



ISSN (E): 2277- 7695

ISSN (P): 2349-8242

NAAS Rating: 5.23

TPI 2021; 10(8): 10-16

© 2021 TPI

www.thepharmajournal.com

Received: 09-06-2021

Accepted: 16-07-2021

Valon Asani

UT – Faculty of Medical Sciences
Tetovo, Republic of North
Macedonia Clinical Hospital
Tetovo, North Macedonia

Atila Rexhepi

UT – Faculty of Medical Sciences
Tetovo, Republic of North
Macedonia Clinical Hospital
Tetovo, North Macedonia

Fisnik Demiri

UT – Faculty of Medical Sciences
Tetovo, Republic of North
Macedonia Clinical Hospital
Tetovo, North Macedonia

Halit Sejfuli

UT – Faculty of Medical Sciences
Tetovo, Republic of North
Macedonia Clinical Hospital
Tetovo, North Macedonia

Vlora Ibrahim Ademi

UT – Faculty of Medical Sciences
Tetovo, Republic of North
Macedonia Clinical Hospital
Tetovo, North Macedonia

Corresponding Author:

Valon Asani

UT – Faculty of Medical Sciences
Tetovo, Republic of North
Macedonia
Clinical Hospital Tetovo

Impact of Rosuvastatin in post AMI/STEMI patients

Valon Asani, Atila Rexhepi, Fisnik Demiri, Halit Sejfuli and Vlora Ibrahim Ademi

Abstract

In this synchronous – primary research, we tend to monitor for 6 months the effect of Rosuvastatin in patients that have been diagnosed with AMI/STEMI. Knowing that reducing and maintaining optimal lipid status in post AMI/PCI patients it is crucial, we want mathematically to verify the effect of Rosuvastatin in these patients.

Keywords: Impact, Rosuvastatin, AMI/STEMI, AMI/PCI

Introduction

For this research we have analyzed the blood work of 20 patients, that came to the department of Interventional Cardiology in the Clinical Hospital Tetovo and were diagnosed with acute myocardial infarction – ST segment elevation myocardial infarction.

The diagnosis was established by performing 12 lead EKG, and laboratory analysis. After these procedures, the patient was sent in the catheterization laboratory where the patients were diagnosed with 100% occlusion of a coronary artery. After the patients were stented, they were treated with:

- Acetylsalicylic acid 100 mg 1x1
- Clopidogrel 75 mg
- Rosuvastatin 40 mg
- Necessary antihypertensive therapy

We have collected and analyzed data of the laboratory results from the blood work of the patients every three months from the admission, meaning:

- 1st blood laboratory was made in February 2021
- 2nd blood laboratory was made in May 2021
- 3rd blood laboratory was made in August 2021

Prior to the infarctions these patients were not on any therapy for any kind of dyslipidemia.

Methods

For this 6 months (from February to August 2021) research we have used

1. Data tabelization; collected from the patients' blood works each 3 months from the admission
2. 12 lead EKG to diagnose AMI/STEMI
3. Necessary catheterization laboratory techniques performed by interventional cardiologists

The 20 patients that were diagnosed with AMI during February 2021, flowed this protocol

1. Admission (during the admission anamnesis was taken from the patients, if the patients prior to the event have taken any hypolipidemic agents; only patients that answered “NO” to this question were selected for the research)
2. EKG performed to verify ST segment elevations
3. Phlebotomy and blood draw prior to PCI (first blood laboratory)
4. Prior to PCI standard therapy was given to the patients
5. PCI procedure and Stenting (we selected patients that had only one culprit heart vessel occluded 100% for this research)
6. Prescription of protocol and necessary therapy including Rosuvastatin 40 mg 1x1
7. Second laboratory performed on May 2021
8. Third laboratory performed on August 2021

Results

After we have collected for each patient 3 laboratories, dating on February, May and August 2021, we started the process of tabelizing the collected data from the patients' lipid status.

