



Leksell SurgiPlan®
Powerful planning
for success



Making a difference in surgical planning

Leksell SurgiPlan

Leksell SurgiPlan® is an advanced image-based neuro-surgical planning software, specifically designed for use with Leksell Stereotactic System®. With its powerful Linux-based operating system and flexible pre-planning capabilities, it offers neurosurgeons a greater degree of freedom and precision in planning and evaluating different surgical approaches. This easy-to-learn package plays an important role in optimizing workflows, potentially improving clinical outcomes and enhancing the cost-efficiencies of treatment.

A modular system to meet your needs

Leksell SurgiPlan offers a range of powerful tools for increasing the precision and confidence of the planning procedure. Based around a high-performance and reliable Linux-based operating system, this modular platform combines advanced image handling options with a new graphic interface for excellent ease-of-use. It also ensures that future requirements can be met in a focused, cost-effective manner.

Streamlining procedure planning

The system is organized in modules from which you can design your own planning and evaluation tool. Each module is designed to meet specific needs.

Stereotactic Planning is the basic module that offers a wide variety of features to plan the surgical approach. Together with Image Fusion it enhances target definition.

Another combination, Functional Planning and AtlasSpace, focuses on functional neurosurgery and is ideal for accurate localization of functional targets.

ImageMerge™ software streamlines the procedure of image interpretation and pre-operative planning through co-registration of frame-based and frameless image studies from CT and MR scanners. Image interpretation is further expanded with the

physiological data provided by ColorPET™. The Pre-Planning™ module enables treatment planning on frameless images, separating the pre-operative planning from the day of surgery.

Seamless integration

Each module is integrated seamlessly for accurate planning and a smooth workflow.

The power to make a difference

The high-performance, PC-based Leksell SurgiPlan offers a clear step up in capabilities over previous versions. The greater computing power translates directly into a higher ability to handle large numbers of different image studies and better support for frameless images. The ability to do more, faster, makes for even greater cost-efficiencies in treatment.

