

# SYNCOPE DIAGNOSIS NEEDED. CHALLENGE ACCEPTED.

ACC/AHA/HRS & ESC Guidelines  
Recommend ICM in the Evaluation  
of Unexplained Syncope



Actual size

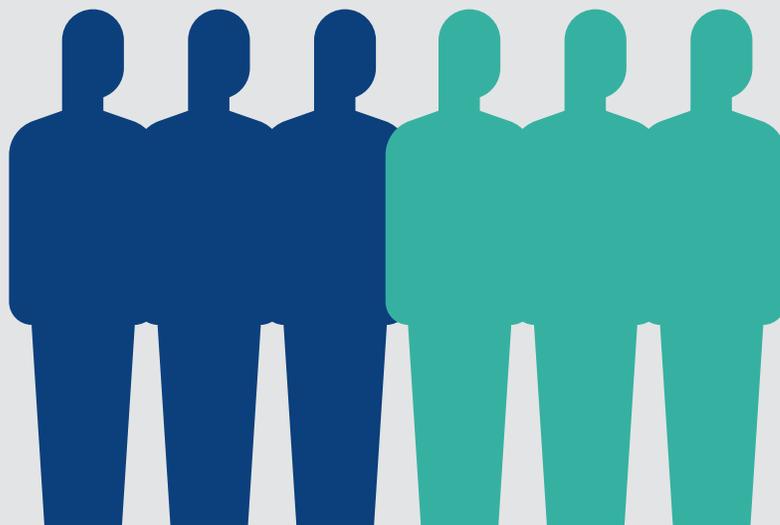
**Reveal LINQ™**  
Insertable Cardiac  
Monitoring

**Medtronic**

# DIAGNOSING UNEXPLAINED SYNCOPE IS CHALLENGING

## HALF OF PATIENTS ADMITTED TO THE HOSPITAL FOR SYNCOPE LEAVE WITHOUT A DIAGNOSIS<sup>1</sup>

An average of 251,000 people are hospitalized for syncope every year.<sup>2</sup>



## PATIENTS NEED ANSWERS

**3**

specialists  
visited  
on average<sup>3</sup>

**13**

inconclusive  
tests\*<sup>3</sup>

\*Median number

**1 in 4**

undergo more  
than 20 tests<sup>4</sup>



# GETTING ANSWERS IS URGENT

## CARDIAC SYNCOPE IS DEADLY

Cardiac syncope can be a predictor of sudden cardiac death.<sup>5</sup>

**2X**  
increased risk of death<sup>6</sup>

**> 10%**  
mortality rate at six months<sup>6</sup>

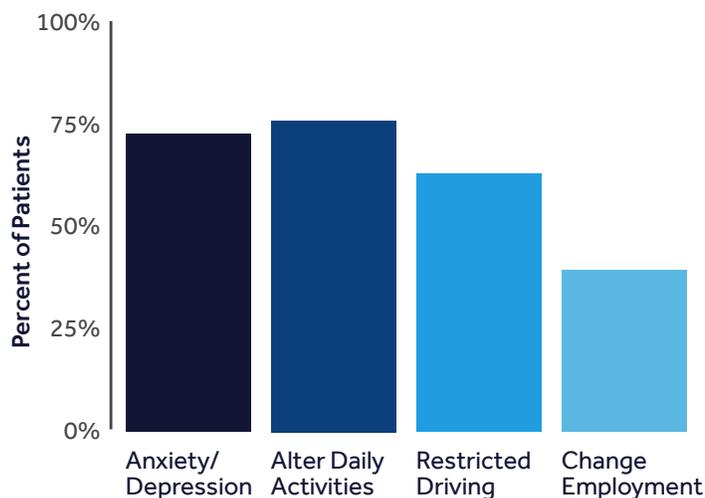


**36%**  
suffer significant trauma<sup>3</sup>



Visit [Medtronic.com/Syncope](https://www.Medtronic.com/Syncope) to hear William's story

## LIVING WITHOUT A DIAGNOSIS COMPROMISES QUALITY OF LIFE<sup>7-9</sup>



- 1.4X increased risk of occupational accidents<sup>9</sup>
- 2X increased risk of loss of employment<sup>9</sup>

# ACC/AHA/HRS & ESC GUIDELINES

Recommend Cardiac Monitoring with Reveal LINQ™ ICM  
Early in the Evaluation of Syncope

Reveal LINQ is recommended for patients  
with infrequent symptoms > 30 days apart

## ACC/AHA/HRS 2017 Guidelines Recommendation<sup>10</sup>

COR	LOE	RECOMMENDATION
I	NA	If the initial evaluation (history, physical exam, ECG) is unclear and a cardiac cause is suspected, cardiac monitoring is recommended.
I	C-EO	The choice of a specific cardiac monitor should be determined on the basis of the frequency and nature of syncope events.
Ila	B-R	To evaluate selected ambulatory patients with syncope of suspected arrhythmic etiology, an ICM can be useful.

