Healthcare Technology for the Digital Age

Feb 2024
Sean White, PhD
Director of Research and Technology
Connection to UCI

Sean White

Tyler Rice

Bruce Yang
From UCI, to LAS, to Medtronic
From UCI, to LAS, to Medtronic

1. Flow Value
   Numerically shows average blood flow

2. Velocity Waveform
   Shows shape of pulse waveform
“My” Problem: Peripheral Artery Disease

Plaque

Critical limb ischemia

"My" Problem: Peripheral Artery Disease

Plaque

Critical limb ischemia

“My” Problem: Peripheral Artery Disease

Plaque

Critical limb ischemia

20%

Amputation at 1-year

"My" Problem: Peripheral Artery Disease

- Critical limb ischemia: 25%
- Amputation at 1-year: 20%
- Mortality at 1 year: 25%

“My” Problem: Peripheral Artery Disease

- **20%**
  - Amputation at 1-year

- **25%**
  - Mortality at 1 year

- **51%**
  - Mortality at 5 years

“My” Problem: Peripheral Artery Disease

Plaque

Critical limb ischemia

Fertile Ground for Innovation

First angiogram to guide balloon angioplasty
1964
Fertile Ground for Innovation

First angiogram to guide balloon angioplasty
1964

~60 years

Angiogram to guide balloon angioplasty
2023

Fertile Ground for Innovation

First angiogram to guide balloon angioplasty
1964

Angiogram to guide balloon angioplasty
2023

66 years

Emerging Impact of AI/ML

Insertable Cardiac Monitor

Image credit: https://www.heart.org/en/health-topics/heart-attack/diagnosing-a-heart-attack/electrocardiogram-ecg-or-ekg
Emerging Impact of AI/ML

Insertable Cardiac Monitor

Time series data

Image credit: https://www.heart.org/en/health-topics/heart-attack/diagnosing-a-heart-attack/electrocardiogram-ecg-or-ekg
Emerging Impact of AI/ML

Insertable Cardiac Monitor

Time series data

Prediction / Forecasting
Classification
Anomaly Detection

Medtronic

Image credit: https://www.heart.org/en/health-topics/heart-attack/diagnosing-a-heart-attack/electrocardiogram-ecg-or-ekg
Emerging Impact of AI/ML

Insertable Cardiac Monitor

Time series data

Prediction / Forecasting
Classification
Anomaly Detection

Results

<table>
<thead>
<tr>
<th></th>
<th>Reduction in false detects</th>
<th>Relative sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brady</td>
<td>95%</td>
<td>98.3%</td>
</tr>
<tr>
<td>Pause</td>
<td>47%</td>
<td>99.4%</td>
</tr>
<tr>
<td>AF*</td>
<td>49%</td>
<td>99.1%</td>
</tr>
</tbody>
</table>

*Compared with the Reveal LINQ™ ICM without TruRhythm® Detection.
Relative sensitivity compared with the Reveal LINQ™ ICM without TruRhythm® Detection.
*Unknown AF patients.

Image credit: https://www.heart.org/en/health-topics/heart-attack/diagnosing-a-heart-attack/electrocardiogram-ecg-or-ekg
Emerging Impact of AI/ML

Intelligent Endoscopy Module

Image credit: https://www.bioworld.com/articles/517581-medtronic-gi-genius-in-study-for-detecting-adenomas-during-colonoscopy?_preview
Emerging Impact of AI/ML

Intelligent Endoscopy Module

Emerging Impact of AI/ML

Intelligent Endoscopy Module

Image Stream

Segmentation Feature Analysis

Emerging Impact of AI/ML

Intelligent Endoscopy Module

Image Stream

Segmentation Feature Analysis

Results

(Dis)integration
(Dis)integration
(Dis)integration
(Dis)integration
(Dis)integration
(Dis)integration
(Dis)integration
(Dis)integration

UI Display

Software Stack

Cross-platform connectivity

AI

- Image segmentation
- Feature recognition
- 3D reconstruction
- Image registration

Data parsing & transfer

Image credit:
https://www.directology.com/article/managing-cath-labs-multiple-specialty-users
https://www.dmaa.com/peripheral-angiography
https://www.angio.com/2016.12.17/01/320394
https://www.usa.philips.com/healthcare/education-resources/technologies/cath/interventional-ultrasound-ivus/peripheral/peripheral-ivus
(Dis)integration

UI Display

Software Stack

Cross-platform connectivity

AI
  - Image segmentation
  - Feature recognition
  - 3D reconstruction
  - Image registration

Data parsing & transfer

See what I’m doing
Quantify what matters
Thank you
Title with subtitle
Subtitle (optional)