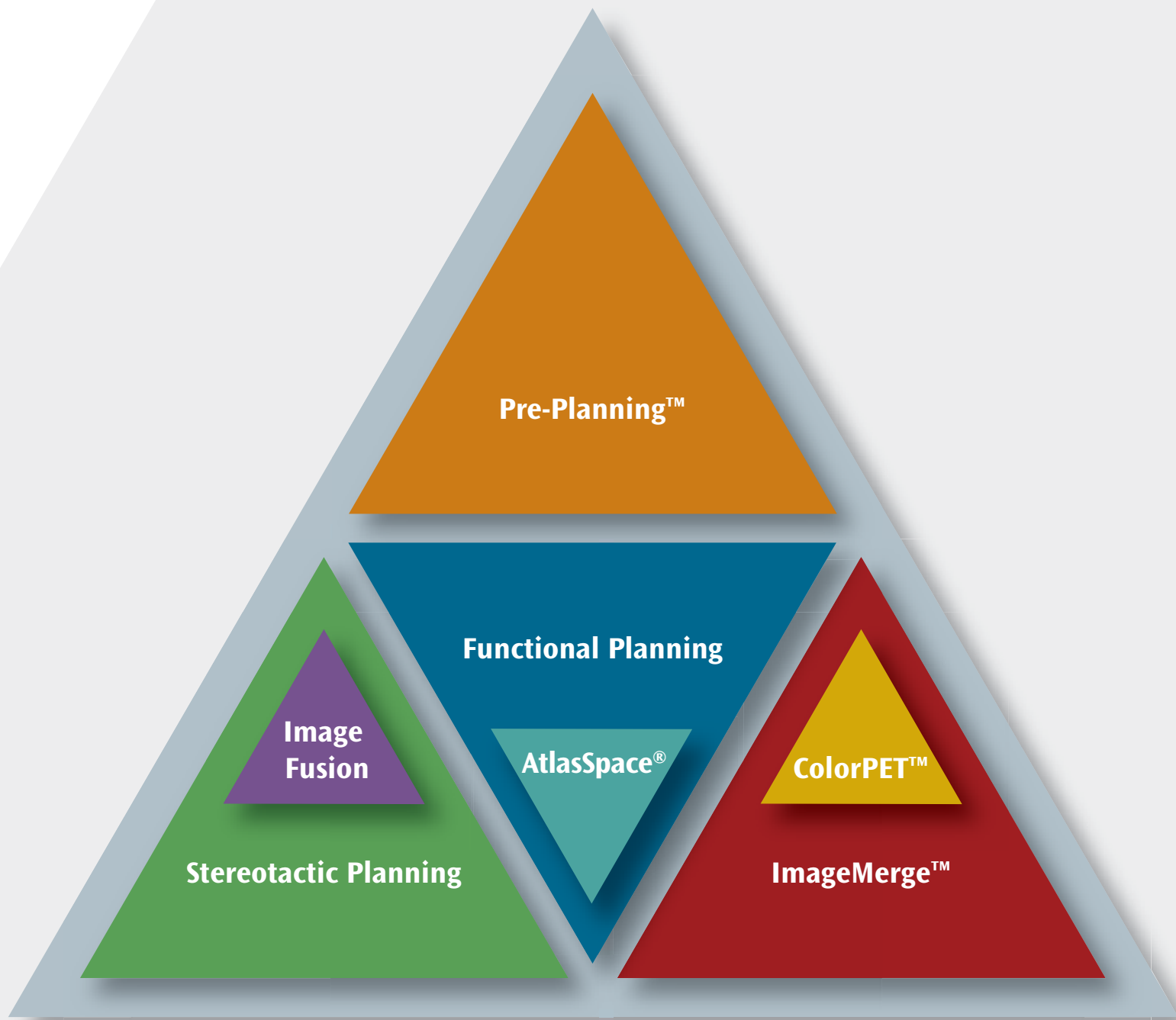
Mobility for greater efficiency

To promote flexibility further Leksell SurgiPlan is also available on a dedicated, high-end PC laptop for the neurosurgeon to use anytime and anywhere.

An excellent educational tool

Leksell SurgiPlan provides an excellent tool for educational purposes with its user-friendly graphical user interface and intuitive workflow.

Combine modules to meet your needs



Optimizing surgical approaches

Stereotactic Planning

Surgical paths can be planned and manipulated across different image views and studies with immediate visual feedback. The paths can also be seen along the probe's eye view or parallel with the probe.

All defined objects and paths can be displayed in different 3-D renderings, facilitating more complete planning validation.

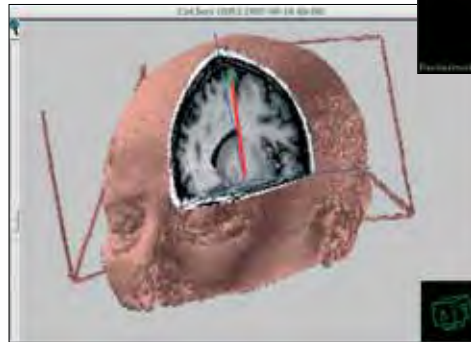
Once images are imported, they are automatically scaled by an optimization algorithm based on their dynamic range so that they will be displayed with the best possible contrast and brightness.

Stereotactic Planning supports MR, CT and angio images.

When measuring lengths, millimeter scales are directly displayed in the images.



Path planning.



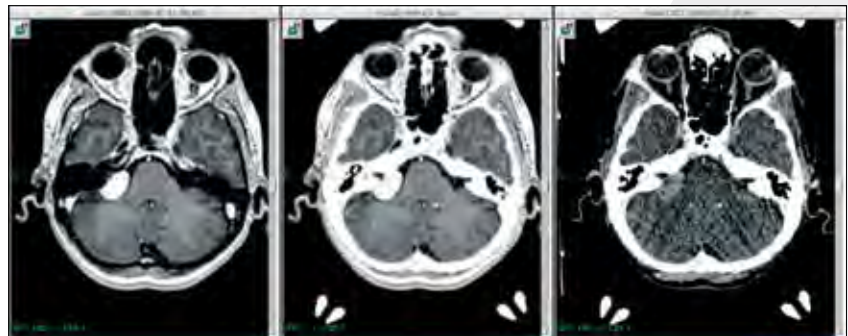
3-D rendering.