COR — Class of Recommendation

LOE — Level of Evidence



**CONTINUE MONITORING.  
GET TO THE ANSWER.**

If initial monitoring is non-diagnostic, keep looking  
with Reveal LINQ ICM.

## ICM is the only ambulatory monitor with a Class I recommendation for syncope

### ESC 2018 Guidelines Recommendation<sup>11</sup>

COR	LOE	RECOMMENDATION
<b>I</b>	<b>A</b>	<b>UPGRADED:</b> ICMs upgraded to Class I/Level A recommendation — the strongest level of clinical evidence — for early monitoring in low-risk patients and after workup of high-risk patients.
<b>IIb</b>	<b>B</b>	<b>NEW:</b> ICMs added as a Class II/Level B recommendation to diagnose unexplained falls and unconfirmed epilepsy
<b>IIa</b>	<b>B</b>	ICMs should be considered in patients with suspected or certain reflex syncope presenting with frequent or several syncopal episodes.

COR — Class of Recommendation

LOE — Level of Evidence

### Holter monitor and tilt testing downgraded from Class I to Class II recommendation

# 88%

of patients who are guideline-eligible for an ICM/ILR are over-tested with other modalities before being offered an ICM/ILR.<sup>4</sup>



Over-testing **increases cost** with no improvement to diagnostic yield.<sup>4</sup>



Reveal LINQ™ ICM  
up to 3 years<sup>12</sup>

# SUPERIOR DIAGNOSTIC YIELD

Clinical evidence overwhelmingly supports  
ICM for infrequent syncope



**3.6x**

more likely to reach  
a diagnosis with  
ICM vs. standard  
of care

2018 ESC Guidelines  
Meta-analysis of  
5 randomized clinical trials<sup>11</sup>

**44%**

ICM diagnostic  
yield<sup>13</sup>

2017 Meta-analysis of  
49 studies  
4,381 patients<sup>†</sup>

vs. standard of care **5-20%**<sup>\*14-17</sup>

\*Range for ICM in the same studies was 42-52%.

†84% of the 4,381 patients in the studies were reported to have been tested with a Reveal™ ICM.

# PATIENTS WITH LONG-TERM MONITORING GET ANSWERS



## EARLIER ICM USE SAVES PATIENTS MONEY

Multiple studies show cost savings with ICM compared to conventional testing due to fewer tests and hospital admissions.<sup>14,17-19</sup>

## REVEAL LINQ ICM BROADLY COVERED

Medicare and private payers cover inpatient and outpatient Reveal LINQ ICM insertions.\*

## REVEAL LINQ GUIDES TREATMENT DECISIONS

"Holter monitoring in syncope is inexpensive in terms of setup costs, but expensive in terms of cost per diagnosis."

—ESC 2018  
Syncope Guidelines  
Task Force<sup>11</sup>

# 78%

of Reveal™ ICM patients with syncope recurrence received a differential diagnosis (PICTURE Study)<sup>3</sup>