We referred to the first laboratory as the baseline laboratory, the other two labs were refed as 3-month checkup laboratory and 6-month checkup laboratory. The data are presented in

Table 1. The analyzed lipid status in its self contains

1. Total cholesterol with referent values: <5.2 mmol/l
2. Triglyceride with referent values: 0-1.7 mmol/l
3. High density lipoprotein with referent values: >1.60 mmol/l (0.9-1.60 decreased values; <0.9 high risik)
4. Low density lipoprotein with referent values: <3.4 mmol/l

Table 1: General data of 3 laboratories for each (20) patient

General data												
Baseline data					3 months check up				6 months check up			
Patient number	Total cholesterol	Triglycerides	HDL	LDL	Total cholesterol	Triglycerides	HDL	LDL	Total cholesterol	Triglycerides	HDL	LDL
1	4.7	0.91	0.84	3.48	3.4	1.93	0.86	1.7	2.9	1.36	0.75	1.5
2	5.2	2.03	1.09	3.2	5	0.94	1.27	3.3	4.83	0.92	1	3.2
3	4.5	1.64	0.72	3	3.1	1	1.1	1.5	2.7	0.92	0.99	1.3
4	5.77	2.24	0.1	5.2	5.7	0.83	1.25	4.3	5.4	0.7	1.32	4.1
5	2.8	0.88	0.88	1.5	2.3	0.99	0.77	4.1	2.8	2.16	0.69	1.1
6	3.9	94	1.23	2.2	3.2	2.27	0.98	1.2	3.4	2.3	1.2	1.3
7	3.7	0.82	0.53	1	2.43	0.7	1.11	1	2.5	1.33	0.87	1
8	6.1	1.04	1.1	4.5	3.6	3.01	0.81	1.42	3.6	2.4	1.7	3
9	5	6.32	0.49	3	3.4	5.75	0.52	3.02	4	4.54	0.56	3
10	5	2.26	0.87	3.1	3	1.76	1.18	1	3	1.56	1.37	0.9
11	3	0.52	1.04	1.7	2.6	0.98	0.99	1.2	3.4	1.1	1.09	1.8
12	2.9	0.3	0.5	1.5	3	0.87	0.55	1	3.2	0.96	0.67	0.95
13	3.6	0.39	1.35	2.1	3.7	0.4	1.57	1.9	4.3	0.6	1.4	2.6
14	2.7	0.91	0.8	1.5	7.8	2.41	0.73	5.6	5	2	1.1	3.3
15	3.4	0.62	0.76	2.5	3.5	1.13	1.01	2	3.62	2.4	1.7	3
16	3.7	1.14	0.97	2.2	4	1.06	1.12	2.4	4.02	1	1.01	2.4
17	5.6	2.73	0.69	3.7	4.7	1.45	1.05	3	3.2	1.32	1.04	1.6
18	3.1	1.21	0.88	1.7	3.3	2.48	0.82	1.2	4.1	1.96	1.11	2.1
19	4.2	0.5	1.19	2.8	2.6	52	1.27	1.1	2.6	0.53	1.3	1.3
20	3.7	0.5	1.3	2	2.9	1.54	1.15	1	2.7	0.96	1.16	1.1

After finalizing the general data, we have divided the general data in 3 other tables for each checkup, for each analyzed substance we have calculated the average value.

The baseline data are presented in Table 2. According to the average data for the baseline laboratory:

- The average value of total cholesterol is 4.2 mmol/l (normal levels);
The Mode of the total cholesterol is: 3.7mmol/l

- The average value of triglycerides is 0.70 mmol/l (close to the upper level of the referent values) The Mode of triglycerides is: 0.91 mmol/l
- The average value of HDL is 1.07 mmol/l (the gained value is lower than the reference value)
- The Mode of HDL is: 0.88 (lower than the referent value)
- The average value of LDL is 2.74 (normal values) The Mode of LDL is: 1.5 mmol/l

Table 2: Baseline data

Patient number	Total cholesterol	Triglycerides	HDL	LDL
1	4.7	0.91	0.84	3.48
2	5.2	2.03	1.09	3.2
3	4.5	1.64	0.72	3
4	5.77	2.24	0.1	5.2
5	2.8	0.88	0.88	1.5
6	3.9	94	1.23	2.2
7	3.7	0.82	0.53	1
8	6.1	1.04	1.1	4.5
9	5	6.32	0.49	3
10	5	2.26	0.87	3.1
11	3	0.52	1.04	1.7
12	2.9	0.3	0.5	1.5
13	3.6	0.39	1.35	2.1
14	2.7	0.91	0.8	1.5
15	3.4	0.62	0.76	2.5
16	3.7	1.14	0.97	2.2
17	5.6	2.73	0.69	3.7
18	3.1	1.21	0.88	1.7
19	4.2	0.5	1.19	2.8
20	3.7	0.5	1.3	2
Average:	4.2	0.70	1.07	2.74

According to the analysis that we have made to the individual presentation of dysmorphosis of the patients' lipid status, we have gained variations of dyslipidemia:

1. Patients with total lipid dysbalance: 3 patients
2. Patients with isolated HDL low values: 11 patients
3. Patients with low levels of HDL and high levels of LDL: 3 patients
4. Patients with high total cholesterol, high triglycerides and low HDL: 3 patients

Characteristic about this tables analysis is that on all the patients we have noticed low levels of HDL.