Enhancing target definition

Image Fusion

Image Fusion enhances the definition of the target by enabling two frame-based image studies of different modalities to be blended.

The fused images have the same high accuracy as the original images, since both image studies are defined in Leksell® stereotactic space by Leksell Coordinate Frame.



Interactive image fusion of CT and MR images.

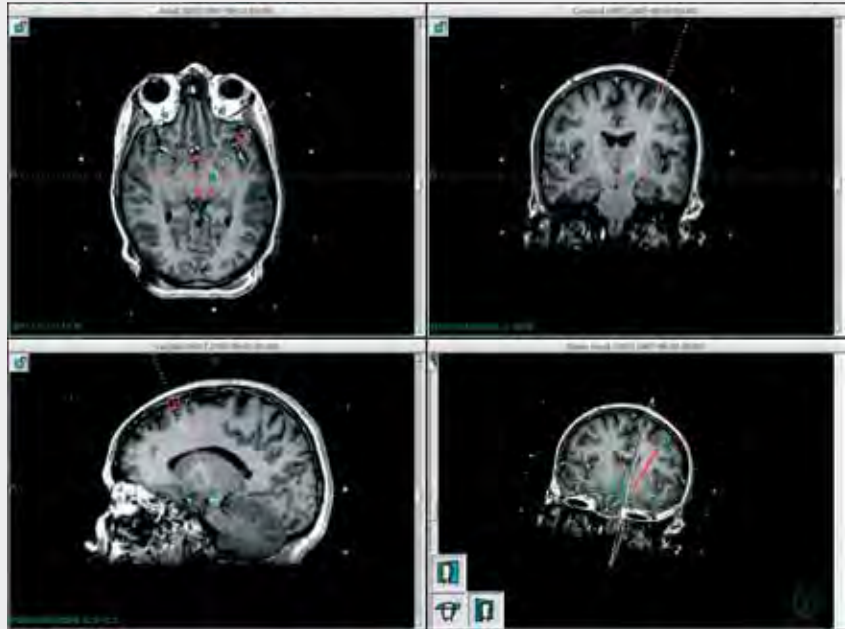
Designed for functional neurosurgery

Functional Planning

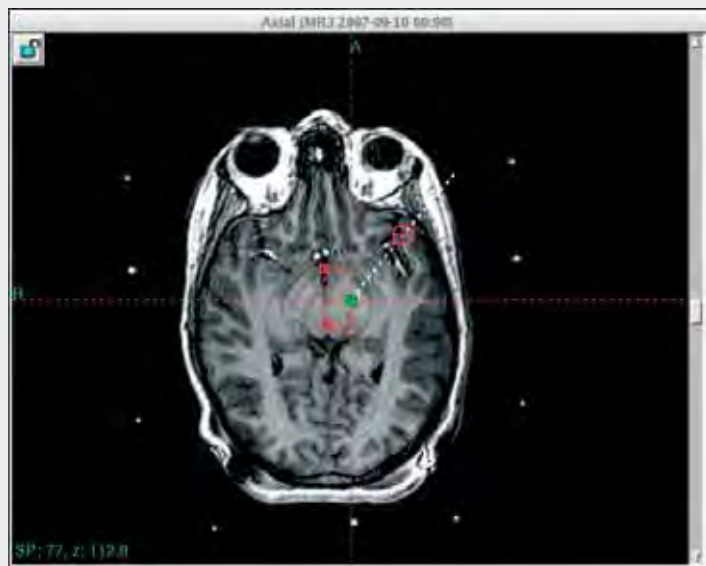
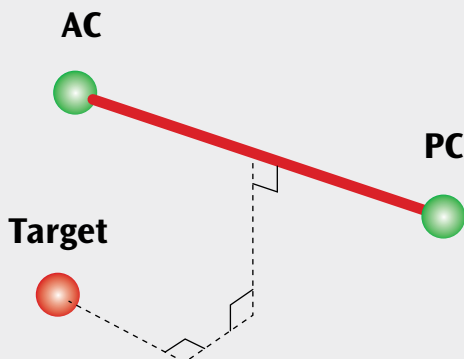
Leksell SurgiPlan® offers dedicated capabilities for functional procedures, facilitating improved clinical outcomes. The AC-PC line can easily be defined whether or not it lies within a single image plane.