# 82%

of Reveal ICM guided diagnoses led to treatment<sup>3</sup>

## IMPROVED QOL

in ICM patients with syncope<sup>16,20</sup>

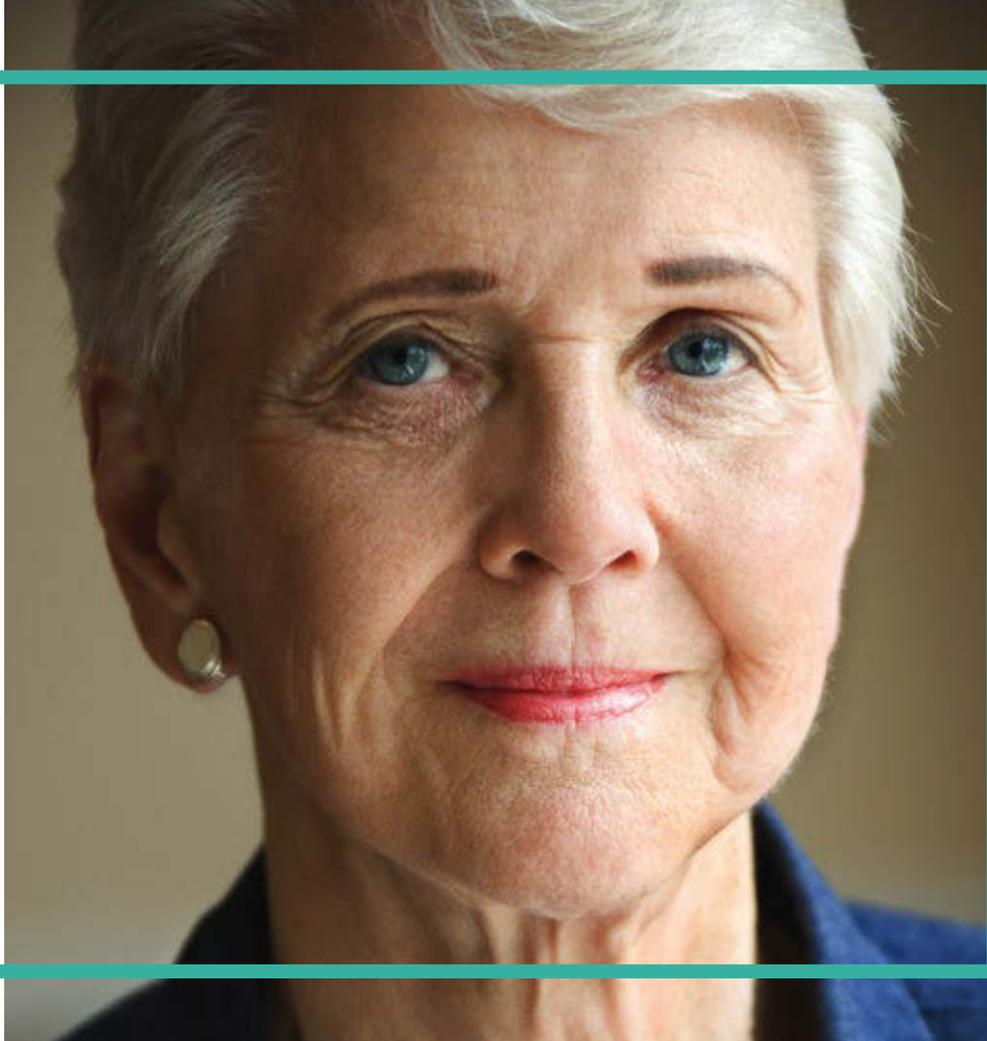
## SIGNIFICANT REDUCTION

in syncope burden with therapies guided by ICM diagnosis<sup>21</sup>

# PATIENTS PREFER REVEAL LINQ™ ICM

Over External  
Wearable Monitors<sup>22</sup>

Continuous, automatic  
cardiac monitoring and  
patient-activated  
symptom marking to  
correlate symptoms to  
cardiac rhythms



## SIMPLE

Insertion procedure is minimally invasive  
and brief

## CONVENIENT

100% of patients found Reveal LINQ ICM  
did not limit their activities of daily living<sup>22</sup>

## ULTRA-DISCREET

Not visible in most patients

## MRI CONDITIONAL

Safe for MRI at 1.5 and 3.0T even on the  
same day of insertion\*

\*Reveal LINQ has been demonstrated to pose no known hazards in a specified MRI environment with specified conditions of use. Please see the Reveal ICM clinician manual or MRI technical manual for more details.

"[If I'd known about it,] I wouldn't  
have requested it — I would  
have demanded that be done.  
I was tired of not having any  
answers."<sup>23,†</sup>

—Reveal LINQ Patient

"It . . . was, for me, a peace of  
mind thing, knowing that, if  
anything happens, they can  
capture it."<sup>23,†</sup>

—Reveal LINQ Patient

"It's easier than the portable  
monitors. . . . I had a very bad  
accident because I passed out . . .  
so I was very ready to do anything  
to make sure that I don't have  
another serious accident. . . .  
I . . . was glad to have a monitor  
that I don't have to have around  
my neck all the time."<sup>23,†</sup>

—Reveal LINQ Patient

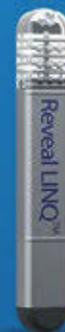
†Patient outcomes may vary.

