

1 **High sensitivity troponin: do lower values predict better prognosis in acute**  
2 **myocardial infarction with ST-segment elevation? High sensitivity tro-**  
3 **ponin in myocardial infarction**  
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7 **ABSTRACT**

8 **Design of the study:** historical cohort

9 **Objectives:** To verify which risk factors contribute to raise high-sensitivity tro-  
10 ponin I in patients with **miocardial** infarction and assess its prognostic impacts.

11 **Methodology:** It was assessed medical records of patients admitted in the Cor-  
12 onary Unit of the Hospital de Clínicas (HC-UFPR) in Curitiba, South of Brazil, di-  
13 agnosed with ST segment elevation Myocardial Infarction and whose serum lev-  
14 els of high sensitivity troponin I (hsTnI) were collected at admission moment. The  
15 select data were: gender, age, high blood pressure, **tabagism**, diabetes, previ-  
16 ous myocardial infarction, dyslipidemia and serum levels of high sensitivity tro-  
17 ponin I. For prognostic proposes, it was analysed intra-hospital death and ven-  
18 tricular function, based on left ventricular ejection fraction.

19 **Findings:** Patients admitted with previous myocardial infarction had lower levels  
20 of hs-TnI. Gender, age, presence of high blood pressure, tabagism, diabetes  
21 and dyslipidemia didn't reveal correlation with troponin values, allowing the in-  
22 ference that high sensitivity troponin values at first **apresentation** of these pa-  
23 tients have no direct relation to these variables. Regarding prognosis, levels of  
24 high sensitivity troponin could not be associated to mortality or ventricular mal-  
25 function

26 **Conclusions:** At admission, high-sensitivity troponin I levels were lower in pa-  
27 tients with prior myocardial infarction.

28 **Relevance:** This work correlates the values of the high-sensitivity troponin of  
29 patients with ST segment Elevation **Miocardial** Infarction to cardiovascular risks  
30 factors and to the prognosis of these patients. This approach is not found in cur-  
31 rent medical literature, whose works mainly relates to acute events.

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33 **Keywords:** diagnosis; myocardial infarction; prognosis; troponin.  
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38 INTRODUCTION

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40 The use of biomarkers for diagnosis of acute myocardial infarction (AMI) is a  
41 clinical practice that has been used since the last century. Laboratory research for  
42 acute myocardial infarction had measures of creatine phosphokinase and its MB  
43 fraction (CK-MB) as gold standards, while conventional cardiac troponin test (cT-T)  
44 was in the background. From 2003, more sensitive cardiac troponin (cTn) dosing  
45 tests were available, and in 2007 the creation of a "ultra-sensitive" test occurred. In  
46 this context, in 1995, the diagnosis of AMI required plasma levels of cTn above 1.5 ng  
47 / mL to be made; in 2003, these biomarkers became identifiable from 0.10 ng / mL;  
48 and currently, ultra-sensitive tests have further reduced this value and levels higher  
49 than 0.04 ng / mL can be scanned.<sup>1</sup>

50 The evolution of cardiac biomarkers implies a new reality to medical practice,  
51 which includes early diagnosis of Acute Coronary Syndrome, allowing acknowledgment  
52 of patient's prognosis in severe cases and the follow-up of therapeutic effects  
53 generated by treatment.<sup>2</sup>

54 Several studies have shown that conventional troponin levels are related to prog-  
55 nosis of patients with acute myocardial infarction<sup>3-5</sup> Bertin Lindahl et al. concluded  
56 that elevations of conventional T troponin (cTnI) were associated with a higher prob-  
57 ability of coronary stenosis, thrombogenesis, and increased risk of reinfarction and  
58 death.<sup>5</sup>

59 Unlike cTnI, which lacks a further increase to be detected by laboratory tests,  
60 Ultrasensitive Troponin Test (hsT-T) means that tiny variations in levels of these  
61 markers of myocardial necrosis can be detected and, therefore, time from one meas-  
62 ure to the next can be shortened, making diagnosis and therapy more efficient.<sup>6</sup>

63 On the other hand, the use of these more accurate tests generates a diagnos-  
64 tic difficulty, since it's high sensitivity predisposes the evaluator to be more frequently  
65 facing "false positive" results - aortic dissection, cardioverter, pulmonary embolism,  
66 renal failure and sepsis are examples of clinical situations that generate troponin ele-  
67 vations, even in the absence of myocardial necrosis;<sup>7</sup> and, despite what is known  
68 about conventional troponins, there is no scientific evidence in literature that variation  
69 of High-sensitivity troponin sérum levels have a prognostic relationship with infarcted  
70 patients.

