The New Frontier in Hip Preservation
Preoperative CT-based Planning for FAI correction

“DYONICS PLAN will substantially raise the bar on the standard of what can be accomplished in patients with symptomatic FAI.”

J.W. Thomas Byrd, MD
A new era in assessing hip impingement treatment options.

The DYONICS™ PLAN Hip Impingement Planning System is a CT-based 3D software tool that provides you with a standardized and repeatable way of visualizing, assessing and treating femoroacetabular impingement (FAI), in conjunction with clinical findings and CT images.

Installed on a personal computer, DYONICS PLAN identifies areas and degree of hip impingement between the pelvis and femur, automates measurements and provides you with range-of-motion (ROM) simulations that allow the development of a pre-surgical resection plan based on a patient’s unique morphology.

Pre-surgical planning with DYONICS PLAN includes:

- 3D models of the femur and pelvis
- Characterization of pathologic bony lesions
- Resection planning and simulation tools
- Automated anatomic measurements such as percent femoral head coverage
- Dynamic range-of-motion (ROM) analysis to identify location and degree of impingement for patient-specific motions, and confirmation of impingement-free ROM
- Virtual X-ray and fluoroscopy, including the view and position where the maximum alpha angle occurs
- Comprehensive output reports exported to PDF or HTML
The resection plan identifies the area to be resected and its depth with the green topographical color map.

DYONICS PLAN automatically identifies key anatomic landmarks such as the center of the femoral head (shown here) and pelvic tilt (not shown).

“DYONICS PLAN can help to avoid pitfalls of radiographs due to differences in pelvic tilt, as pelvic tilt has an effect on acetabular version, cross-over sign, and ROM.”

Asheesh Bedi, MD

DYONICS PLAN provides you with the tools you need to know where to resect, and how much.

Femoral resection plan

After DYONICS PLAN has automatically rendered the 3D models, it generates a default femoral resection plan based on alpha angles around the clock face.

The alpha angle – which has been associated with preoperative FAI symptoms and lesion size – is calculated at each position around the clock face, giving you a more comprehensive understanding of CAM deformity than two-dimensional radiographs or three-dimensional CT scans alone can provide, improving the preoperative characterization of CAM morphology.

The resection plan identifies the area to be resected and its depth with the green topographical color map.

The plan can be changed by dragging the circles on the CT slice view, allowing you to modify the shape and extent of the resection around the clock face.

The preoperative plan begins when you load the system with a CT exam

The CT scans are based on a low-dose protocol, in which the amount of radiation dose is 50% less than a standard CT protocol.

Landmarks set the baseline for planning

A default estimate is made for each step of the analysis, but allows interactive adjustments of the parameters and landmarks based on your clinical judgment.

For example, pelvic tilt can be corrected if the patient was misaligned during the CT scan acquisition.

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Acetabular resection plan

DYONICS® PLAN lets you plan acetabular resection for the correction of pincer impingement in two ways: plan the resection of acetabular over-coverage using normative data based on the 3D coverage of 400 normal hips; or, plan the resection of impingement areas based on a dynamic ROM assessment.

Automated measures appear on the acetabulum planning screen, including the center edge angle (shown here), cross over sign and axial version.

Automated measures also include acetabular coverage of the femoral head in different views, which is shown relative to a group of 400 normative asymptomatic hips. The white line indicates the mean, and the grey bar is plus or minus one standard deviation.

The green topographical color map indicates zones identified by DYONICS PLAN for corrective resection.

Virtual Fluoroscopy and X-ray

DYONICS PLAN includes a virtual fluoroscopy and X-ray feature which allows you to place the hip in position for standard radiographic views and for optimal visualization of the maximum alpha angle intra-operatively. The availability of virtual radiographic images may reduce the need to order additional X-rays and expose the patient to more radiation.

Displaying the virtual fluoroscopy where the maximum alpha angle occurs can facilitate recreating the same view intra-operatively. This can be exported to the output report, providing you with the patient position and a template to compare the shape of the planned resection with the X-ray views obtained intra-operatively.
Dynamic ROM analysis of the hip joint identifies areas of conflict on the femur and pelvis, including subspine impingement⁶

The degree and location of hip impingement can be identified by putting the femur through dynamic ROM simulations, performed manually or automatically through predefined or custom motion patterns. This feature can also be used to individualize a patient’s resection plan based on a sports-specific motion, and to assess different resection strategies such as cam-only correction.

In addition, motion simulations using the planned correction can be performed to confirm an impingement-free ROM.