# CARDIAC MONITORING UP TO 3 YEARS

# 20%

of syncope diagnosed  
with Reveal ICMs  
occurred after 2 years<sup>24</sup>

THE LONGER  
YOU LOOK,  
THE MORE  
YOU FIND



Actual size

The world's smallest  
insertable cardiac monitor

## INDUSTRY-LEADING TRURHYTHM™ DETECTION

	Reduction in false detects*	Relative sensitivity*
BRADY	↓ 95%	98.3%
PAUSE	↓ 47%	99.4%



### EXCLUSIVE ALGORITHMS

significantly **reduce false positives while preserving sensitivity.**<sup>25,26</sup>



### INTELLIGENT

**Smart Filtering** algorithm improves detection accuracy for Brady & Pause.



### ACTIONABLE

**Streamlined Episodes & Report Updates** simplify data review.

\*Compared with the Reveal LINQ ICM without TruRhythm Detection

## References

- <sup>1</sup> Mendu ML, McAvay G, Lampert R, Stoehr J, Tinetti ME. Yield of diagnostic tests in evaluating syncopal episodes in older patients. *Arch Intern Med.* July 27, 2009;169(14):1299-1305.
- <sup>2</sup> Data obtained from CDC National Hospital Ambulatory Medical Care Survey (NHAMCS) from the years 2008-2014.
- <sup>3</sup> Edvardsson N, Frykman V, van Mechelin R, et al. Use of an implantable loop recorder to increase the diagnostic yield in unexplained syncope: results from the PICTURE registry. *Europace.* February 2011;13(2):262-269.
- <sup>4</sup> Edvardsson N, Wolff C, Tsintzos S, Rieger G, Linker NJ. Costs of unstructured investigation of unexplained syncope: insights from a micro-costing analysis of the observational PICTURE registry. *Europace.* July 2015;17(7):1141-1148.
- <sup>5</sup> R. Brugada, et al. (eds), *Clinical Approach to Sudden Cardiac Death Syndromes*, London: Springer-Verlag; 2010.
- <sup>6</sup> Soteriades ES, Evans JC, Larson MG, et al. Incidence and prognosis of syncope. *N Engl J Med.* September 19, 2002;347(12):878-885.
- <sup>7</sup> Linzer M, Pontinen M, Gold DT, Divine GW, Felder A, Brooks WB. Impairment of physical and psychosocial function in recurrent syncope. *J Clin Epidemiol.* 1991;44(10):1037-1043.
- <sup>8</sup> Linzer M, Gold DT, Pontinen M, Divine GW, Felder A, Brooks WB. Recurrent syncope as a chronic disease: preliminary validation of a disease-specific measure of functional impairment. *J Gen Intern Med.* April 1994;9(4):181-186.
- <sup>9</sup> Numé AK, Kragholm K, Carlson N, et al. Syncope and Its Impact on Occupational Accidents and Employment. *Circ Cardiovasc Qual Outcomes.* April 2017;10(4).
- <sup>10</sup> Shen WK, Sheldon RS, Benditt DG, et al. 2017 ACC/AHA/HRS Guideline for the Evaluation and Management of Patients With Syncope: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines, and the Heart Rhythm Society. *J Am Coll Cardiol.* August 1, 2017;70(5):e39-e110.
- <sup>11</sup> Brignole M, Moya A, de Lange FJ, et al. 2018 ESC Guidelines for the diagnosis and management of syncope. *Eur Heart J.* Published online March 19, 2018.
- <sup>12</sup> Reference the Reveal LINQ ICM Clinician Manual for usage parameters.
- <sup>13</sup> Solbiati M, Casazza G, Dipaola F, et al. The diagnostic yield of implantable loop recorders in unexplained syncope: A systematic review and meta-analysis. *Int J Cardiol.* March 15, 2017;231:170-176.
- <sup>14</sup> Farwell DJ, Freemantle N, Sulke AN. Use of implantable loop recorders in the diagnosis and management of syncope. *Eur Heart J.* July 2004;25(14):1257-1263.
- <sup>15</sup> Krahn AD, Klein GJ, Yee R, Skanes AC. Randomized assessment of syncope trial: conventional diagnostic testing versus a prolonged monitoring strategy. *Circulation.* July 3, 2001;104(1):46-51.
- <sup>16</sup> Podoleanu C, DaCosta A, Defaye P, et al. Early use of an implantable loop recorder in syncope evaluation: a randomized study in the context of the French healthcare system (FRESH study). *Arch Cardiovasc Dis.* October 2014;107(10):546-552.
