

Advances in Cardiac Arrhythmias and Great Innovations in Cardiology

A novel three-dimensional catheter tracking system (Mediguide): Current and future applications

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Agenda

- Role of 3D mapping in interventional EP
- Limitations of current catheter navigation
- Introduction of the gMPS technology (MediGuide)
- Potential fields in clinical interventional EP
- Future applications

Interventional EP – the picture is changing

- diagnosis and therapy (ablation) of tachycardic arrhythmias

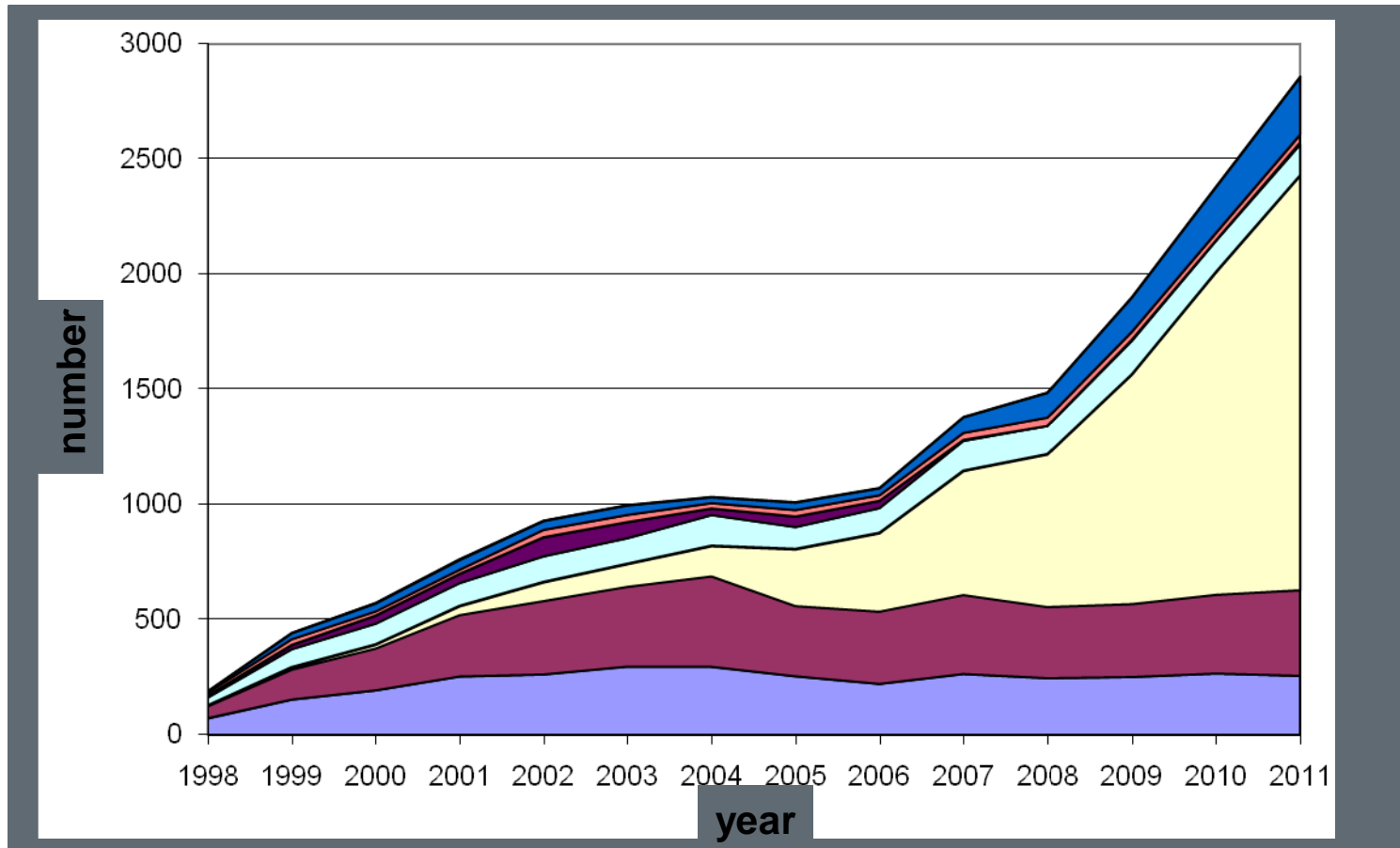
- ablation of „simple“ arrhythmias

- AVNRT, typical atrial flutter, accessory pathway

- ablation of „complex“ arrhythmias

- AF, atypical atrial flutter, VT

Indications for catheter ablation @ Heart Center Leipzig



VT

EAT

AVN

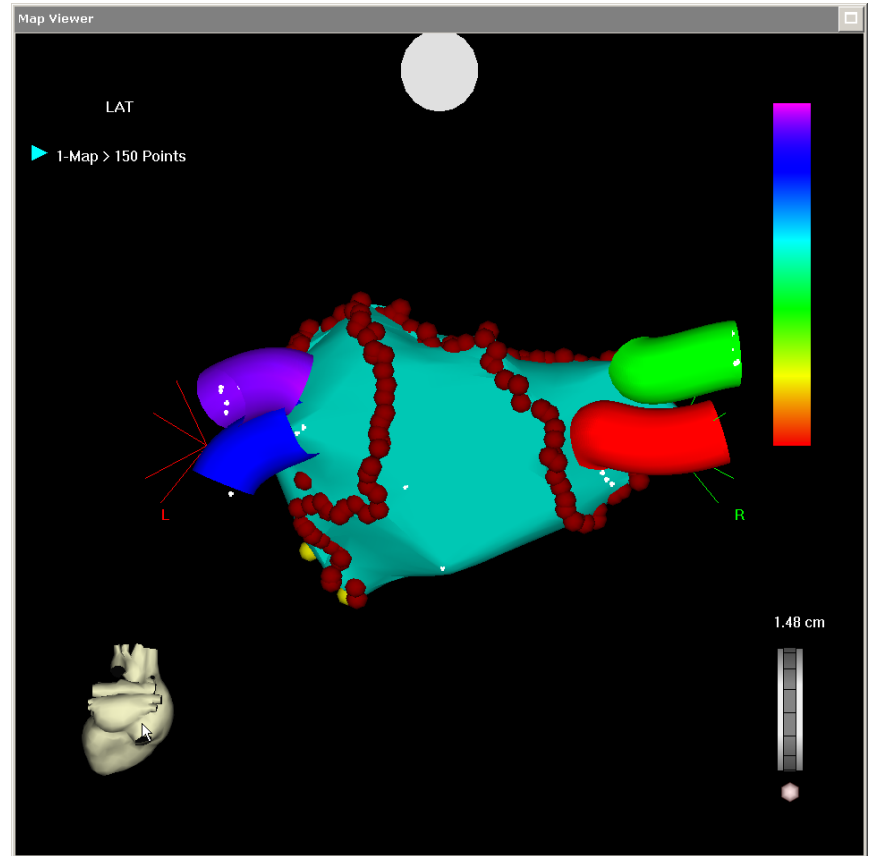
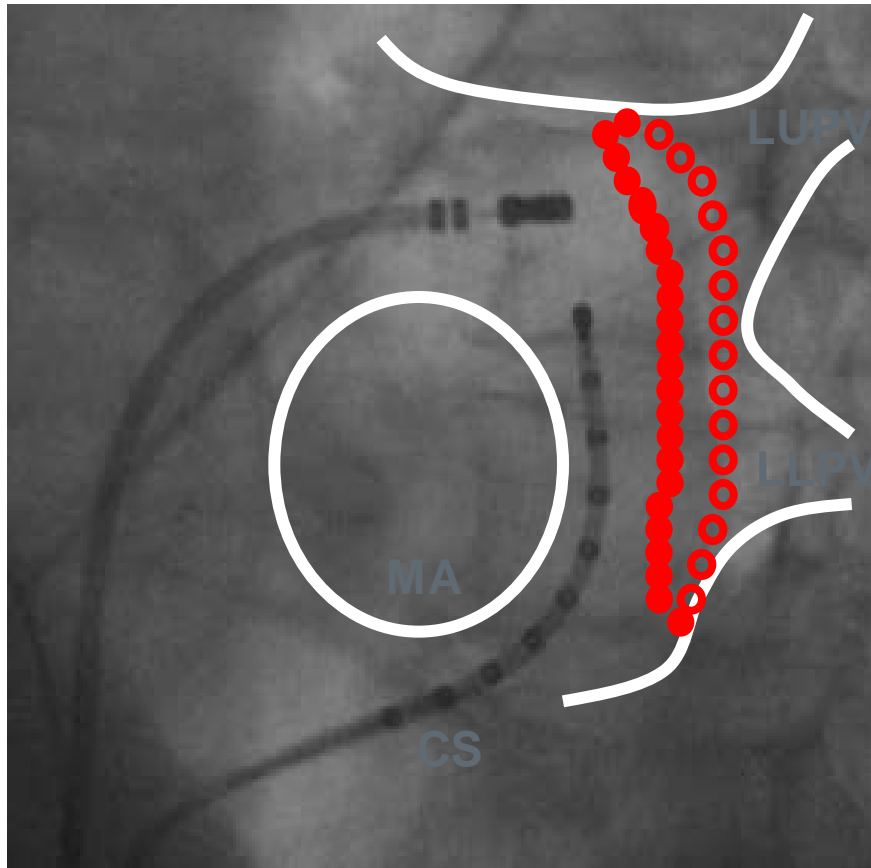
AVRT

