Radio Frequency Ablation Registration (RFA) uses high-frequency alternating electrical current to destroy malignant tissues without harming normal tissues. RFA procedures are done by placing needle-shaped probes into the patient’s liver, targeting the tumor lesion. High-frequency alternating current is supplied through the probe via creating a temperature gradient between the tumor and the normal tissue surrounding it. The heat generated by the tissue causes necrosis, thus destroying the tumor.

Liver Segmentation

Liver segmentation is done through automated or semi-automated methods. Automated methods use voxel similarity measures like distance or intensity to define volume of interest contours. Semi-automated methods use procedural feedback, and assessment of treatment physicians to define matching boundaries from boundaries of adjacent structures in CT volumes. Once the VOI is manually defined, it is automatically propagated in the volume, resulting in a segmentation of the liver.

PET and CT Planning

PET-CT planning is done by placing needle-shaped probes into the patient’s liver, targeting the tumor lesion. PET and CT images are fused into a single image, allowing the physician to view the tumor location and the surrounding vasculature. PET images are used to target the tumor, while CT images are used to visualize the vasculature. The physician can then select the virtual entry and target points for the RFA probe, allowing the physician to view the tumor location and the surrounding vasculature.

Blending Information

Blending information may better define the spatial relationship of target lesions and treatment zones, and may allow functional optical models of expanding during ablation.

RFA Planning Process

RFA planning process includes the following steps:

1. **Data Types**: The data types include nodule data, VOI localization, RFA probe data, and CT PET data.
2. **Image Processing**: The image processing includes segmentation/classification, measurement/quantification, registration/fusion, and plugin data. The segmentation/classification step is done using adaptive segmentation and fusion. The measurement/quantification step is done using automated methods. The registration/fusion step is done using linear or non-linear methods. The plugin data includes customizable tools for the physician.
3. **RFA Probe**: The RFA probe is placed in the patient’s liver, targeting the tumor lesion. The probe is connected to a generator that supplies high-frequency alternating electrical current to destroy the tumor.
4. **CT PET Planning**: CT PET planning includes the following steps:
   - **Segmentation**: Segmentation is done using automated or semi-automated methods. Automated methods use voxel similarity measures like distance or intensity to define volume of interest contours. Semi-automated methods use procedural feedback, and assessment of treatment physicians to define matching boundaries from boundaries of adjacent structures in CT volumes. Once the VOI is manually defined, it is automatically propagated in the volume, resulting in a segmentation of the liver.
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