- <sup>17</sup> Krahn AD, Klein GJ, Yee R, Hoch JS, Skanes AC. Cost implications of testing strategy in patients with syncope: randomized assessment of syncope trial. *J Am Coll Cardiol.* August 6, 2003;42(3):495-501.
- <sup>18</sup> Davis S, Westby M, Pitcher D, Petkar S. Insertable loop recorders are cost-effective when used to investigate transient loss of consciousness which is either suspected to be arrhythmic or remains unexplained. *Europace.* March 2012;14(3):402-409.
- <sup>19</sup> Providência R, Candeias R, Morais C, et al. Financial impact of adopting implantable loop recorder diagnostic for unexplained syncope compared with conventional diagnostic pathway in Portugal. *BMC Cardiovasc Disord.* May 6, 2014;14:63.
- <sup>20</sup> Farwell DJ, Freemantle N, Sulke N. The clinical impact of implantable loop recorders in patients with syncope. *Eur Heart J.* February 2006;27(3):351-356.
- <sup>21</sup> Sulke N, Sugihara C, Hong P, Patel N, Freemantle N. The benefit of a remotely monitored implantable loop recorder as a first line investigation in unexplained syncope: the EaSyAS II trial. *Europace.* June 2016;18(6):912-918.
- <sup>22</sup> Reveal LINQ Usability Study. Medtronic data on file. 2013.
- <sup>23</sup> Research on file.
- <sup>24</sup> Furukawa T, Maggi R, Bertolone C, Fontana D, Brignole M. Additional diagnostic value of very prolonged observation by implantable loop recorder in patients with unexplained syncope. *J Cardiovasc Electrophysiol.* January 2012;23(1):67-71.
- <sup>25</sup> Pürerfellner H, Sanders P, Sarkar S, et al. Adapting detection sensitivity based on evidence of irregular sinus arrhythmia to improve atrial fibrillation detection in insertable cardiac monitors. *Europace.* Published online October 3, 2017.
- <sup>26</sup> Passman RS, Rogers JD, Sarkar S, et al. Development and validation of a dual sensing scheme to improve accuracy of bradycardia and pause detection in an insertable cardiac monitor. *Heart Rhythm.* July 2017;14(7):1016-1023.
- <sup>27</sup> Da Costa A, Defaye P, Romeyer-Bouchard C, et al. Clinical impact of the implantable loop recorder in patients with isolated syncope, bundle branch block and negative workup: A randomized multicenter prospective study. *Arch Cardiovasc Dis.* March 2013;106(3):146-154.
- <sup>28</sup> Linzer M, Yang EH, Estes NA 3rd, Wang P, Vorperian VR, Kapoor WN. Diagnosing syncope. Part 2: Unexplained syncope. Clinical Efficacy Assessment Project of the American College of Physicians. *Ann Intern Med.* July 1, 1997;127(1):76-86.
- <sup>29</sup> Krahn AD, Klein GJ, Yee R, Takle-Newhouse T, Norris C. Use of an extended monitoring strategy in patients with problematic syncope. Reveal Investigators. *Circulation.* January 26, 1999;99(3):406-410.
- <sup>30</sup> ICM Competitive Comparison Guide. Medtronic data on file. 2017.
- <sup>31</sup> Medtronic Reveal Publications. Medtronic data on file. 2016.

## Indications, Safety, and Warnings

If you are located in the United States, please refer to the brief statement below to review applicable indications, safety, and warning information. See the device manual for detailed information regarding the implant procedure, indications, contraindications, warnings, precautions, and potential complications/adverse events. For further information, please call Medtronic at 763-514-4000 and/or consult the Medtronic website at medtronic.com.

If you are located outside the United States, see the device manual for detailed information regarding the implant procedure, indications, contraindications, warnings, precautions, and potential adverse events. For further information, contact your local Medtronic representative and/or consult the Medtronic website at medtronic.com.



[www.medtronic.com/manuals](http://www.medtronic.com/manuals)

Consult instructions for use at this website. Manuals can be viewed using a current version of any major Internet browser. For best results, use Adobe Acrobat Reader® with the browser.

