In relation to GGA type, local progression did not occur during the assessment period in 292 of the 341 complete-type tumors (85.6%) or 72 of the 115 incomplete-type tumors (62.6%). The 1-, 2- and 3-year technique effectiveness rates as assessed by Kaplan-Meier methods were 77.7%, 64.8% and 60.5% for complete-type tumors and 57.8%, 45.3% and 33.9% for incomplete-type tumors, respectively. Tumor size for incomplete-type group was significantly larger than for complete type. (p<0.05)

Complications: The incidence of pneumothorax, pleural effusion, and tube placement of pneumothorax were 52.2%, 18.8%, and 20.5% respectively. Two patients died during the course of the study because of intractable pneumothorax and massive hemoptysis.

Discussion
In the present study, a significant difference was noted between ≤2 cm and >2 cm tumors, but not between 2-3 cm and >3 cm tumors. Mid-term technique effectiveness was favorable for ≤2 cm tumors. This may be attributable to the ablation capacity of RF systems. Since we often used a system with the range of ablation of a 1-3-cm sphere, complete ablation could be expected with tumors ≤2 cm in size. We now use larger LeVeen needles to overcome this problem.

Based on this report, we defined complete necrosis as having a safety margin of ≥5 mm, and technique effectiveness were more favorable for complete-GGA-type tumors. Surrounding GGA can be assessed immediately after RF ablation, and may be useable as an indicator of technique effectiveness. However, local progression still occurred with tumors completely surrounded by GGA, so not all GGA reflects coagulative necrosis. Reasons for this include the following: degree of ablation cannot be assessed in areas adjacent to existing structures such as the pleura and/or large pulmonary vessels; GGA could be caused by other factors such as bleeding; and the discrepancy between range of GGA seen on CT and actual histopathological range of necrosis. As complete-type tumors were smaller than incomplete-type tumors with statistical significance, GGA type can simply reflect tumor size.

Our study revealed that secondary technique effectiveness rates improved with re-RF ablation in the treatment of local progressions. Compared to other treatments such as surgery and radiotherapy, RF ablation is advantageous because therapy is easily repeated many times.

RF ablation appears to be a safe and minimally invasive option with negligible mortality and little morbidity in selected patients with unresectable thoracic malignant tumors.

3. de Baere T et al. Midterm local efficacy and survival after radiofrequency ablation of lung tumors with minimum follow-up of 1 year: prospective evaluation. Radiology 2006; 240:587-596

Interventional pulmonology
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In the last decades, thanks to the introduction of various ancillary diagnostic and therapeutic techniques, the role of bronchoscopy has evolved as an essential tool in the management of lung cancer in any step of the natural history of the disease.

From the early detection (autofluorescence bronchoscopy) to the diagnosis and staging (transbronchial needle aspiration, ultrasound bronchoscopy), the value of bronchoscopy as a diagnostic and staging method is worldwide acknowledged. On the contrary, the potential therapeutic role of bronchoscopy in lung cancer is still underrated and in the flow-charts of treatment modalities of lung cancer the interventional pulmonology procedures are often unmentioned. 50-60% of lung cancers occurs in central airways and thus are reachable by bronchoscopic techniques that can be utilised with curative intent or for palliative care.

Various intraluminal bronchoscopic treatment methods have been used with curative intent in early stage cancer of the central airways (carcinoma in situ or microinvasive carcinoma). Photodynamic therapy (PDT), endobronchial brachytherapy, laser therapy, electrocautery and cryotherapy have been employed in this field. Complete response rate ranges from 75 to 97 % and it is higher when the tumor has a limited surface area less than 1 square centimeter.

More frequently, bronchoscopic techniques are used with palliative intent in cases of malignant central airways obstruction in patients not candidate for surgery. Symptoms such as dyspnea, cough, post-obstructive pneumonia and haemoptysis are commonly present in patients with lung cancer and may be related to the endobronchial extension of the tumor. These symptoms may be life-threatening and cause of death or may affect the quality of life.

There are various bronchoscopic techniques to be employed in the palliative treatment of endobronchial tumours. The choice depends on three major factors:
1) the need to obtain an immediate effect for symptoms relief in patients with severe dyspnea and imminent respiratory failure or life-threatening haemoptysis. Therapeutic bronchoscopy using laser, electrocautery, argon plasma coagulation and the use of stents may provide an immediate reopening of the airway lumen.
2) the type of stenosis that can be related to endoluminal growing tumours, to extrinsic compression or to mixed pattern with intraluminal tissue associated with intramural spread or extrinsic compression;
3) the local availability of facilities or experience.

In selected cases, the bronchoscopic treatment of lung cancer can provide faster relief of symptoms than any other treatment measure. Unfortunately, the endoscopic intervention is generally reserved to “advanced cases”, after that oncologic treatment as chemo- or radiotherapy have failed. On the contrary, the above mentioned procedures should be considered means of treatment for central airways tumours, that do not compete but must be integrated with other care modalities, even at the beginning of the therapeutic management of the patient. In this sense a close cooperation between the interventional pulmonologist, the oncologist and the radiotherapist is an essential step to optimise the management of lung cancer patient.

The different techniques for disobstructing airways in patients affected by lung cancer will be discussed in this “Meet the Professor” Session.