

Prognostic Significance of Heart Rate for Predicting Cardiac Death in Post-Infarction Patients On Beta Blocker Therapy

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Disclosure Information

Nothing to disclose

What we know

Elevated heart rate predicts recurrent cardiac events in post-infarction patients

Beta blockade therapy reduces the absolute risk of recurrent cardiac events in post-infarction patients

Specific Aim

To determine if elevated heart rate remains predictive of cardiac death in post-infarction patients on beta-blockade therapy.

Methods

Pooled data from MPIP, MDPIT, and THROMBO studies whereby:

- **Patients were admitted to a hospital with acute myocardial infarction**
 - Male or female, age > 21
- **Resting heart rate measured on pre-discharge ECGs**
 - Less than 1% with missing ECG data
- **Study dates range from 1981-1997**

Methods

- **Study Endpoint: Cardiac Death**
- **Statistical analyses:**
 - Determine heart rate quartiles for both groups (on and off beta blockers)
 - Cox multivariate model of cardiac death including clinical variables
 - Kaplan Meier curves of heart rate and beta blocker usage

4,462 post-infarction patients

**1947 (44%)
Not on B-blockers**

**2,513 (56%)
on B-blockers**

Heart Rate Q1	Heart Rate Q2	Heart Rate Q3	Heart Rate Q4
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Heart Rate Q1	Heart Rate Q2	Heart Rate Q3	Heart Rate Q4
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Heart Rate Ranges

	<u>1st Quartile</u>	<u>2nd Quartile</u>	<u>3rd Quartile</u>	<u>4th Quartile</u>
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Not taking B-blockers:

Range (bpm)	<65	65-75	76-90	>90
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Taking B-blockers:

Range (bpm)	<64	64-72	73-80	>80
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Clinical Characteristics

	<u>No B-blk</u> (n=1947)	<u>Yes B-blk</u> (n=2513)	<u>P-value</u>
Male	76%	80%	0.01
White	85%	83%	
Age \geq 60	53%	45%	<0.0001
Hypertension	36%	43%	<0.0001
EF \leq 35%	36%	25%	<0.0001
Pulm. Cong.	29%	14%	<0.0001
Diabetes	12%	11%	
Prior MI	22%	20%	
ASA	23%	47%	<0.0001
ACE-Inhibitor	7%	14%	<0.0001