The patient's images can then be realigned with the AC-PC line so they are truly axial, coronal and sagittal, making them easier to reference with different brain atlases. This feature also facilitates the process of frame attachment, since perfect frame alignment with the AC-PC line is no longer necessary.

Functional targets can be localized using formulas based on distances from the AC-PC line, which automatically then provide the corresponding stereotactic coordinates.



Simple and intuitive user interface allows direct manipulation in images and simultaneous display of different modalities and orientations.



Close-up of axial view showing AC-PC line and path.

Navigate with confidence

AtlasSpace

AtlasSpace® is intended for use when performing functional procedures. Based on the three original series of the Schaltenbrand & Wahren* atlas it offers a combination of sophisticated 3-D matching, overlay of atlas contours on patient images, and interactive selection of displayed atlas contours. It increases confidence and ease of use by facilitating interpretation of patient images and identification of correct targets.

Fast and flexible matching in 3 dimensions

AtlasSpace overlays the atlas contours from the Schaltenbrand & Wahren atlas directly on the patient's images. It matches the data in three dimensions by using the Talairach proportional grid, which uses eight anatomical landmarks.

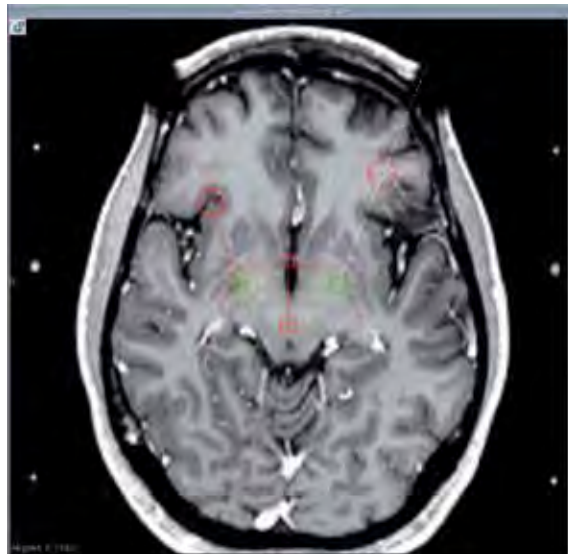
The atlas contours can also be well matched in all dimensions to non-symmetrical brains. Once a target area is selected the matching can be further refined using local anatomical landmarks.

Accurate identification with interactive and customized atlas contours

The atlas contours can be turned on or off individually. Groups of user selected contours can be defined so that only the relevant structures for different procedures are displayed, according to the individual surgeon's preferences.



Workspace showing paths, entry points and targets in treatment plan.



Close-up of axial view showing atlas contours.

These customized sets of structures can also be easily saved for future use by using the mini menu inserted on screen

The atlas contours are interactively labeled, and by placing the

cursor on a displayed contour, the name of the contour is revealed. Neighboring contours always have different colors.