AF

A-Fla

AVNRT

Role of 3D mapping systems in interventional EP



AF ablation: Relevance of individual 3D anatomy

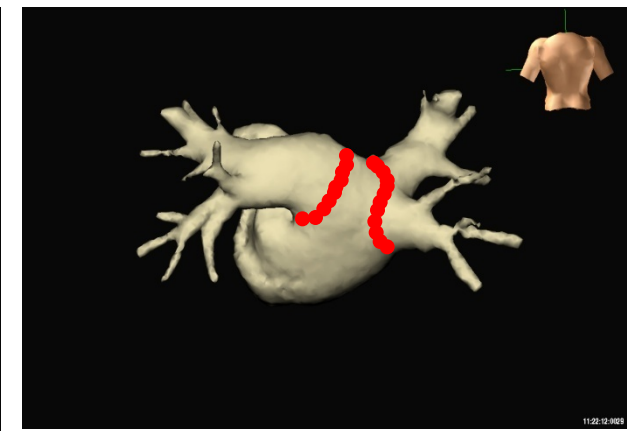
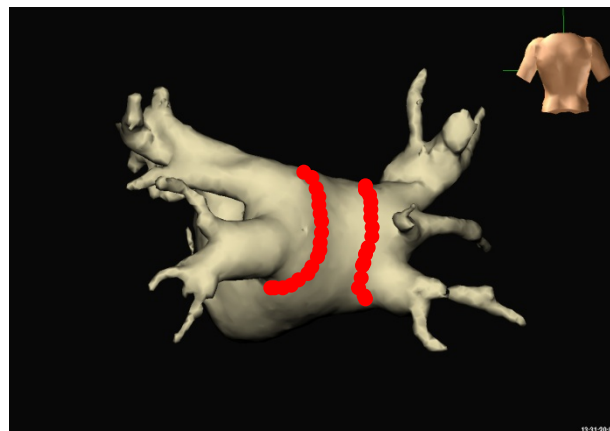
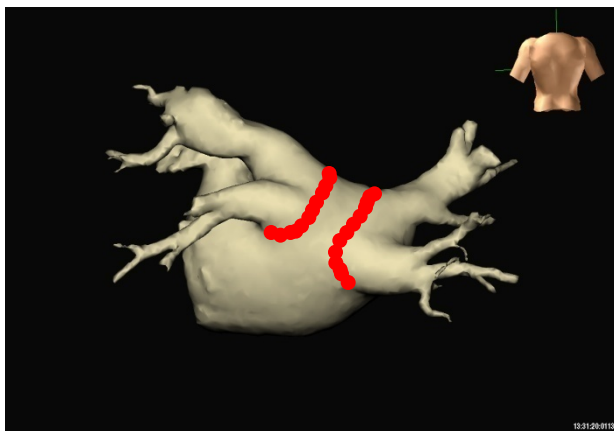
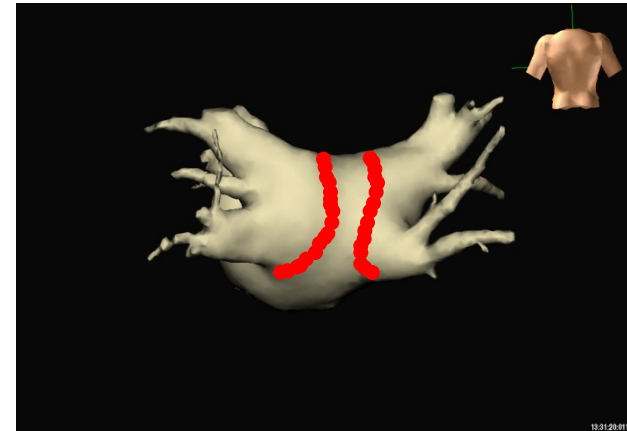
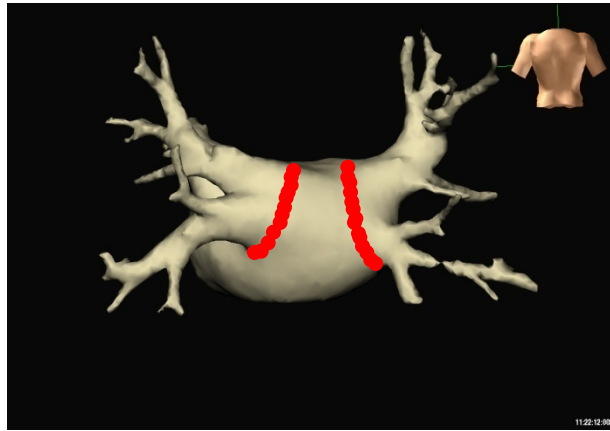
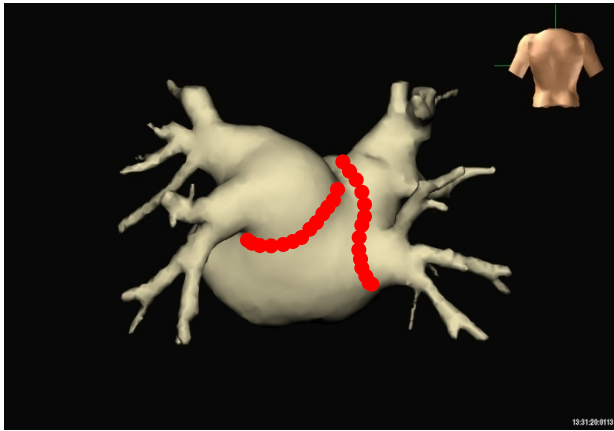
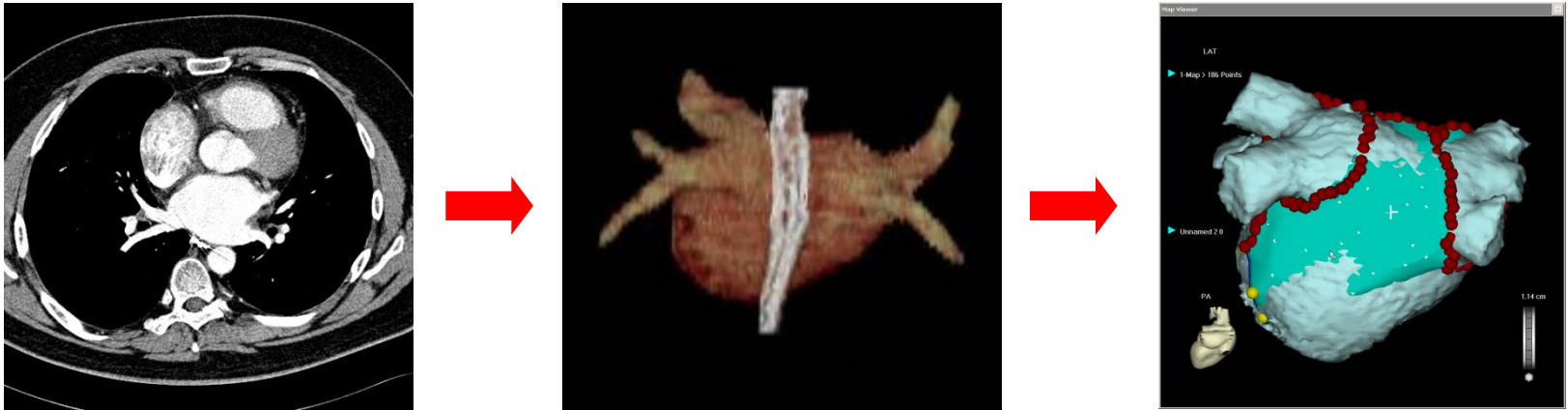


Image integration into 3D mapping systems



- **clinical data on image integration are contradictory**
- **limitations are mainly registration difficulties due to**
 - **cardiac and respiratory motion**
 - **lack of adequate ‘landmarks’ (aorta?, CS?, LA points?)**
 - **inaccuracies of the electroanatomical LA reconstruction**