The 3-month checkup data are presented in Table 3. The average values gained are:

- The average value of total cholesterol is 3.66 mmol/l (normal value) The Mode of the total cholesterol is: 3.4 mmol/l
- The average value of triglycerides is 1.83 mmol/l (higher than the reference value)
- The average value of HDL is 1 mmol/l (the gained value is lower than the reference value) The Mode of HDL is: 1.27 mmol/l
- The average value of LDL is 2.14(normal value) The Mode of LDL is: 1.2 mmol/l

Table 3: 3 moth checkup data

Patient number	Total cholesterol	Triglycerides	HDL	LDL
1	3.4	1.93	0.86	1.7
2	5	0.94	1.27	3.3
3	3.1	1	1.1	1.5
4	5.7	0.83	1.25	4.3
5	2.3	0.99	0.77	4.1
6	3.2	2.27	0.98	1.2
7	2.43	0.7	1.11	1
8	3.6	3.01	0.81	1.42
9	3.4	5.75	0.52	3.02
10	3	1.76	1.18	1
11	2.6	0.98	0.99	1.2
12	3	0.87	0.55	1
13	3.7	0.4	1.57	1.9
14	7.8	2.41	0.73	5.6
15	3.5	1.13	1.01	2
16	4	1.06	1.12	2.4
17	4.7	1.45	1.05	3
18	3.3	2.48	0.82	1.2
19	2.6	5.2	1.27	1.1
20	2.9	1.54	1.15	1
Average	3.66	1.83	1	2.14
Mode	3.4	-	1.27	1.2

Variations of dyslipidemia gained form the second performed blood laboratory are

1. Patient with total dysbalance of lipid status: 1
2. Patient with high values of triglycerides and low levels of HDL: 7
3. Patient with high levels of triglycerides and total cholesterol but low levels of HDL: 1
4. Patients with low levels of HDL: 9
5. Patient with high values of total cholesterol and LDL but low levels of HDL: 1
6. Patients with low levels of HDL but high levels of LDL: 2

If we compare the average values form the first and the second table, we can conclude that rosuvastatin had modified these values:

- Total cholesterol value has lowered for 0.8 mmol/l for 3 months
- Triglycerides have increased for 1.13 mmol/l for 3 months
- HDL levels have increased for 0.2 mmo/l
- LDL levels have decreased for 0.6mmol/l

The 6-month checkup data are presented in Table 4. The gained average values are:

- The average value of total cholesterol is 3.56 mmol/l (normal value) The Mode of the total cholesterol is: 2.7 mmol/l
- The average value of triglycerides is 1.55 mmol/l (normal value) The Mode of triglycerides is: 0.92 mmol/l
- The average value of HDL is 1.10 mmol/l (the gained value is lower than the reference value) The Mode of HDL is: 1.7 mmol/l
- The average value of LDL is 2.02 (normal value) The Mode of LDL is: 1.3 mmol/l

Table 4: 6-month checkup data

Patient number	Total cholesterol	Triglycerides	HDL	LDL
1	2.9	1.36	0.75	1.5
2	4.83	0.92	1	3.2
3	2.7	0.92	0.99	1.3
4	5.4	0.7	1.32	4.1
5	2.8	2.16	0.69	1.1
6	3.4	2.3	1.2	1.3
7	2.5	1.33	0.87	1
8	3.6	2.4	1.7	3
9	4	4.54	0.56	3
10	3	1.56	1.37	0.9
11	3.4	1.1	1.09	1.8
12	3.2	0.96	0.67	0.95
13	4.3	0.6	1.4	2.6
14	5	2	1.1	3.3
15	3.62	2.4	1.7	3
16	4.02	1	1.01	2.4
17	3.2	1.32	1.04	1.6
18	4.1	1.96	1.11	2.1
19	2.6	0.53	1.3	1.3
20	2.7	0.96	1.16	1.1
Average	3.56	1.55	1.10	2.02
Mode	2.7	0.92	1.7	1.3