**Important Reminder:** This information is intended only for users in markets where Medtronic products and therapies are approved or available for use as indicated within the respective product manuals. Content on specific Medtronic products and therapies is not intended for users in markets that do not have authorization for use.

### Reveal LINQ™ LNQ11 Insertable Cardiac Monitor and Patient Assistant

The Reveal LINQ insertable cardiac monitor is an implantable patient-activated and automatically-activated monitoring system that records subcutaneous ECG and is indicated in the following cases:

- Patients with clinical syndromes or situations at increased risk of cardiac arrhythmias
- Patients who experience transient symptoms such as dizziness, palpitation, syncope, and chest pain, that may suggest a cardiac arrhythmia

This device has not specifically been tested for pediatric use.

### Patient Assistant

The Patient Assistant is intended for unsupervised patient use away from a hospital or clinic. The Patient Assistant activates the data management feature in the Reveal™ insertable cardiac monitor to initiate recording of cardiac event data in the implanted device memory.

### Contraindications

There are no known contraindications for the implant of the Reveal LINQ insertable cardiac monitor. However, the patient's particular medical condition may dictate whether or not a subcutaneous, chronically implanted device can be tolerated.

### Warnings and Precautions

#### Reveal LINQ LNQ11 Insertable Cardiac Monitor

Patients with the Reveal LINQ insertable cardiac monitor should avoid sources of diathermy, high sources of radiation, electrosurgical cautery, external defibrillation, lithotripsy, therapeutic ultrasound, and radiofrequency ablation to avoid electrical reset of the device, and/or inappropriate sensing as described in the Medical procedure and EMI precautions manual. MRI scans should be performed only in a specified MR environment under specified conditions as described in the Reveal LINQ MRI Technical Manual.

### Patient Assistant

Operation of the Patient Assistant near sources of electromagnetic interference, such as cellular phones, computer monitors, etc., may adversely affect the performance of this device.

### Potential Complications

Potential complications include, but are not limited to, device rejection phenomena (including local tissue reaction), device migration, infection, and erosion through the skin.

### Medtronic MyCareLink™ Patient Monitor, Medtronic CareLink™ Network, and CareLink™ Mobile Application

#### Intended Use

The Medtronic MyCareLink patient monitor and CareLink network are indicated for use in the transfer of patient data from some Medtronic implantable cardiac devices based on physician instructions and as described in the product manual. The CareLink mobile application is intended to provide current CareLink network customers access to CareLink network data via a mobile device for their convenience. The CareLink mobile application is not replacing the full workstation, but can be used to review patient data when a physician does not have access to a workstation. These products are not a substitute for appropriate medical attention in the event of an emergency and should only be used as directed by a physician. CareLink network availability and mobile device accessibility may be unavailable at times due to maintenance or updates, or due to coverage being unavailable in your area. Mobile device access to the Internet is required and subject to coverage availability. Standard text message rates apply.

#### Contraindications

There are no known contraindications.

#### Warnings and Precautions

The MyCareLink patient monitor must only be used for interrogating compatible Medtronic implantable devices.

See the device manual for detailed information regarding the implant procedure, indications, contraindications, warnings, precautions, and potential complications/adverse events. For further information, please call Medtronic at 1-800-328-2518 and/or consult the Medtronic website at medtronic.com.

**Caution:** Federal law (USA) restricts these devices to sale by or on the order of a physician.

# DIAGNOSIS NEEDED. CHALLENGE ACCEPTED.

ACC/AHA/HRS & ESC Guidelines Recommend  
ICM in the Evaluation of Unexplained Syncope

CHOOSE  
REVEAL LINQ™ ICM  
FOR PATIENTS  
WITH SYMPTOMS  
> 30 DAYS APART

ICM Delivers  
Superior  
Diagnostic Yield  
for infrequent  
syncope compared  
to conventional  
testing<sup>15,16,27</sup>



Reveal LINQ™ ICM  
up to 3 years<sup>12</sup>

20 YEARS  
OF ICM  
LEADERSHIP &  
INNOVATION

- The most effective diagnostic tool for infrequent, unexplained syncope<sup>1,13,15,16,20,27-29</sup>
- Unmatched detection accuracy<sup>30</sup>
- The most studied and validated ICM, with over 500 publications<sup>31</sup>

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