Limitations of current 3D catheter navigation

Moving mapping and ablation targets due to

- cardiac and respiratory motion

Static map/image with moving catheters results in

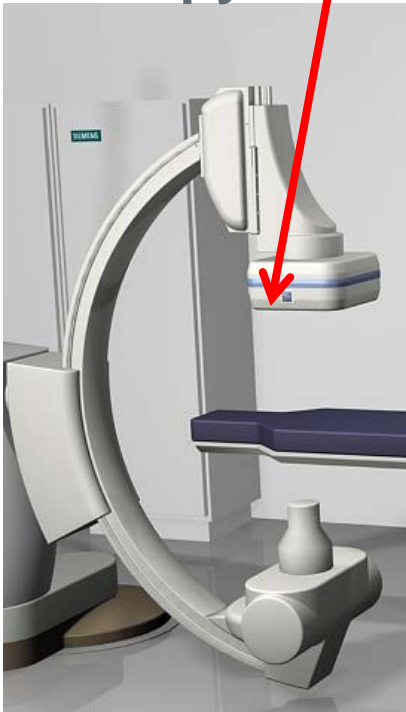
- misleading catheter positions and loss of 3D accuracy

Inherent mapping inaccuracies and limitations of 3D reconstruction

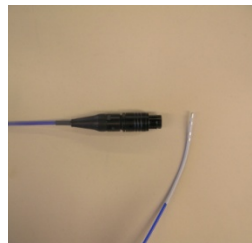
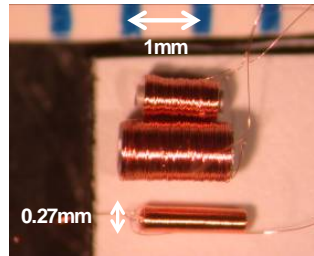
Result: Impact on procedure duration, fluoroscopy, efficacy, complications

The gMPS technology (Mediguide)

3D electromagnetic field
integrated into the
fluoroscopy detector



miniaturized sensor
technology



integration with
3D cardiac mapping
system (NavX)

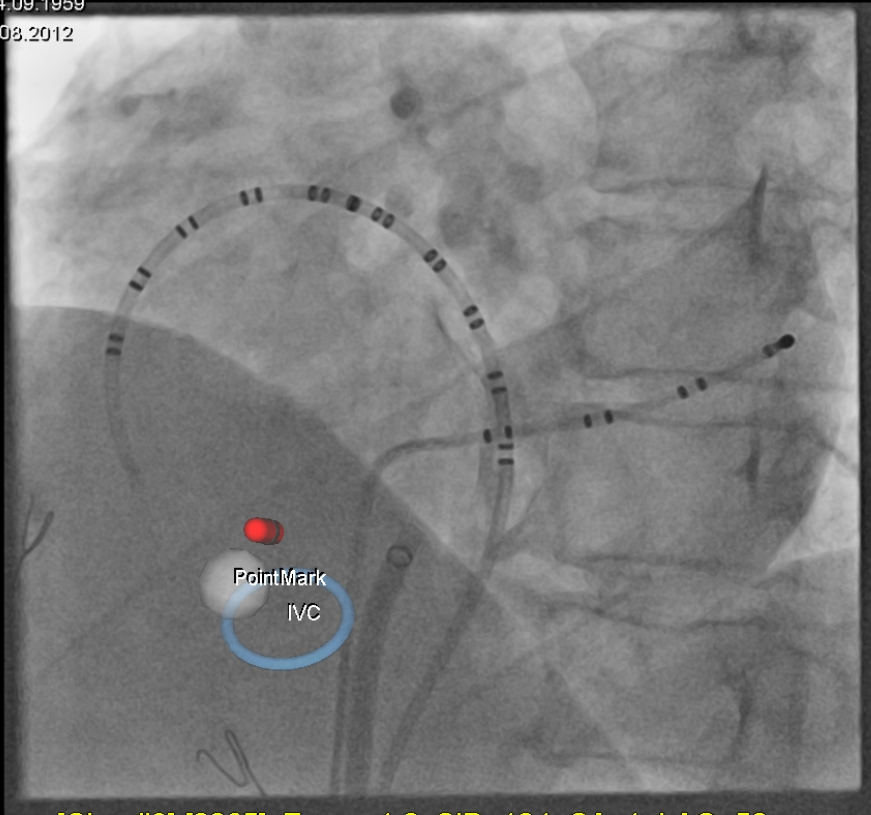


Clinical Experience with the Mediguide System (Elisabethinen Hospital Linz/October 2012)

- n=87 procedures using MediGuide
- 30 procedures including ablation catheter (Safire Duo MG, Cool Path Duo MB)
 - 19 Atrial Fibrillation
 - 5 VTs
 - 4 Atrial Flutter
 - 2 WPW

Atrial Flutter

* 04.09.1959
14.03.2012



Point Mark =
TV annulus

cm 25 [Cine #2] [0065] Zoom: 1.0 SID: 104 CA: 1 LAO: 50

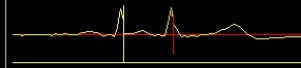
ST. JUDE MEDICAL

gABL-R@P-2:Valid

Motion Sensor: valid
Not Ready For Cineloop

noname1
surname

48 BPM



LVT - Geometry

The screenshot displays the 'Therapy' tab of an ablation mapping software. The main window shows a 3D anatomical model of a heart with a large, irregularly shaped ablation lesion in a light yellow color. The interface includes a top menu bar with 'File', 'Amplifier', 'HotKeys', and 'Help'. Below the menu is a toolbar with icons for 'Setup', 'Model', 'Mapping', 'Therapy', and 'Review'. The 'Therapy' tab is active, showing a 'Diameter(mm): 4' and a 'Projection' of 20. The main display area is labeled 'VT' and 'Review: Sep 04, 2012 08:12:40 AM'. A vertical scale on the right indicates a distance of 28 mm. A list of ablation points is visible on the right side, with columns for 'No.' and 'Time'. The 'Property' panel at the bottom right shows 'Color' set to yellow and 'Diameter' set to 4 mm. The 'Therapy Display' panel at the bottom left shows 'Show Lesion Text' checked. The status bar at the bottom indicates 'Segment 02: map' and '1:1' zoom.

