

# Angioplastie coronaire

Assistée par robot.  
Premiers pas...



CENTRE  
CARDIO  
THORACIQUE  
DE MONACO

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# Occupational Health Hazards of Working in the Interventional Laboratory

## A Multisite Case Control Study of Physicians and Allied Staff

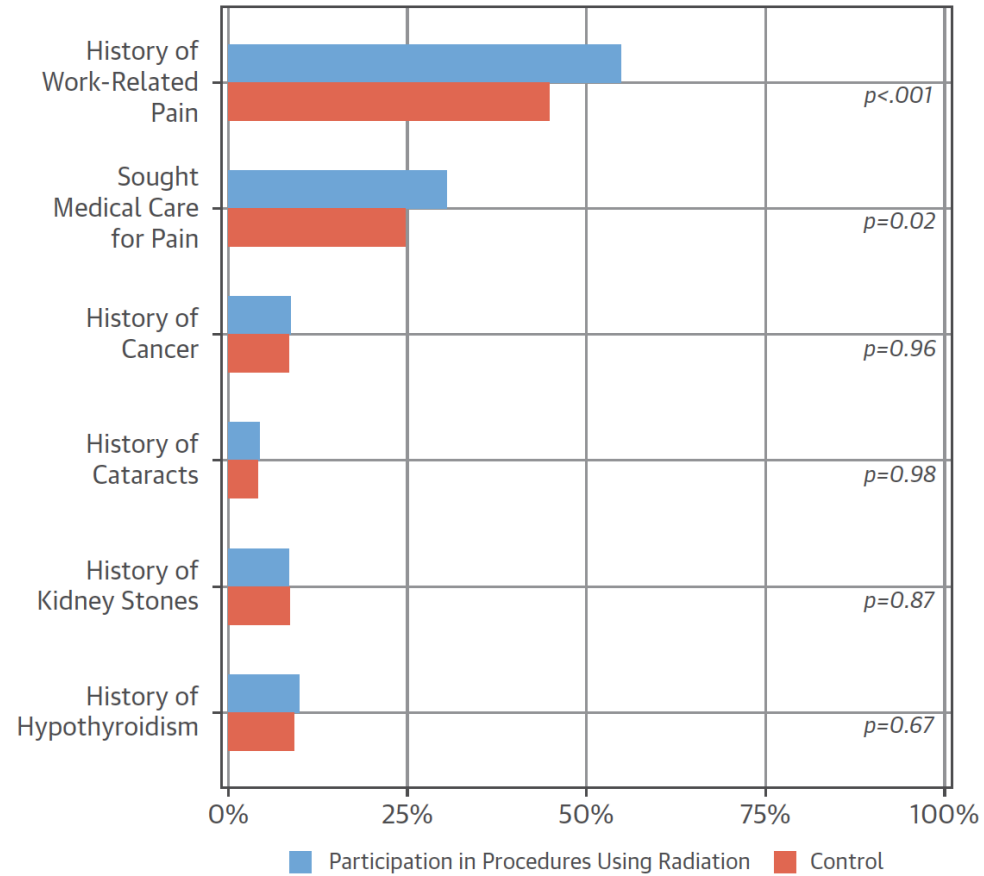
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CrossMark

