

# CARDIOLOGY GRAND ROUNDS

**Presentation: AHA 2015 PREVIEW**

**Date: Monday, November 2, 2015, 7:00 – 8:00 AM**

**Location: ANW Education Building, Watson Room**

**Speaker: Prognostic Value of Serial Changes of High-Sensitivity Cardiac Troponin I and T Using Reference Change Values Among Hemodialysis Patients**

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**Inter-Reader Concordance and Variations in Interpretation of Post-Resuscitation ECG in Abnormal vs Normal Metabolic Milieus Following Out-of-Hospital Cardiac Arrest**

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## OBJECTIVES

At the completion of this activity, the participants should be able to:

1. Summarize emerging research that colleagues will present at upcoming American Heart Association national scientific meeting.
2. Synthesize ideas and input from across disciplines relevant to each presentation.
3. Recommend content revisions or areas of focus to the presenters.

## ACCREDITATION

**Physicians:** This activity has been planned and implemented in accordance with the Essential Areas and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of Allina Health and Minneapolis Heart Institute Foundation. Allina Health is accredited by the ACCME to provide continuing medical education for physicians.

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**Others:** Individuals representing other professional disciplines may submit course materials to their respective professional associations for 1.0 hours of continuing education credit.

## DISCLOSURE STATEMENTS

**Speaker(s):** Both presenters have declared that they do not have any conflicts of interest in making these presentations.

**Planning Committee:** Dr. Michael Miedema, and Jolene Bell Makowsky have declared that they do not have any conflicts of interest associated with the planning of this activity. Dr. Robert Schwartz declared the following relationships - stockholder: Cardiomind, Interface Biologics, Aritech, DSI/Transoma, InstyMeds, Intervalle, Medtronic, Osprey Medical, Stout Medical, Tricardia LLC, CoAptus Inc, Augustine Biomedical; scientific advisory board: Abbott Laboratories, Boston Scientific, MEDRAD Inc, Thomas, McNerney & Partners, Cardiomind, Interface Biologics; options: BackBeat Medical, BioHeart, CHF Solutions; speakers bureau: Vital Images; consultant: Edwards LifeSciences.

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# Minneapolis Heart Institute Grand Rounds

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November 2015



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## Inter-Reader Concordance and Variations in Interpretation of Post-Resuscitation ECG in Abnormal vs. Normal Metabolic Milieus Following Out-of-Hospital Cardiac Arrest

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# Disclosures

None of the authors have any potential or actual conflict of interest in relation to this presentation.



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# Background

Among survivors of out of hospital cardiac arrest (OHCA), the post resuscitation 12-lead electrocardiogram (ECG) is a widely used tool to identify acute thrombotic coronary occlusion and for appropriate triage to the catheterization laboratory.



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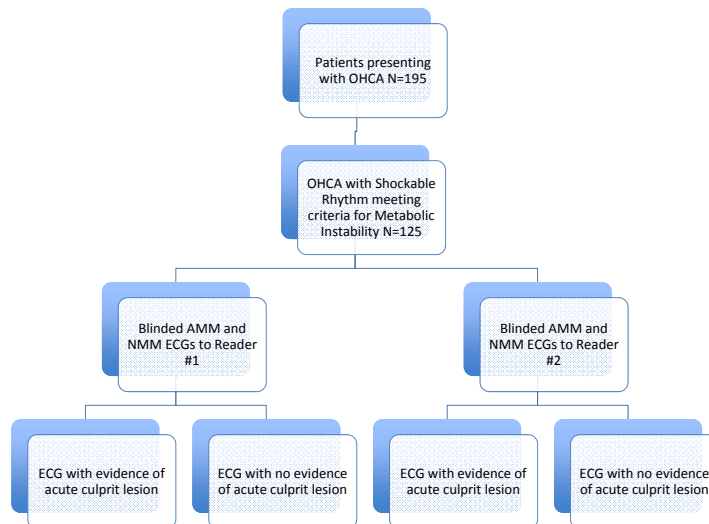
# Clinical Question

- It is unknown how a post-resuscitation abnormal metabolic milieu impacts ECG accuracy.
- We studied inter-reader concordance in ECG interpretation as well as same-patient variation in interpretation between abnormal (A) and normal (N) metabolic milieus (MM).



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# Methods



\* Abnormal Metabolic Milieu: as pH <7.1, K <2.8 or >6 mEq/L, vasoactive drug use or lactate >2 ng/ml.