File Amplifier HotKeys Help Sep 13, 2012 07:36:10 AM

File Amplifier HotKeys Help Sep 13, 2012 07:32:07 AM

Setup Model Mapping Therapy Review

ABL D Color Diameter(mm): 4 Projection 20 Lesion at EnGuide 3D Lesion at EnGuide -62 -69

VT Review: Sep 04, 2012 08:12:40 AM map

No map selected

28
0
-150

No.	Time
1	09:27:12.688
2	10:44:46.658
3	10:44:47.674
4	10:44:48.397
5	10:44:49.184
6	10:44:51.171
7	10:44:53.176
8	10:44:59.045
9	10:45:02.495
10	10:45:03.203
11	10:45:04.058
12	10:45:14.129
13	10:45:15.914
14	10:45:15.914
15	10:45:18.715
16	10:45:25.734
17	10:47:35.142
18	10:47:35.782
19	10:47:37.118
20	10:47:39.447
21	10:47:41.276
22	10:47:42.828
23	10:47:44.667
24	11:08:47.422
25	11:34:18.900

Respiration
300
200
100
0
-100
-200
-300%

Electrode spacing: | Distal | D - 2 | 2 - 3 | 3 - 4 |
Nominal (mm) 4.0 2.0 5.0 2.0
Measured (mm) 2.3 5.4 1.9

Proximity to EnSite surface:
-6.9 mm

ABL @ 1-2 PRS @ 1-2

Property
Visible
Color
Diameter 4
3D Lesion

Therapy Display
Show Lesion Text

Segment 02: map 1:1

RVOT

NavX Model



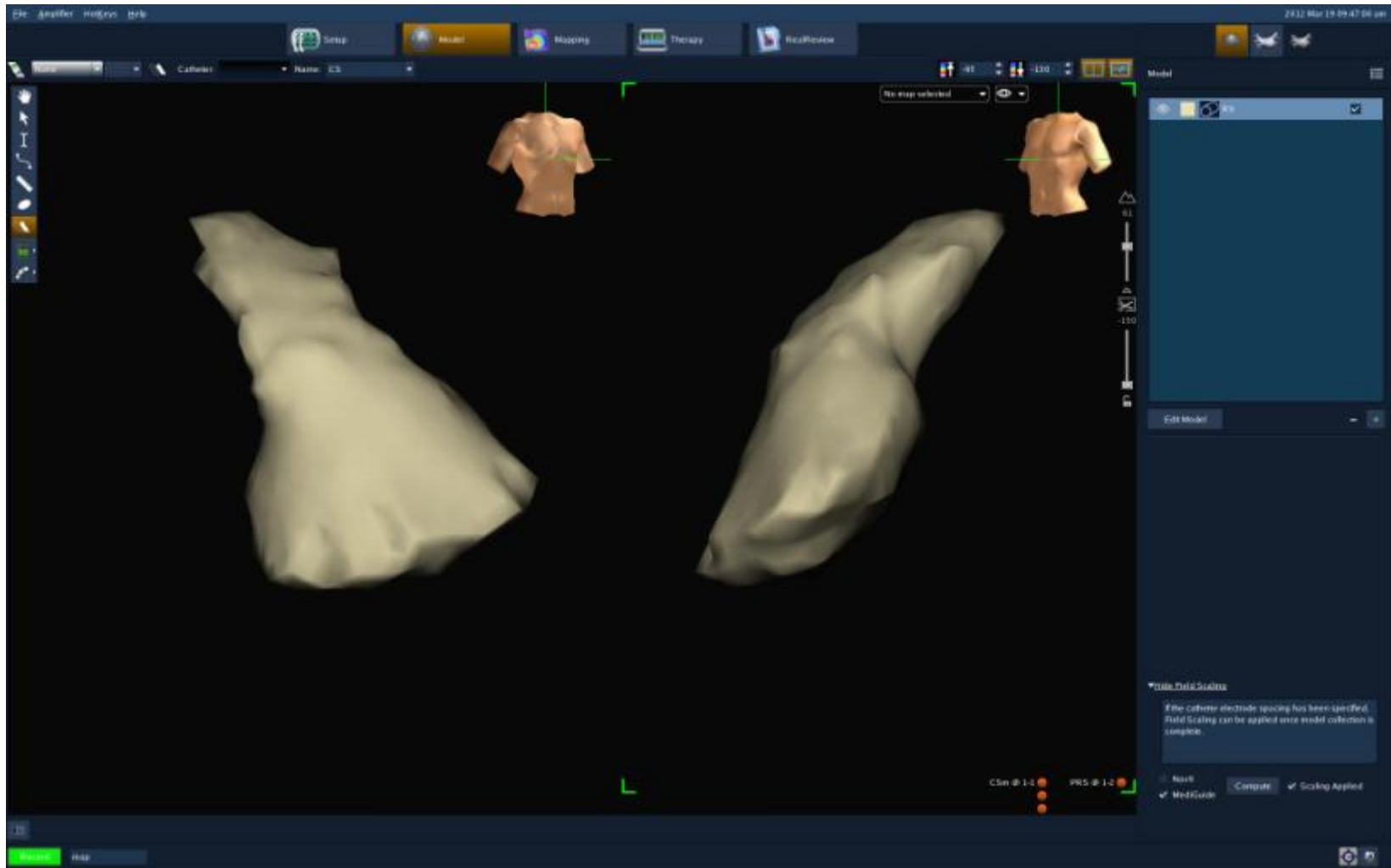
RVOT

MediGuide Model



RVOT

MediGuide Model



[RVOT Video 1](#)

[RVOT Video 2](#)