71 Given the need for a better understanding of this **exame** (hsT-T) and the bene-  
72 fits that it's interpretation can bring to proper care of patients suffering from an acute  
73 coronary event, this study aimed to verify which risk factors contribute to increase hs-  
74 Tnl in patients with **Miocardial Infarcion** with ST segment elevation and analyze if and  
75 which prognostic impacts it may have.

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## 77 METHODS

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79 This study is a historical cohort in which medical records of patients of the  
80 Hospital de Clínicas (HC / UFPR), admitted to the Coronary Unit in the period be-  
81 tween January 1, 2014 and December 31, 2014, with diagnosis of acute myocardial  
82 infarction with ST-segment elevation and who had serum levels of hs-Tnl dosed on  
83 admission. Patients under 18 years old, patients who did not present electrocardio-  
84 graphic findings of AMI with ST-segment elevation, or whose hs-Tnl serum level was  
85 not collected at admission were excluded from this study.

86 Data on gender, age, High Blood Pressure (HBP), smoking, diabetes mellitus  
87 (DM), previous infarction, dyslipidemia, hs-Tnl, intra hospital death and left ventricular

88 ejection fraction (EF) were collected. Among these data, intra hospital death and ven-  
89 tricular dysfunction (EF<45%) were used for prognostic analysis.

90 All procedures were submitted and approved for the Research Ethics Commit-  
91 tee (CEP) of the Hospital de Clínicas da Universidade Federal do Paraná, where the  
92 study was conducted.

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## 94 RESULTS

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96 We selected 77 patients who met the inclusion criteria. 30 were female (38.9%)  
97 and 47 male (61.0%), with a mean age of 61.2 years. (table 1). In this population, risk  
98 factors for acute coronary events and their relationship with high-sensitive troponin  
99 values obtained at hospital admission were assessed (table 2). As for variables of  
100 prognostic value, intra hospital death occurred in 11.1% of the cases and ejection  
101 fraction was lower than 45% in 28.3%.

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103 Table 1: Characteristics of the population included in the study

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106 Table 2: Prevalence of risk factors for Acute Coronary Syndrome (ACS) in the  
107 studied population

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109 Statistical analysis was based on models for independent samples. There was  
110 statistical significance in the relation of hs-TnI with previous myocardial infarction  
111 (graph 1). For the other analyzed variables, no statistical significance ways obtained  
112 in their comparisons with hs-TnI values (Table 3).

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114 Graph 1: Comparison of hs-TnI (pg / mL) with episode of previous infarction.

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117 Table 3: Relationship of hs-TnI values with independent variables studied, according  
118 to Mann-Whitney test, Hs-TnI (pg/mL) values correspond to the medians obtained  
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## 121 DISCUSSION

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123 **Patients** with history of previous heart infarction had lower serum hs-TnI,  
124 when compared to those patients without previous infarction. This might reflect the  
125 importance of cardiac collateral circulation in **reincident** patients, which contributes to  
126 a less muscle loss in a second event.<sup>9-10</sup> In patients with chronic coronary artery dis-  
127 ease, there is development of a collateral circulation network to supply the cardiac  
128 tissue demand. Therefore, in an acute ischemic event, myocyte loss due to the arte-  
129 riolar obstruction is lower than that in patients who do not have chronic coronary ar-  
130 tery disease and, because of this, do not have a compensatory collateral vasculariza-  
131 tion. This fact may justify the lower levels of hs-TnI in patients who have had an in-  
132 farction, since the existence of this previous event suggests that coronary heart dis-  
133 ease is present for a longer period of time and a collateral circulation network is bet-  
134 ter established.

135 It is important to emphasize that lower muscle loss can not be translated into a  
136 better prognosis, since patients already infarcted tend to have more comorbidities  
137 than patients who is suffering the acute coronary event for the first time. The HORI-  
138 ZONS-AMI<sup>11</sup> study indicates that reinfarction is a strong predictor of worse prognosis,  
139 and it has been found that these patients, besides having more comorbidities, are  
140 older, less likely to receive the treatment recommended by the guidelines and most  
141 often suffer cardiogenic shock. In our study, prognostic analysis - which included in-  
142 tra hospital death and ventricular dysfunction - was unable to determine a relation-  
143 ship between hs-TnI serum levels and prognosis.