In the dynamic range-of-motion (ROM) analysis, areas of hip impingement are displayed in blue. You can perform a ROM simulation based on the patient’s original morphology (top row), and the resection plan (bottom row). Surgeons have found the simulations are especially helpful in recognizing areas of conflict that are unexpected.

“DYONICS PLAN™ is an exceptional teaching tool to help learn the blind spots on the CT scan.”
J.W. Thomas Byrd, MD

“DYONICS PLAN™ can be used to determine virtual ROM with specific activities and the anticipated improvement in this motion with different surgical corrections to individualize the surgical plan to the patient’s needs.”
Christopher Larson, MD
Customized output report in PDF or HTML format.

DYONICS™ PLAN provides a comprehensive output report that can be customized with a variety of different measures and views from the planning steps. This includes the resection depth at each clock position based on your resection plan and the virtual fluoroscopy view and position where the maximum alpha angle occurs.

Since the output reports can be exported into PDF format, they can be viewed on any device that supports Adobe Reader®, including tablets, mobile devices and Mac® computers.

“Performing impingement surgery in the hip without the plan [DYONICS PLAN] is analogous to putting in a total knee without jigs. The plan [DYONICS PLAN] takes the guesswork out of every case.”

Bryan Kelly, MD

PLAN Ahead. The revolutionary way to visualize FAI and develop a patient-specific preoperative plan to correct it.

DYONICS PLAN allows the ability to understand impingement on a deeper level than what is possible with the standard imaging tools available today, providing a more complete solution for FAI identification and correction planning.
Articulate your plan to patients, and differentiate your practice.

The unique assessment and planning capabilities of DYONICS™ PLAN can be an important differentiator for your practice. And because DYONICS PLAN tells a more complete story than standard radiologic images or CT images, it provides a uniquely visual communication tool for patient education. The clear, 3D anatomical depictions and ROM simulations are indispensable in explaining hip impingement as well as the corresponding resection plan to correct FAI.

**System Requirements**: DYONICS PLAN requires a powerful graphics card (see specifications below for Dell and HP mobile workstations) to complete the three-dimensional rendering of the CT scans, and to complete the resection plan.

**Dell Precision M4600 Laptop Workstation**
- Processor Unit: Intel Core i7 2600M, 2.5GHz, 8MB, Quad Core
- RAM: 8GB
- Screen: 1920x1080 resolution
- Hard drive: 500GB, 7200RPM
- Graphics Card: NVIDIA Quadro 2000M
- Operating System: Windows® 7 Professional, 64 bit or Windows 8 Professional, 64 bit
- 2 USB 2.0 or 3.0 ports
- DVD-ROM Drive
- Ethernet port and/or Wi-Fi certified with connectivity
- Keyboard
- Mouse with three buttons and a scroll wheel

**HP ZBook 15 (Product ID F2P53UT#ABA)**
- Processor Unit: Intel Core i7-4700MQ 2.4GHz, 2.4GHz, 6MB, Quad Core
- RAM: 8GB
- Screen: 1920x1080 resolution
- Hard drive: 500GB, 7200RPM
- Graphics Card: NVIDIA Quadro K1100M, 2GB
- Operating System: Windows 7 Professional, 64 bit
- 4 USB 2.0 or 3.0 ports
- DVD-ROM Drive
- Ethernet port and/or Wi-Fi certified with connectivity
- Keyboard
- Mouse with three buttons and a scroll wheel

**Minimum PC Requirements**
- Processor Unit: 1.73 GHz, 8 MB, Quad Core
- RAM: 4 GB
- Screen: 1920 x 1080 Resolution
- Hard Drive: 500 GB
- Graphics Card: 1 GB NVIDIA Quadro FX 1800 M, 45 W
- Operating System: Windows 7, 64-bit

Visit dyonicsplan.com for system requirements and ordering information.

Note: At this time, DYONICS PLAN is not compatible with Apple Macintosh® computers.

See how DYONICS® PLAN can help you develop patient-specific preoperative plans for FAI correction.

- Visit dyonicsplan.com for system requirements and ordering information
- Call Customer Service at +1 800 343 5717
- Email US: quotesandpricing.endoscopy@smith-nephew.com
- For countries outside the US, email: endo-DL_INTL_CS@smith-nephew.com

To get started with DYONICS PLAN, begin using the low-dose CT protocol and choose the software license that's right for you. Licenses are available based on number of cases, or length of time. Once you make your purchase, you can download, install and start using DYONICS PLAN.

*Unlimited number of users

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