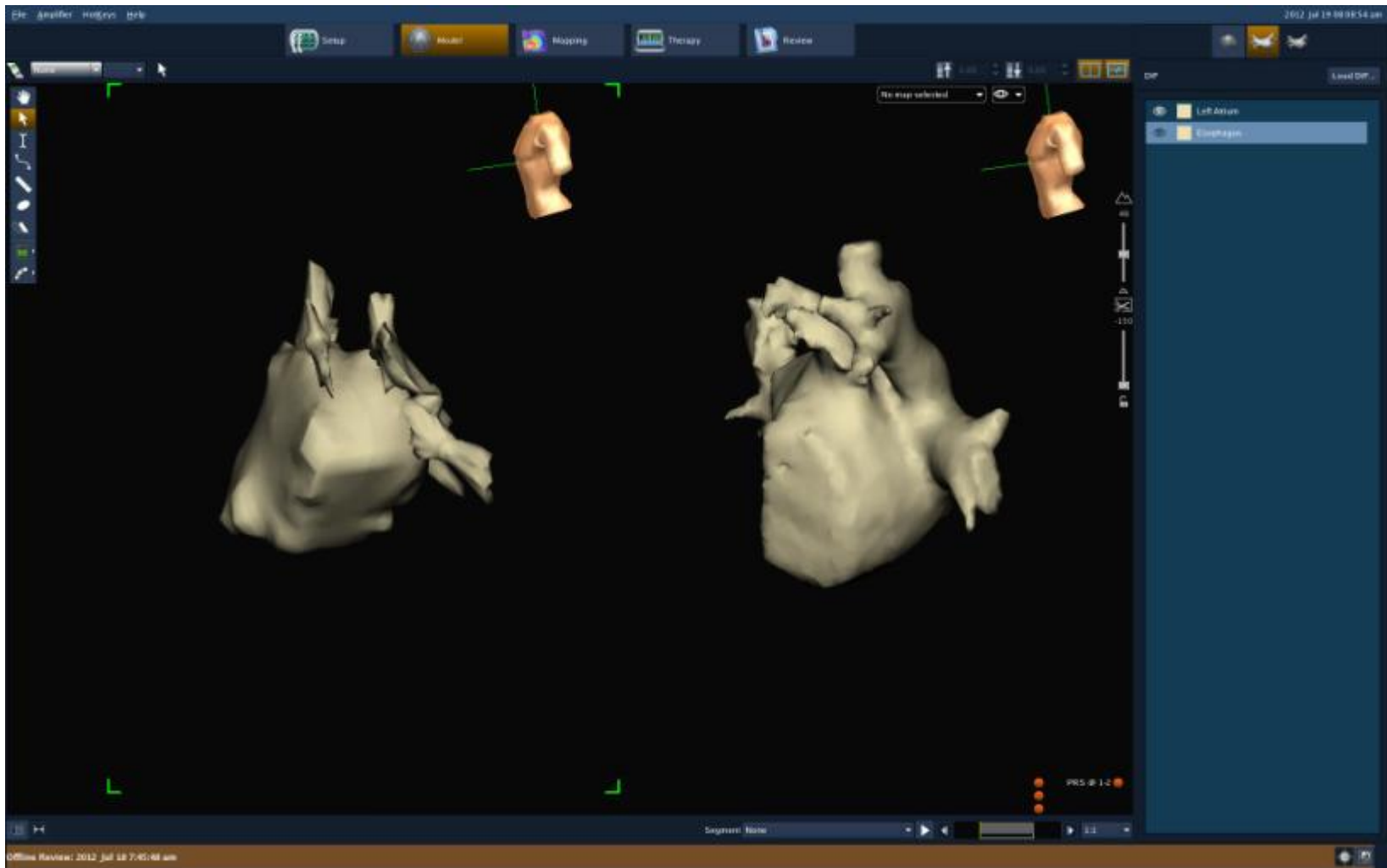
First AF Procedure
Safire Duo MediGuide enabled
July 2012

Model – Safire (1)



Model Points taken with Safire only

Model – Safire (2)



Model – Safire (3)