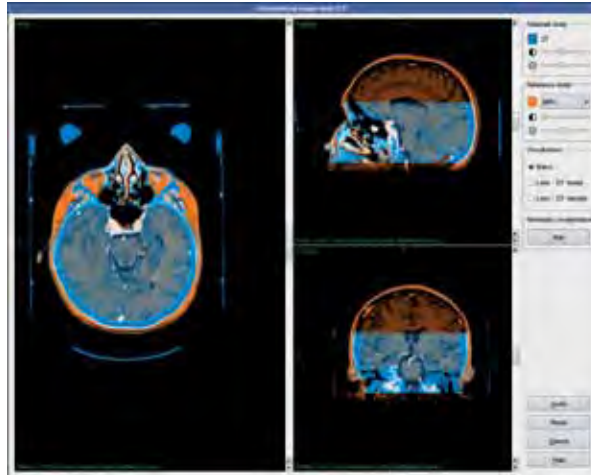
*© George Thieme Verlag, Stuttgart/New York

Completing the picture

ImageMerge

ImageMerge™ facilitates better interpretation by enabling the co-registration of additional frameless image studies. One image study scanned with Leksell® Coordinate Frame can thus be matched with any other image study when the use of previously scanned images is desired.

ImageMerge supports both MR and CT images, and PET images (with the optional ColorPET™ module).



Co-registration of frameless and frame-based image studies.

Better interpretation with additional image modalities

Merging CT and MR image studies provides high quality images of bone structures and excellent definition of tissue. When using PET images physiological data may be added to further increase the information of the presented images.

Automatic co-registration

The fully automatic option is both fast and highly accurate, with no need to define any anatomical landmarks. As part of the automatic co-registration a movable lens is displayed in both images in order to facilitate checking the accuracy of the result.

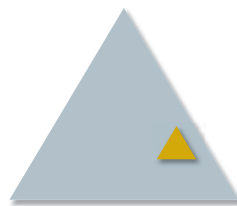
When the co-registration is completed the image studies are displayed in axial, sagittal and coronal directions to further help verify the result. Where the images do not have enough mutual information, manual co-registration is also available.

Promoting flexibility

ImageMerge facilitates scheduling with regard to MR scanning since it allows images to be scanned in advance of the day of surgery. This feature also enhances convenience and comfort for the patient.

Improved follow-up

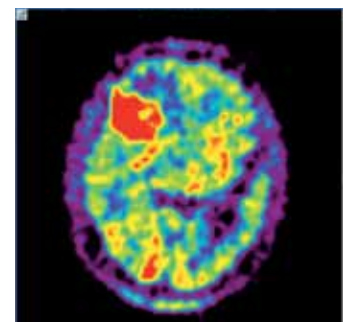
For comprehensive evaluation ImageMerge enables not only pre-operative images but also post-operative images to be easily aligned with the image studies used for the surgery.



Adding information

ColorPET

The ColorPET module for ImageMerge allows importation as well as visualization of color coded PET image studies. The user can combine the physiological data of PET images with the anatomical data provided by CT and MR images.



Color coded PET image.

Increased flexibility in planning

Pre-Planning

The Pre-Planning™ module increases flexibility and saves time as well as resources considerably by allowing the neurosurgeon to plan procedures days ahead of the surgery, and to base decisions on frameless images.

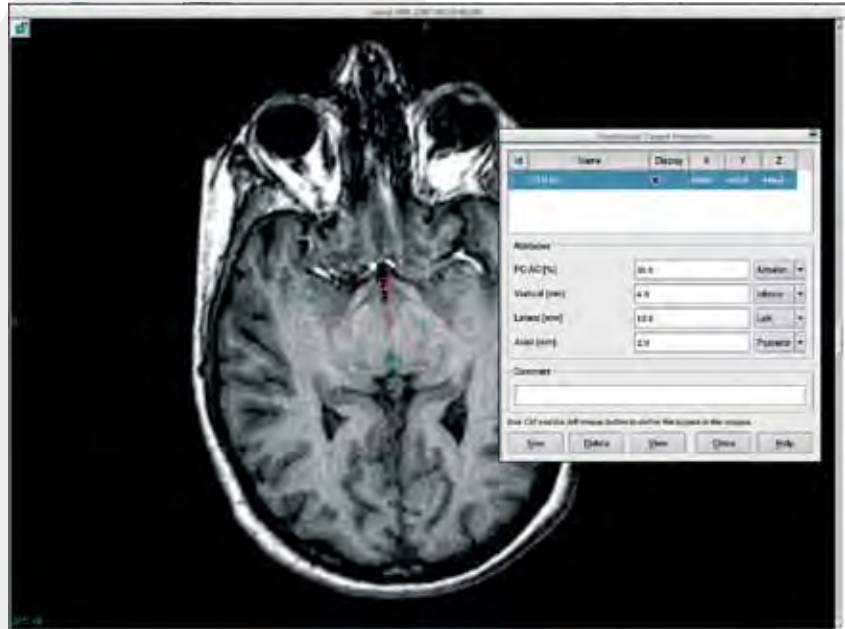
All that is required on the day of the surgery is a CT registration scan with the frame. It is then possible to import the draft plan and co-register it using ImageMerge™. All the treatment data (such as AC-PC line, targets, paths and measurements) created in the draft plan are included and transformed into Leksell® coordinates.

