

# **Tumour ablation: current role in the kidney, lung and bone**

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### **Abstract**

The last few years have seen a rapid expansion in the use and availability of ablation techniques with hundreds of papers published. Radiofrequency remains the front-runner in terms of cost, ease of set-up, versatility and flexibility but other techniques are catching up. Ablation with cryotherapy and microwave, which were previously only available at open laparotomy due to the large size of the probes, are now readily performed percutaneously, with a predictable reduction in morbidity. Ablation is now accepted as the first line of treatment in patients with limited volume hepatocellular carcinoma who are not candidates for transplantation. There is continuing debate in most other areas but the evidence is increasing for an important role in liver metastases, renal carcinoma, inoperable lung tumours and some bone tumours.

## Technical developments

Radiofrequency (RF) remains the frontrunner in terms of cost, ease of set-up, versatility and flexibility but other techniques are catching up. Ablation with cryotherapy and microwave, which were previously only available at open laparotomy due to the large size of the probes, are now readily performed percutaneously, with a predictable reduction in morbidity.

Cryotherapy offers the opportunity to monitor the ice-ball with ultrasound (US), computed tomography (CT) or magnetic resonance imaging (MRI).

Simultaneous use of multiple energy sources (probes/electrodes) is now available in all the different technologies.

Collateral injury has been reduced by the widespread adoption of dextrose isolation. Five percent dextrose is instilled into the area adjacent to the ablation to displace vulnerable structures, usually bowel, away from the ablation zone. A displacement of as little as 1 cm is enough to protect the bowel.



## Specific applications

Ablation is now accepted as the first line of treatment in patients with limited volume hepatocellular carcinoma (HCC) who are not candidates for transplantation. There is continuing debate in most other areas but the evidence is increasing for an important role in liver metastases, renal carcinoma, inoperable lung tumours and some bone tumours.

## *Tumours of the kidney*

patients with a solitary kidney and others with borderline renal function will increasingly be treated with ablation. Both tumour size and location are important predictors of outcome post ablation. Renal tumours up to 3.5 cm in diameter can be destroyed *in situ* by laser, RF or cryotherapy with virtually no damage to the surrounding normal renal tissue.

Some authors advocate cryotherapy for larger renal tumours <5 cm in diameter. Exophytic tumours are more readily ablated than central tumours. Multiple renal tumours are not rare and can be difficult to resect without complications but complications are rare after ablation, particularly if a percutaneous approach is used. Haemorrhage is the most common.



## *Lung tumours*

This is predicted to be the single largest growth area in ablation over the next few years. Laser, radiofrequency, cryotherapy and microwave have all been used. Currently the most widely used technique is radiofrequency. Good results can be achieved in small, peripheral tumours. Both inoperable primary and limited numbers of metastatic tumours have been treated.

Pneumothorax occurs in about 40%, a similar incidence to that seen with trucut biopsy, but only a small percentage (10–15%) require drainage.

The second most common complication is pleural effusion. Other complications include infection, haemorrhage and bronchopleural fistulae.

Tumours <3.0 cm can usually be ablated at a single session, larger tumours, 3.0–5.0 cm, may require more than one ablation or other additional therapy.

Ablation is the best option for preserving lung function.

## *Bone tumours*

Treatment by RFA may be curative, but is more likely to form part of a palliative treatment regimen. CT or MR are the usual guidance methods.

Radiofrequency ablation and cryoablation have been advocated in the symptomatic palliation of bone metastases following radiotherapy. Initial results suggest that ablation can produce significant reductions in pain levels and analgesic requirements.



## Conclusion

The last few years have seen a sharp increase in our understanding of ablation, maturation of the technology, an improvement in the safety profile, ablation efficacy and monitoring techniques and the publication of results in larger patient cohorts.