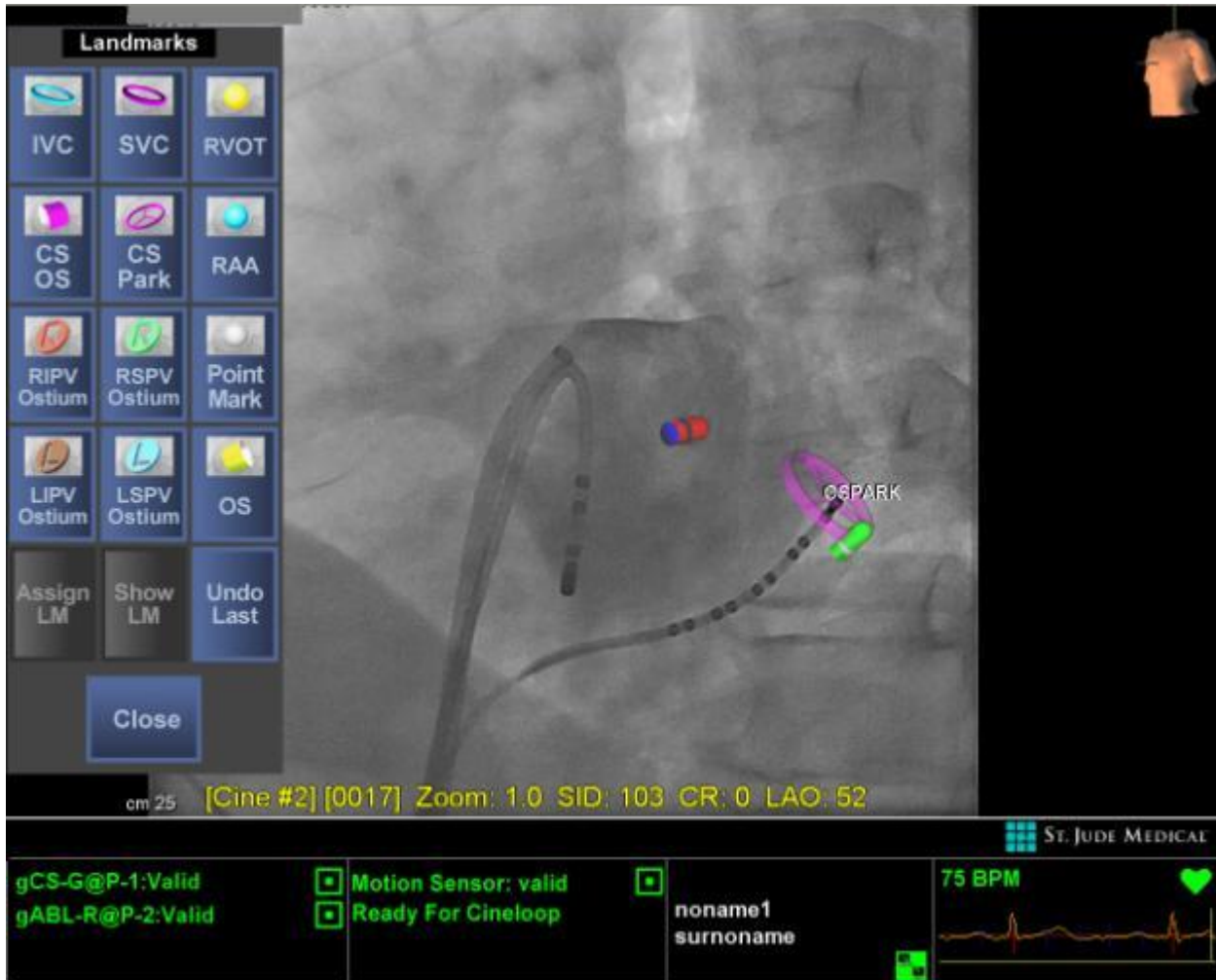


AF Procedure (1)



Atriography of left atrium in AP Projection – Contrast Agent applied through transseptal sheath

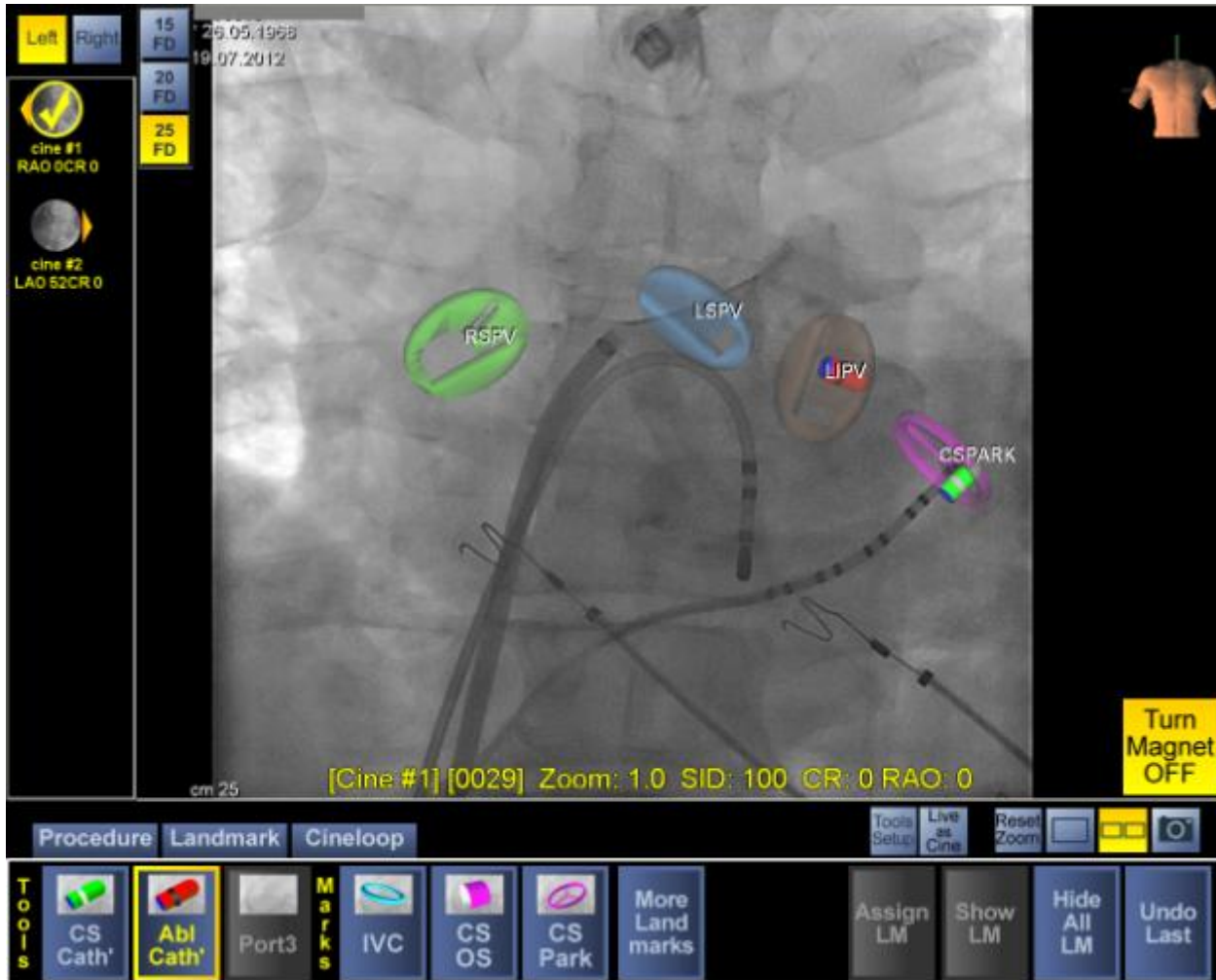
AF Procedure (2)



Atriography of
left atrium in
LAO projection

AF Video 1
AF Video 2

AF Procedure – Marker (1)



AF Procedure – Marker (2)

The screenshot displays a catheter ablation system interface. On the left is a 'Landmarks' menu with the following options:

- IVC, SVC, RVOT
- CS OS, CS Park, RAA
- RIPV Ostium, RSPV Ostium, Point Mark
- LIPV Ostium, LSPV Ostium, OS
- Assign LM, Show LM, Undo Last
- Close