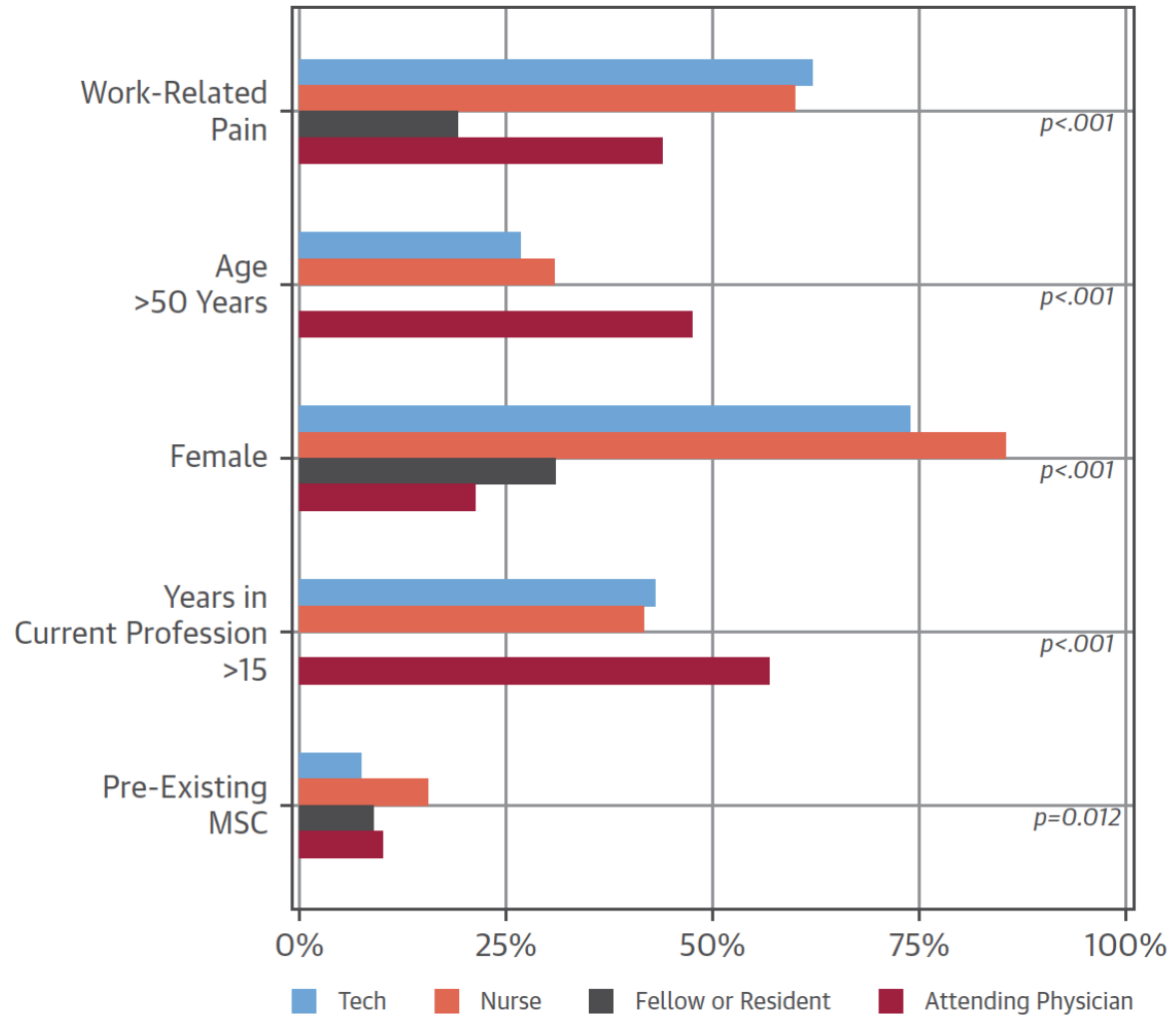


**FIGURE 2** Prevalence of Medical Conditions Potentially Related to Working in the Interventional Laboratory



Healthcare workers who perform or assist with procedures requiring radiation reported more work-related musculoskeletal pain and more often sought medical care for this pain compared to similar employees within the same departments who are not exposed to these procedures. There was no significant difference in the prevalence of other medical conditions in this 1-time cross-sectional study.

**FIGURE 1** Work-Related Musculoskeletal Pain Among Employees Involved in Procedures With Radiation Exposure, Analyzed by Job Description