## Methods

- Gold standard – angiographic coronary culprit lesion
- The Cohen’s kappa scale was used to measure concordance.



## Demographics

Total=125	Angiographic Culprit Present (n=41)	Angiographic Culprit Absent (n=84)	p= value
Age (y) – Mean (SD)	53 (10)	57 (15)	0.25
Male – n (%)	38 (95)	67 (79)	0.10
Prior known CAD – n (%)	12 (30)	14 (16)	0.16
Chronic Kidney Disease – n (%)	2 (5)	3 (3)	0.70
Prior myocardial infarction – n (%)	10 (25)	12 (14)	0.27
Prior PCI – n (%)	6 (15)	9 (11)	0.64
Prior CABG – n (%)	8 (20)	3 (3)	0.01
Diabetes Mellitus – n (%)	10 (25)	20 (24)	0.91
Dyslipidemia – n (%)	18 (45)	32 (38)	0.58
Hypertension – n (%)	24 (60)	48 (57)	0.82
Initial EF – Median (25 <sup>th</sup> -75 <sup>th</sup> Percentiles)	53 (35,58)	35 (23,55)	0.02

## Table 1. Inter-rater reliability among ECG readers

	Abnormal Metabolic Milieu	Normal Metabolic Milieu
N=125	125	125
Kappa	0.70	0.82
95% Confidence Interval	0.56-0.84	0.64-0.99

• According to Landis and Koch (1977) Kappa statistics between .61 and .80 indicate moderate agreement, anything over .81 indicated almost perfect or perfect agreement



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## Results

- The inter-rater reliability is higher for NMM, reaching almost perfect agreement range, compared to moderate agreement range for AMM
- However, the 95% confidence intervals overlap, which would indicate no statistical difference between the two subsets



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Table 2. Variation in ECG Interpretation

	Normal Metabolic Milieu- *** Diagnostic for Culprit Artery	Normal Metabolic Milieu- *** Not Diagnostic for Culprit Artery
Abnormal Metabolic Milieu-ECG Diagnostic for Culprit Artery	6% (8)	22% (27)
Abnormal Metabolic Milieu-ECG Not Diagnostic for Culprit Artery	2% (2)	70% (88)



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## Results

- 35 ECGs interpreted as diagnostic for ATCO (+) in AMM 27 (77%) were reclassified as ATCO (-) after metabolic correction.
- 90 ECGs initially diagnosed as ATCO (-) in AMM 2 (2%) were reclassified as ATCO (+) whereas 88 (98%) remained as ATCO (-) in NMM.



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Table 3. accuracy compared to coronary Culprit Artery on angiogram

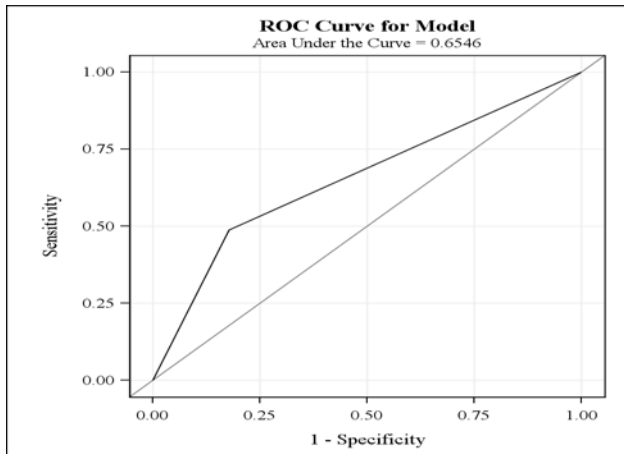
Accuracy of ECG to Predict Angiographic Coronary Culprit	Abnormal Metabolic Milieu (AMM)	Normal Metabolic Milieu (NMM)
Sensitivity	48.78%	17.07%
Specificity	82.14%	96.43%
Positive Predictive Value	57.14%	70%
Negative Predictive Value	76.67%	70.43
C-Statistic	0.665	0.568



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Figure 1. C-Statistic for AMM