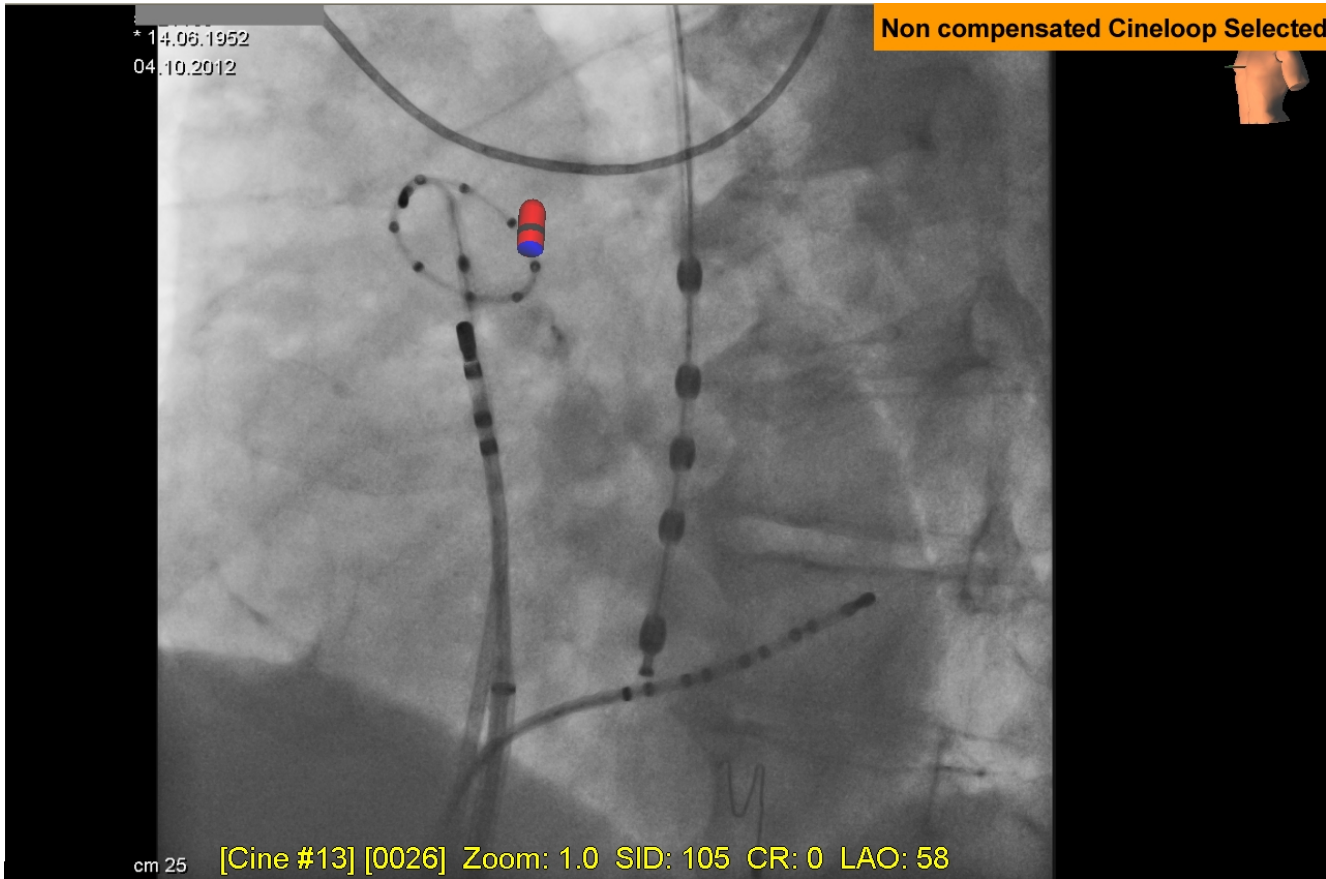
The central 3D map shows the heart with several catheters and landmarks labeled: RSPV (green circle), LSPV (blue line), LIPV (red line), and CSPARK (pink circle). A patient model is visible in the top right corner.

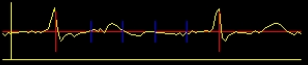
At the bottom of the map area, the text reads: cm 25 [Cine #2] [0007] Zoom: 1.0 SID: 103 CR: 0 LAO: 52

The bottom status bar includes the following information:

- gCS-G@P-1:Valid
- gABL-R@P-2:Valid
- Motion Sensor: valid
- Ready For CineLoop
- noname1 surnoname
- 73 BPM
- St. Jude Medical logo
- ECG waveform

Atrial Fibrillation



 ST. JUDE MEDICAL			
gABL-R@P-2:Valid	<input checked="" type="checkbox"/> Motion Sensor: valid Ready For Cineloop	<input checked="" type="checkbox"/> noname1 surnoname	79 BPM  

AF Procedure – Summary

- Procedure Duration: 155min
- Total Fluoro Time: 4,1min
 - Catheter Positioning: 0,6min (Biplane Mode)
 - Transseptal Puncture: 1,4min (Biplane Mode)
 - Geometry Creation: 0,7min
 - Ablation: 1,4min
- Total Dosage: 3631,1 μGym^2 (NTA Settings: 15F/s)

AFib Ablation – The Leipzig Experience

Table 2. Procedural Parameters and Follow-Up Data

	All Patients (n=98)	MGT Group (n=49)	Control Group (n=49)	<i>P</i> Value
Fluoroscopy time, min*	24 (16, 33)	16 (10, 23)	31 (25, 43)	<0.001
Irradiation dose, cGy*cm ²	10 835±7509	7363±5827	14 453±7403	<0.001
Procedural time, min	166±48	174±43	157±51	0.06
RF time, s	2067±1014	1900±799	2250±1191	0.19
RF pulses, n	34±21	31±16	38±25	0.16
Documented PVI	100%	100%	100%	1.00
AF/AT freedom at 6 mo (%)	67 (68%)	33 (67%)	34 (69%)	0.83

Summary

“Mediguide” is an electromagnetic sensor technology

unique features are:

- full integration with fluoroscopy
- miniaturized sensor technology

that allows:

- compensation of cardiac, respiratory and patient motion

potential clinical EP applications

- non-fluoroscopic 2D intracardiac catheter navigation
- enhancement of 3D mapping accuracy
- automatic image integration

Future Applications

MediGuide™ Technology Monitors and Software



MediGuide™ Technology Cardiology Platform