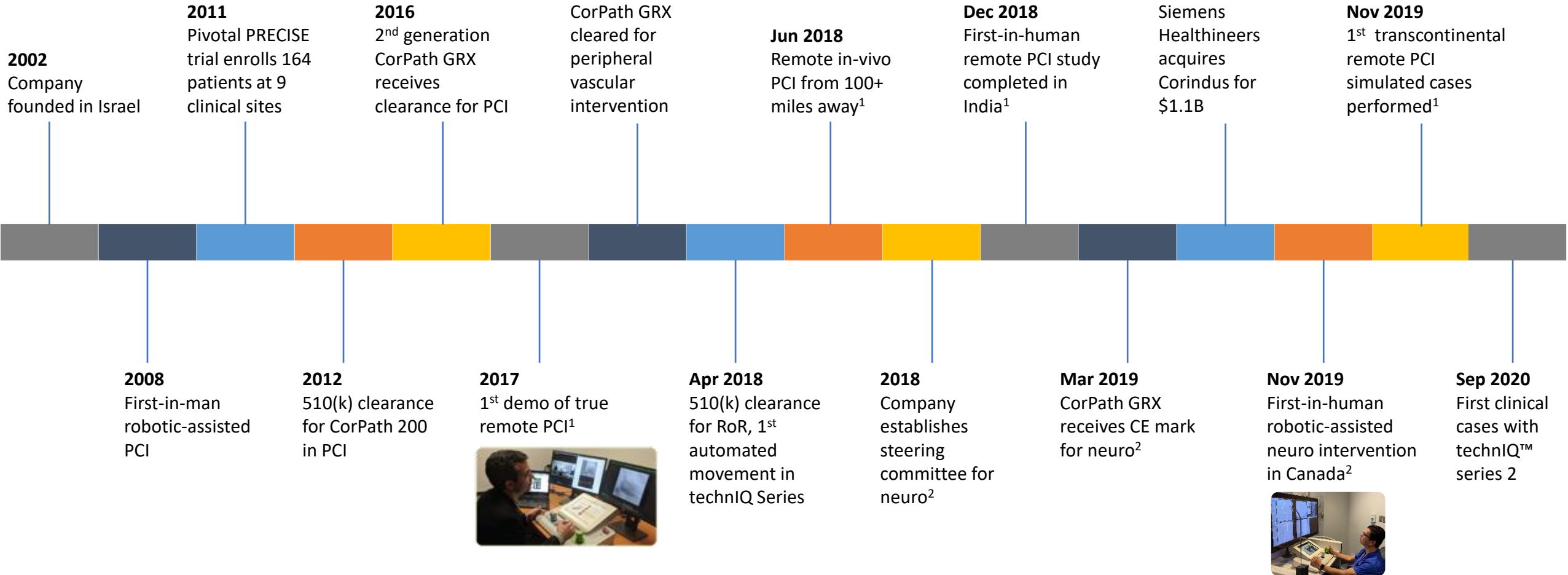
Nonphysician allied staff working in the interventional laboratory reported more work-related musculoskeletal pain than interventional lab attending physicians.  
MSC = musculoskeletal condition.

	Manual PCI with Traditional PPE	Manual PCI with Suspended Lead Suit	Robotic PCI with Suspended Lead Suit
<b>Chest Exposure (N)</b>	120	157	42
Dose per case ( $\mu\text{Sv}$ )	0.4	0.0	0.0
Dose per case – normalized DAP*	0.4	0.0	0.0
<b>Head Exposure (N)</b>	121	156	41
Dose per case ( $\mu\text{Sv}$ )	14.9	0.5	0.1
Dose per case – normalized DAP*	17.8	0.5	0.1

## Remote Robotic Success Rates

	Successful Remote Delivery/ # of Lesions Attempted	Success Rate
Predilation balloon delivery	20/21	95.2%
Stent delivery	18/20	90.0%
Postdilation balloon delivery	15/15	100.0%
Technical success achieved	19/22	86.4%

# A Brief History of Corindus



<sup>1</sup> Remote capabilities are currently under development; it is not for sale. Its future availability cannot be guaranteed.

<sup>2</sup> CorPath GRX for use in neurovascular interventions is currently under development; it is not for sale in the U.S.A. Its future availability cannot be guaranteed.