C-Statistic	0.665
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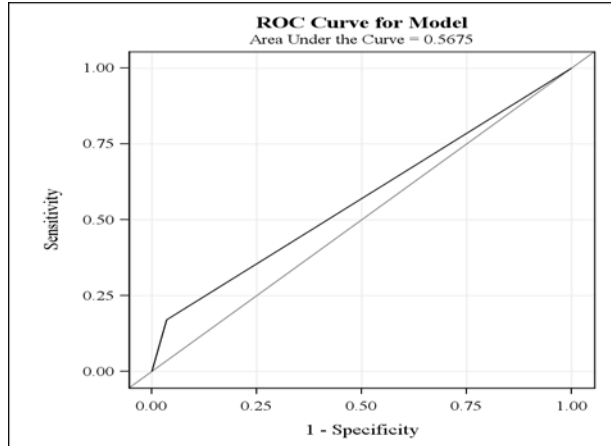


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## Figure 2. C-Statistic for NMM

C-Statistic	0.568
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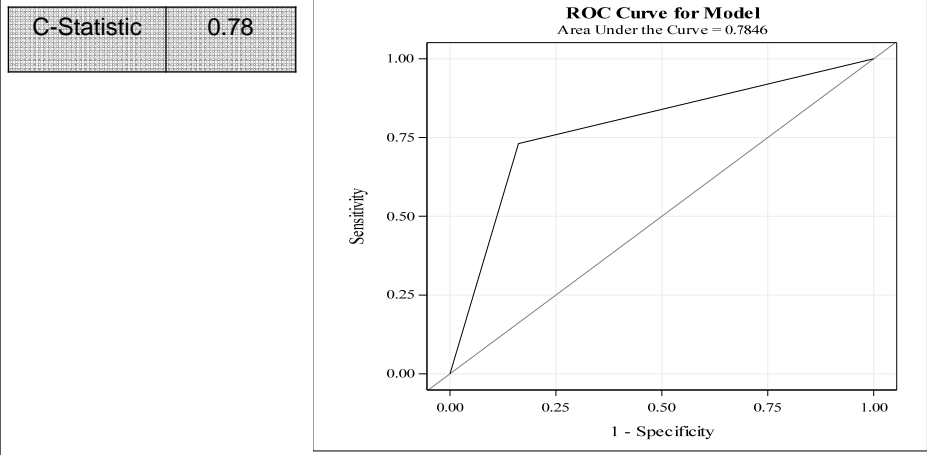
## Table 4. Accuracy compared to coronary Culprit Artery on angiogram with TIMI 0/1

Accuracy of ECG to Predict Angiographic Coronary Culprit	Abnormal Metabolic Milieu (AMM)	Normal Metabolic Milieu (NMM)
Sensitivity	73.08%	26.92%
Specificity	83.84%	96.97%
Positive Predictive Value	54.29%	70%
Negative Predictive Value	92.22%	83.48%
C-Statistic	0.785	0.619

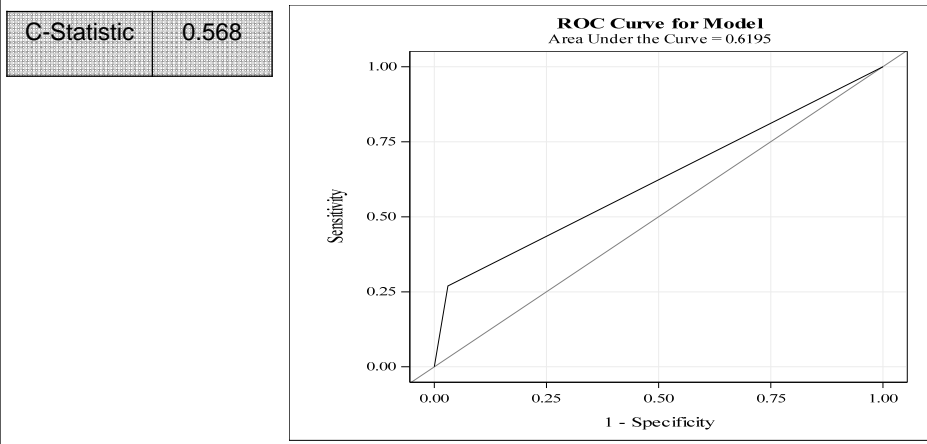


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### Figure 3. C-Statistic for AMM with TIMI 0/1



### Figure 4. C-Statistic for NMM with TIMI 0/1



## Conclusion

- Despite acceptable inter-reader concordance (moderate in AMM, high in NMM) between experienced ECG readers, a significant proportion of acute culprit lesions were missed on post resuscitation ECGs.



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## Conclusion

- A high percentage of patients with angiographic ATCO were reclassified on ECG from ATCO (+) in AMM to ATCO (-) in NMM, suggesting possible interim blunting/resolution of typical diagnostic ECG changes in NMM.



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