144 Current **studies** have approached hs-TnI levels and its relation to acute  
145 events, especially acute myocardial infarction and possible differential diagnoses. In  
146 addition, it was found that periodic dosing of hs-TnI in the investigation of acute in-  
147 farction provides a high negative predictive value - 99.6% according to Gimenes et  
148 al<sup>12</sup>, however, the international literature lacks studies that assess the interference of  
149 the risk factors, usually present in patients who develop acute coronary syndrome, in  
150 the alteration of hs-TnI.

151 Our study aimed to supply this literary need and, through its results, generated  
152 new hypotheses to be evaluated. There is a need to carry out a study that contem-  
153 plates a larger number of patients and, in addition to assessing hs-TnI on admission  
154 moment, also analyze the variation of this cardiac biomarker over time and the rela-  
155 tionships thereof with cardiovascular risk factors and with the prognosis of the pa-  
156 tients.

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## 158 CONCLUSION

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160 High-sensitivity troponin I levels were lower in patients with previous myocar-  
161 dial infarction. No correlation was found with the other risk factors evaluated. Finally,  
162 high-sensitive troponin I serum levels could not be correlated with prognosis of pa-  
163 tients who were having an acute coronary ischemic event.

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## TABLES AND GRAPH

Table 1: Characteristics of the population included in the study

Data	Lowest value	Highest Value	Average	Median
Age (years)	28	89	61,2	61
hs-Tnl (pg/mL)	50	309.895	76.010	44.356

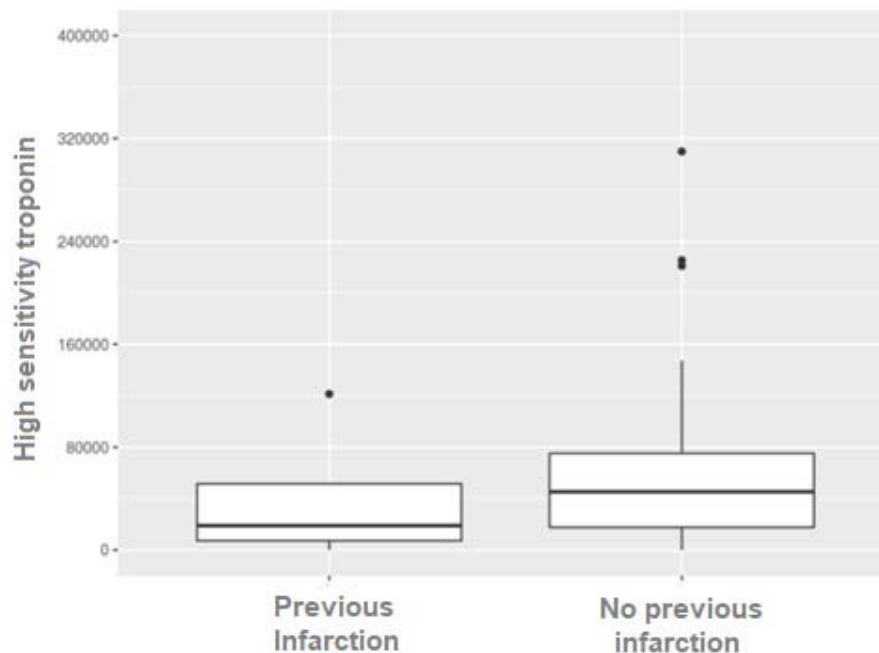
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Table 2: Prevalence of risk factors for Acute Coronary Syndrome (ACS) in the studied population

Risk factor	Prevalence
Dyslipidemia	81,5%
High Blood Pressure	66,1%
Tabagism	56,9%
Diabetes	36%
Previous infarction	8,4%

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242 Graph 1: Comparison of hs-TnI (pg / mL) with episode of previous infarction.



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245 Table 3: Relationship of hs-TnI values with independent variables studied, according  
 246 to Mann-Whitney test, Hs-TnI (pg/mL) values correspond to the medians obtained

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Variables	Hs-TnI with Risk Factor	Hs-TnI without Risk factor	Significância estatística (p)
Previous infarction	4899	50.000	0,0211
Diabetes	50.000	35.201	0,4171
HBP	50.000	46.214	0,5154
Dyslipidemia	45.289	53.239	0,9306
Intra Hospital Death	30.501	39.831	0,9786
EV<45%	28.751	48.111	0,5358

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