# Robotics in the Interventional

## Second-generation robotic system

### Bedside Unit

- Optimized bedside unit for radial or femoral access
- Simple setup & in-procedure workflow
- Devices fixed during intervention
- Imaging and device agnostic



### Interventional Workstation

- Precise robotic control of
  - ✓ Guide catheter
  - ✓ Guidewire
  - ✓ RX catheter
- Radiation-shielded workstation (optional cockpit available)
- 4K resolution monitor



# Traditional vs. Robotic Intervention

Robotics can add value throughout the procedure








## Today's Cath Lab Environment

- High radiation exposure
- Significant fatigue and orthopedic strain



Manual Intervention
Struggle to see angiography
Trial & error, wire spinning
'Eyeball' estimate
Manual adjustment
Devices loose during inflation

STEPS
 <b>Assess Anatomy</b>
 <b>Navigate</b>
 <b>Measure Anatomy</b>
 <b>Position Stent</b>
 <b>Deploy Stent</b>

Robotic-assisted Intervention
Close proximity, ergonomic visualization
Automated robotic techniques
Sub-millimeter measurement
1mm precise positioning
Devices fixed during deployment



## Robotic Cath Lab

- Shields from radiation
- Potential to reduce fatigue and orthopedic strain

# Corindus Robotic Technology

Potential to be first disruptive treatment option in vascular medicine in 40+ years

Cleared		CE Mark	In Development
PCI	PVI	NEURO	NEURO + REMOTE
			
<ul style="list-style-type: none"> <li>• 1<sup>st</sup> generation cleared in 2012, GRX in 2016</li> <li>• Used in clinical practice for simple to complex PCI</li> <li>• Over 8,000 robotic-assisted PCIs performed</li> </ul>	<ul style="list-style-type: none"> <li>• CorPath GRX cleared in 2018</li> <li>• Focused on below-the-knee interventions including CLI as well as renal interventions</li> </ul>	<ul style="list-style-type: none"> <li>• FIH neurovascular procedure performed November 1, 2019<sup>1</sup></li> <li>• Regulatory approval received in select markets<sup>2</sup></li> <li>• Steering committee established in 2018<sup>1</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Potential disruptor to stroke therapy with remote access capabilities<sup>1,3</sup></li> <li>• First in human remote PCI case completed in Dec 2018<sup>3</sup></li> </ul>

<sup>1</sup> CorPath GRX for use in neurovascular interventions is currently under development; it is not for sale in the U.S.A. Its future availability cannot be guaranteed.

<sup>2</sup> CorPath GRX has CE mark and TGA approval for use in neurovascular interventions.

<sup>3</sup> Remote capabilities are currently under development; it is not for sale. Its future availability cannot be guaranteed.

# Clinical Evidence for Robotics

Proven benefit for patients & providers



## CORA-PCI Trial

demonstrated **99.1%** clinical success in complex cases and **comparable procedure times** with manual PCI.<sup>1\*†</sup>

## PRECISE trial

demonstrated a **95% reduction** in radiation exposure to primary operator.<sup>2‡</sup>



## Circulation

single center trial demonstrated a **20% reduction** in radiation exposure to patients compared to manual PCI.<sup>3\*</sup>

## Robotic vs manual

Measurement of lesions with robotic PCI may **reduce measurement errors, need for extra stents**, and LGM.<sup>4†</sup>



\* This study was performed at a single center and there can be no guarantee that other customers will achieve the same results

† Clinical trials were conducted using CorPath 200

‡ Compared to levels found at the traditional table position during the PRECISE trial.

1 Mahmud E., et al. JACC Cardiovasc Interv, 2017.

2 Weisz G, et al. JACC, 2013.

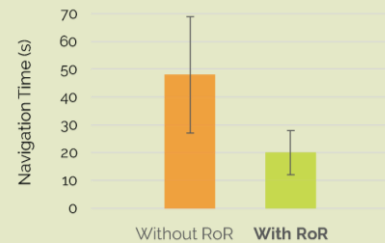
3 Patel E., et al. Circ Cardiovasc Interv, 2020.

4 Campbell P, et al. Cardiovasc Revasc Med, 2015.

## Rotate on Retract (RoR)

Navigation algorithm that automatically rotates the guidewire upon joystick retraction.

**53%** reduction in wiring time with reduced variability<sup>1</sup>



## Spin

Lesion crossing algorithm that automatically rotates guidewire in an oscillating motion while driving forward.

## Wiggle

Navigation algorithm that automatically rotates guidewire in a reciprocating motion while moving forward (RoR enabled).

## Dotter

Lesion crossing algorithm that incrementally advances and retracts working device while driving forward.