By supporting the use of frameless images and allowing planning to be based on these, the Pre-Planning module increases the freedom-of-choice for the neurosurgeon and facilitates more efficient scheduling. This module requires ImageMerge.

More effective follow-up and additional treatment

The Pre-Planning module enables the use of frameless images when evaluating the results of treatment on follow-up images, which can be merged with the original treatment plan. Should additional surgical procedures be necessary, a previous treatment plan can be imported and can serve as input when planning the next treatment.

Optimizing the use of existing image studies and plans in this way also enhances cost-efficiency.



Target planning on frameless images.



Path definition on frameless images.

Improved patient comfort

For the patient, the combination of being able to plan before the day of surgery and the ability

to use previously taken images, means greater patient comfort.



Summary

Stereotactic planning

- Graphical user interface is designed for ease-of-use, optimized for image display on screen and provides updates in real time.
- Software is compatible with CT, MR and angiographic images.
- Advanced 3-D rendering helps visualize patient data and planning.
- Targets can be easily defined with the semi-automatic outline function, which also allows for complex non-continuous regions.
- Alternative approaches and multiple paths can be easily simulated and evaluated, and can be simultaneously displayed on all open image studies and reconstructions.
- Paths can also be seen either along the probe's eye view or parallel to the probe.
- The stereotactic coordinates for any selected point or path are determined and displayed. Lengths can be measured using mm scales displayed directly in the images.
- Planned parameters are summarized in a treatment protocol together with patient data and a wire frame skull display.

Image fusion

- For blending two stereotactic image studies of different modalities.
- Handles CT, MR and PET images.
- The same accuracy as the original image studies.

Functional planning

- The AC-PC line can be defined in 3-D space, whether or not it is localized within a single image.
- All images can be aligned to AC-PC line.
- Localization of functional targets by using AC-PC line-based formulas.
- Automatically provided stereotactic coordinates for functional targets.

AtlasSpace®

- Axial, coronal and sagittal views based on the three original micro series of the Schaltenbrand & Wahren atlas for Stereotaxy of the Human Brain. Extended to cover both hemispheres and mutually co-registered.
- Matching atlas and patient data by using the 3-D Talairach proportional grid with anatomical landmarks.
- Matching can be refined by using local landmarks.
- Atlas contours overlaid on patient's images.
- Interactive labeling of atlas contours. Name of structure automatically shown.
- The user can select relevant atlas contours.

ImageMerge™

- Facilitates pre-operative planning and post-operative follow-up by co-registering image studies from CT, MR and PET scanners.
- Only one registration image study with Leksell® Coordinate Frame is needed.
- Provides both automatic and manual alignment of images.
- Automatic co-registration based on mutual information.
- Visual verification of a co-registration result with movable lens tool.

ColorPET™

- Optional module for co-registration of PET image studies.
- Visualization of color coded PET images, with user-defined as well as sample color maps.

Pre-Planning™

- Allows complete pre-operative planning based on frameless images. A co-registration with a frame-based image study is then done using ImageMerge on the day of surgery.
- Follow-up – allows evaluation of results of treatment at different points in time using frameless images. All data from the treatment examination is imported.
- Additional treatment – previous treatment plan can be imported and used as input to the planning of the additional treatment.

...adapted to the task

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