Advancing interventional CT
Precise Intervention

Overview
Philips Incisive CT features intellect at every step to help meet the challenges of interventional CT. Like never before, operator and design efficiencies come together for wise decisions from start to finish. With the Precise Intervention tool of Precise Suite, Incisive CT provides everything a user needs to quickly and confidently perform an interventional CT scan.

CT-guided percutaneous procedures are used for many different applications to aid diagnosis and treatment

<table>
<thead>
<tr>
<th>Procedure type</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biopsy and puncture</td>
<td>Obtain biological tissue (biopsy) or liquid samples (puncture) for analysis</td>
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<tr>
<td>Drainage and nephrostomy</td>
<td>Drain air or liquid (urine for nephrostomy)</td>
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<tr>
<td>Alcoholization (celiac plexus block)</td>
<td>Inject alcohol in celiac plexus area for palliative pain management mainly in the context of tumor infiltration</td>
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<tr>
<td>Articular infiltration</td>
<td>Puncture and inject anti-inflammatory corticosteroid at the level of lumbar joints</td>
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<tr>
<td>Cementoplasty (i.e., vertebroplasty, kyphoplasty, osteoplasty, sacroplasty)</td>
<td>Inject cement (methyl methacrylate) into an osseous lesion</td>
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<tr>
<td>Radio frequency ablation (RFA) and microwave ablation (MWA)</td>
<td>Destroy tumor tissue with heat</td>
</tr>
<tr>
<td>Cryoablation or cryotherapy</td>
<td>Destroy tumor tissue with cold</td>
</tr>
<tr>
<td>Embolization</td>
<td>Trans-arterial embolization of tumors or traumatic hemorrhage</td>
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</tbody>
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This content is not intended for a US audience.
Cancer is becoming a chronic condition

Although there are different types of interventional procedures performed with CT systems, oncology-based interventions are the most challenging to perform and are projected to have the most growth.

Background

The World Health Organization (WHO) states that 1 in every 6 deaths can be attributed to cancer, and that cancer is the second-leading cause of death after cardiovascular disease.

Globally, 1 out of 6 deaths are due to cancer

According to the American Cancer Society, the global cancer burden is expected to grow to 27.5 million new cancer cases and 16.3 million cancer deaths by 2040.1

Globally, 2018 estimates show

Breast cancer most prevalent
Lung cancer highest mortality
Liver cancer closest ratio of mortality to incidence

Cancer incidence and mortality rates vary by country due to a variety of factors including the age of the population, prevalence of risk factors such as infections, availability and use of early detection tests (including preventive care), and the availability of advanced treatments.
CT is often chosen for diagnosis and treatment involving image-guided procedures because of its exceptional contrast and spatial resolution compared to other imaging modalities.

**Image-guided procedures** are increasing

- **Potential benefits over surgery**
  - Less patient discomfort
  - Improved outcomes
  - Greater cost-effectiveness

**Typical workflow for CT-guided interventions**

<table>
<thead>
<tr>
<th>Location</th>
<th>Procedure</th>
<th>Control</th>
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</tr>
<tr>
<td>Survie (optional)</td>
<td>Contrast-enhanced helix</td>
<td>Follow-up (sequential or helix)</td>
</tr>
<tr>
<td>Target and entry site selection</td>
<td>Needle guidance (sequential or fluoroscopy CT)</td>
<td></td>
</tr>
</tbody>
</table>

- Low dose
- High accessibility
- Fast and precise
- Low accessibility
- High dose

The goals of interventional CT are to aid in planning, guidance, treatment and control.
Precise Intervention for confidence in interventional CT

Reduce procedure time by 16%.
Perform more exams or procedures in a day using Precise Intervention.

Needle planning, guidance and tracking
Ensure visualization of the target path and needle by allowing the physician to verify or modify his needle angle according to scan parameters.

Radiation dose-conscious scanning
Perform efficient procedures with high image quality at low dose.

Trends in interventional CT

Traditionally, CT systems have been installed in radiology departments. As CT image quality and speed have improved, so has the use of accurate, minimally invasive techniques. However, time is still a challenge for interventional procedures.

Most sites have to schedule extended time slots of up to 60 minutes with the CT system for an interventional procedure. As image quality has improved, the focus is now on reducing procedure time and also radiation dose.

Radiation dose

Depending on the type of interventional procedure, the entire study time may be as short as a few minutes, but it may also take many hours. Therefore, radiation dose plays a key role in decisions before and during the procedure.

Pre-procedure
When decisions are made about the optimal imaging method to use, radiation dose is considered for the planning helical scan and during the needle or probe guidance.

During the procedure
Image-guiding techniques, single scan for step-by-step guidance vs fluoro CT for real-time imaging, and radiation dose per scan may be adjusted to optimize image quality, and at the same time, minimize dose to the user and the patient. There are also techniques to select an angle for the acquisition to minimize radiation dose.

Precise Intervention for confidence in interventional CT

Incisive CT has advances for optimal lesion depiction and characterization from the planning stage through follow-up. Expect high image quality and low dose, with the efficiency to improve the experience for both patients and clinicians.
**Image display with references**

While acquiring images, it can be useful to display one or two reference images. These reference images allow the user to compare to a previously acquired image.

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**Advanced needle guidance**

To ensure precise placement of a needle regardless of the complexity of access, Incisive CT allows the user to plan any needle obliquity, along with tracking of the needle, as it is inserted toward the target lesion. These tools allow for fast feedback on the accuracy of needle placement, which in turn permits the user to not only be confident in performing the procedure, but also to carry out the procedure in as short a time as possible. These tools assist in ensuring an optimal outcome of the procedure while reducing time.

- Supports planning and re-plan and editing of the needle path
- Displays safety margins from 5 mm up to 20 mm
- Transmits depth and angle information for the planned path
- Provides automatic needle tracking algorithm, tracking results and system display measurements of needle tip to target, along with deviation from plan and insertion depth
- Workflow available on the gantry, in room displays and the console

**Incisive CT features advanced interventional needle tracking capability.**

- Needle guidance on console and in room display
- Needle guidance on the gantry touch panel
Interventional tools with the flexibility provided by the OnPlan gantry controls.

**Flexible display**

**Image**
Interventional images are displayed on the gantry panel, and the images are controlled using gesture controls such as scroll, WW/WL changes, pan and zoom. Images can also be saved.

**Acquisition**
Allows the physician to immediately change scan parameters to ensure visualization of the target, path and needle through change of scan modes or change of scan parameters, including slice thickness.

**Interventional table controls**
Saves multiple scan locations and moves to the selected location. Also allows user to move the table incrementally to aid in locating the needle tip.

**Layout**
Flexibility to display images according to user preference. User can select to display one or three images. Simultaneously display either a single roadmap image or a roadmap and surview image to assist in guidance.
Clinical relevance
Interventional CT is becoming increasingly important in the guidance of complex procedures in oncology. Incisive CT with Precise Intervention delivers workflow advances and enables confident procedures in this critical but complex area of CT imaging.

Conclusion
Precise Intervention needle planning and tracking is a major enhancement that provides the ability to perform interventional CT procedures with accuracy and confidence. Incisive CT provides a number of meaningful advances encompassing workflow, all to make procedures easy and efficient.

Reference
References


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