## Constant Speed

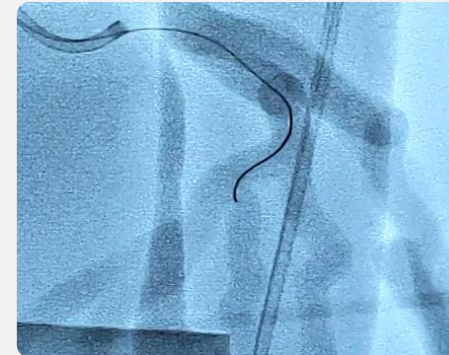
Measurement algorithm that allows user to select a single, constant drive speed (selectable at 2 mms and 5 mms).

## technIQ Performance in a Model - Spin

*Two type B2 lesions in a coronary flow model*

Without Automation

With Automation



<sup>1</sup> Madder R, et al. TCT 2017. Preclinical study data may not be predictive of clinical results.

# Guidewire & Device Joystick Control

## Linear and rotational movement

### Operation

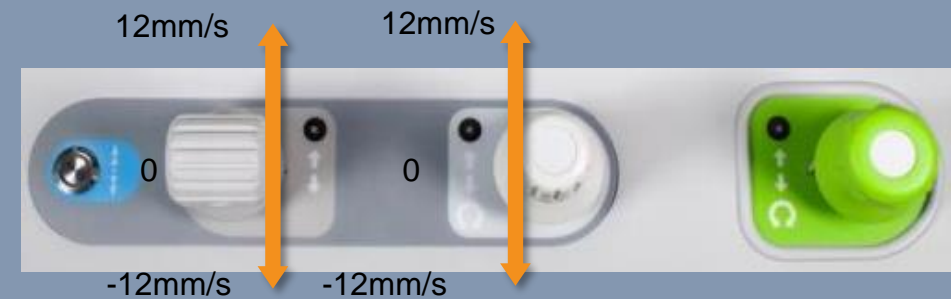
#### Linear Movement: RX Device and Guidewire

- Advances or retracts faster as the user moves joystick farther from the neutral position
  - Speed increases incrementally up to 12mm/second

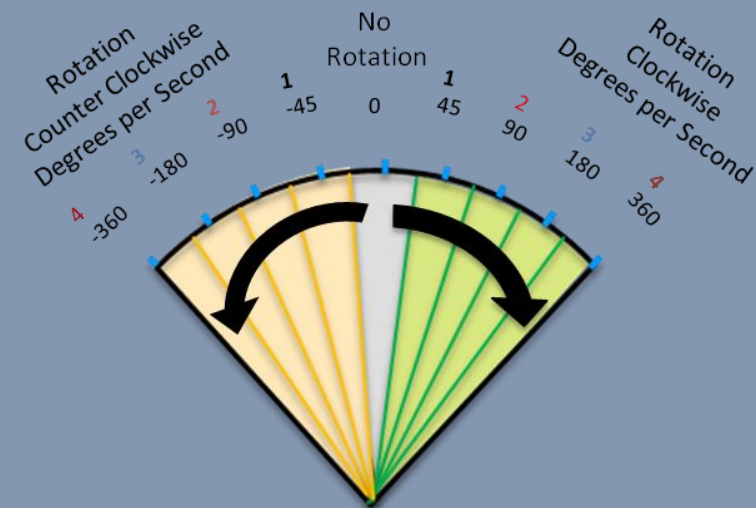
#### Rotation: Guidewire

- The speed of rotation increases incrementally as the guidewire joystick is rotated
- 4 speeds available, clockwise and counterclockwise
  - Speed 1 = 45° per second
  - Speed 2 = 90° per second
  - Speed 3 = 180° per second
  - Speed 4 = 360° per second (maximum)

#### Linear Speed



#### Rotational Speed



# Guide Catheter Joystick Control

## Linear and rotational movement

### Operation

#### Linear Movement

- Advance/retract speed increases incrementally up to 24mm/sec as the joystick control moves further away from the neutral position

