumours <3cm in size. RFA or MA of the lung can be performed as a treatment for either primary lung tumours or metastases.
- Patients who have multiple lung tumours may be candidates for ablation treatment.
- Can reduce the size of a lung tumour so that it can be more easily treated by chemotherapy or radiation.
- Can provide relief when a lung tumour invades the chest wall and causes pain.
- A biopsy can be performed at the same time as RFA or MA if your physician or oncologist needs further tumour analysis.
- Lung function is better preserved with RFA or MA than after surgical tumour removal - this is important for patients with pre-existing breathing problems.
- If a tumour recurs in the same region, it usually can be retreated with RFA or MA, including in previously irradiated patients.
- Even when RFA or MA does not remove all of a tumour, a reduction in total tumour size may extend life for a substantial time.
- RFA/MA is a quick procedure with rapid recovery time meaning that chemotherapy may be resumed almost immediately in patients who require it.

Economics

Compared to surgery, with a median cost per month lived for RF ablation recipients of $620.74, versus $1,195.92 for those treated with surgery (5). For every SABR therapy ($15000) one could perform 3 lung radiofrequency ablations ($5000) (5).

References:

1. Image-guided Thermal Ablation of Lung Malignancies - Radiology 2011; 260; 3; 633-655
2. NICE guidance: Percutaneous radiofrequency ablation for primary or secondary lung cancers www.ice.org.uk/guidance/ipg372
3. Standards for radiofrequancy ablation: Royal College of Radiologists www.rcr.ac.uk/sites/default/files/docs/radiology/pdf/BFCR%2813%298_Standards_RFA.pdf
4. Pulmonary radiofrequency ablation in a district general hospital: is it a safe and effective treatment? - Clinical Radiology 2016; 71 (9); 939.e1-939.e8
5. Cost and effectiveness of radiofrequency ablation versus limited surgical resection for stage I non-small-cell lung cancer in elderly patients: is less more? J Vasc Interv Radiol. 2013 Apr;24(4):476-82. doi: 10.1016/j.jvir.2012.12.016. Epub 2013 Feb 23
6. Comparison of procedure costs of various percutaneous tumour ablation modalities (2014) www.ahra.org/AM/Downloads/OI/qc/RM364_p12-17_Features.pdf