Results

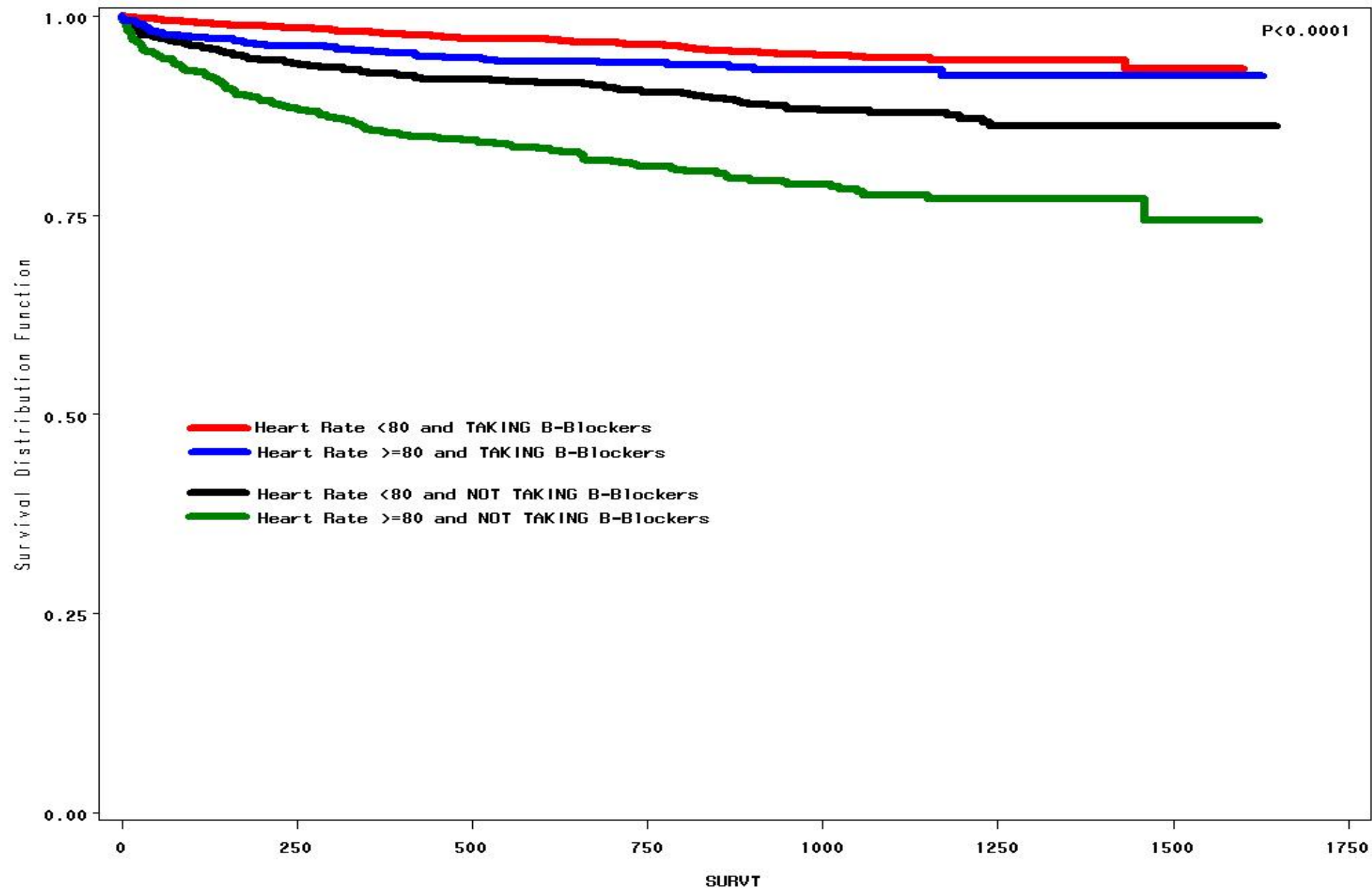
	<u>No B-blk</u> (n=1947)	<u>Yes B-blk</u> (n=2513)	<u>P-value</u>
Total Death	364 (19%)	172 (7%)	<0.0001
Cardiac Death	281 (14%)	121 (5%)	<0.0001
Cardiac Death Mean Heart Rate	86 bpm	76 bpm	<0.001

Multivariate Cox Analysis*

	<u>1st Quartile</u>	<u>2nd Quartile</u>	<u>3rd Quartile</u>	<u>4th Quartile</u>
<u>Not taking B-blockers:</u>				
Heart Rate Range (bpm)	<65	65-75	76-90	>90
Hazard Ratio (p-value)	1	1.61 (0.03)	1.67 (0.02)	2.17 (<0.001)
Cardiac Death Rates	6.6%	11.8%	16.7%	23.7%
<u>Taking B-blockers:</u>				
Heart Rate Range (bpm)	<64	64-72	73-80	>80
Hazard Ratio (p-value)	1	1.28 (0.36)	0.84 (0.58)	1.69 (0.05)
Cardiac Death Rates	3.5%	5.1%	3.7%	6.9%

* Adjusted for age, low EF, diabetes, hypertension, prior MI, pulmonary congestion, aspirin and ACE-inhibitor use

Kaplan–Meier Curves Comparing Cardiac Death Rates



Limitations

- **Retrospective analysis**
- **MI treatments improved over time course of the three studies**
- **10 second ECG recordings**
- **Intention-to-treat approach of beta blocker use history without full monitoring of heart rates or medication usage throughout study**

Conclusions

In post-infarction patients:

- 1. Resting heart rate >80 BPM poses a similar relative risk of cardiac death irrespective of the use of B-blocker therapy.**
- 2. (in patients on B-blocker therapy) Resting heart rate >80 BPM doubles the absolute risk of cardiac death compared to patients with heart rates <65 BPM**

Implications

1. **Beta blockade therapy is associated with an absolute reduction of cardiac death in post infarction patients irrespective of heart rate**
2. **Resting heart rate measurement is useful as a tool to adjust beta blockade therapy for the reduction of cardiac death in post-infarction patients**

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