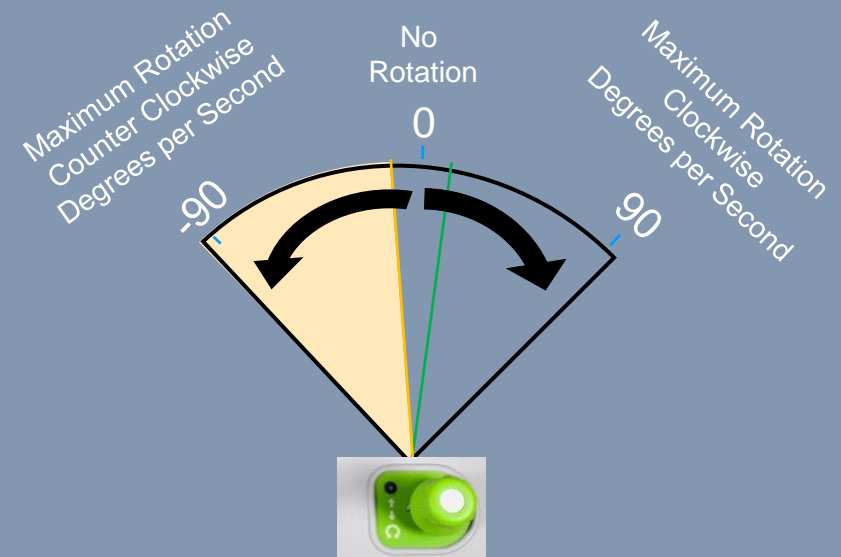
#### Rotation

- Can rotate clockwise or counter clockwise with up to 90 degrees rotation per second as joystick moves further from the neutral position

#### Linear Movement



#### Rotational Movement







## ROTATE ON RETRACT (ROR)

GUIDEWIRE  
NAVIGATION



## WIGGLE \*

GUIDEWIRE  
NAVIGATION



## SPIN \*

LESION  
CROSSING

GUIDEWIRE DRIVE ▲



## DOTTER \*

LESION  
CROSSING

DEVICE DRIVE ▲

BOTH ▼



## CONSTANT SPEED \*

ANATOMY  
MEASUREMENT

NEW

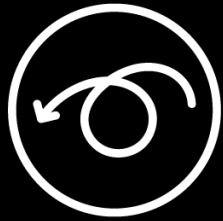
NEW

NEW

NEW

# technIQ - Smart Procedural Automation

## Rotate on Retract (RoR)



### ROTATE ON RETRACT (ROR)

#### GUIDEWIRE NAVIGATION

To reduce navigation time in difficult anatomies, such as tortuous vessels, RoR automatically rotates the guidewire when joystick is retracted and redirects guidewire tip.





# technIQ - Smart Procedural Automation\*

## Wiggle

New introduction



## WIGGLE

### GUIDEWIRE NAVIGATION

To prevent prolapses in tortuous anatomy during guidewire navigation, Wiggle oscillates the guidewire as it advances.



\*technIQ is not commercially available in all countries. Their future availability cannot be guaranteed.

# technIQ - Smart Procedural Automation

## Spin

New introduction



**SPIN**

### LESION CROSSING

To efficiently cross lesions in complex cases and difficult anatomies, Spin utilizes clockwise and counterclockwise rotations of the guidewire.

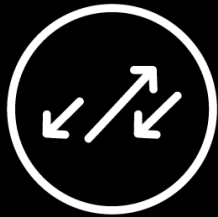


\*technIQ is not commercially available in all countries. Their future availability cannot be guaranteed.

# technIQ - Smart Procedural Automation

## Dotter

New introduction



## DOTTER

### LESION CROSSING

To aid in lesion crossing and delivery of therapy, especially in very narrow or calcified lesions, Dotter utilizes rapid linear back-and-forth motions as the device advances.

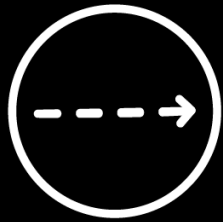


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# technIQ - Smart Procedural Automation

## Constant Speed

New introduction



### CONSTANT SPEED

#### ANATOMY MEASUREMENT

To enable precise measurement of the anatomy, Constant Speed maintains a controlled, consistent speed of 2mm/s or 5mm/s, as selected by the user on the guidewire or device.

## Constant Speed



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