Variations of dyslipidemia gained form the second performed blood laboratory are:

1. Low levels of HDL 12 patients
2. High levels of HDL and Total cholesterol 1 patient
3. High levels of triglycerides and low levels of HDL 4
4. High levels of triglyceride 2 patient
5. High levels of total cholesterol and triglycerides with low levels of HDL 1 patient

If we compare the average values gained from the lab data of the 3-month checkup and the data from the 6-month checkup we conclude that:

- The average value of total cholesterol levels has been increased for 0.16 mmol/l (even so the value is in the normal range of the referent value)
- The average value of triglycerides has been decreased for 0.28 mmol/l
- The average value for HDL has been increased for 0.10mmol/l (still remaining lower than the referent value)
- The average value for LDL has been decreased 0.12 mmol/l

Table 5: Index of Rosuvastatin action on total cholesterol

Patient number	Total cholesterol Baseline	1 st trimester of action	Total cholesterol 3 Months	2 nd trimester of action	Total cholesterol 6 Months
1	4.7	1.3	3.4	0.5	2.9
2	5.2	0.2	5	0.17	4.83
3	4.5	1.4	3.1	0.4	2.7
4	5.77	0.07	5.7	0.3	5.4
5	2.8	0.5	2.3	-0.5	2.8
6	3.9	0.7	3.2	-0.2	3.4
7	3.7	1.27	2.43	-0.07	2.5
8	6.1	2.5	3.6	0	3.6
9	5	1.6	3.4	-0.6	4
10	5	2	3	0	3
11	3	0.4	2.6	-0.8	3.4
12	2.9	-0.1	3	-0.2	3.2
13	3.6	-0.1	3.7	-0.6	4.3
14	2.7	-5.1	7.8	2.8	5
15	3.4	-0.1	3.5	-0.12	3.62
16	3.7	-0.3	4	-0.02	4.02
17	5.6	0.9	4.7	1.5	3.2
18	3.1	-0.2	3.3	-0.8	4.1
19	4.2	1.6	2.6	0	2.6
20	3.7	0.8	2.9	0.2	2.7
Average		0.46		0.10	
Index of action				0.28	

In the table 5, we have presented isolated total cholesterol values. To find the average value of the impact of rosuvastatin in the total cholesterol, first we found out the average impact of rosuvastatins in the total cholesterol values; which for the first 3-months is: 0.46 mmol/l, and for the second 3 months it

is 0.10 mmol/l. The average value gained from the average of 1st trimester of action and 2nd trimester of action it is the index of rosuvastatins' action which is 0.28 mmol/l in a 6-month period.

Table 6: Index of Rosuvastatins action on triglycerides

Patient number	Triglycerides Baseline	1 st trimester of action	Triglycerides 3 Months	2 nd trimester of action	Triglycerides 6 Months
1	0.91	-1.02	1.93	0.57	1.36
2	2.03	1.09	0.94	0.02	0.92
3	1.64	0.64	1	0.08	0.92
4	2.24	1.41	0.83	0.13	0.7
5	0.88	-0.11	0.99	-1.17	2.16
6	9.4	7.13	2.27	-0.03	2.3
7	0.82	0.12	0.7	-0.63	1.33
8	1.04	-1.97	3.01	0.61	2.4
9	6.32	0.57	5.75	1.21	4.54
10	2.26	0.5	1.76	0.2	1.56
11	0.52	-0.46	0.98	-0.12	1.1
12	0.3	-0.57	0.87	-0.09	0.96
13	0.39	-0.01	0.4	-0.2	0.6
14	0.91	-1.5	2.41	0.41	2
15	0.62	-0.51	1.13	-1.27	2.4
16	1.14	0.08	1.06	0.06	1
17	2.73	1.28	1.45	0.13	1.32
18	1.21	-1.27	2.48	0.52	1.96
19	0.5	-4.7	5.2	4.67	0.53
20	0.5	-1.04	1.54	0.58	0.96
Average		1.82	-0.02	1.83	0.28
Index of action				0.70	

Table 6 shows the data of triglycerides only in a period of 6 months. The average value gained with the calculation of the average value of 1st and 2nd trimester, tells the index of action of Rosuvastatin in the triglycerides which is 0.70mm/l.

Meaning that bay regular intake of Rosuvastatin for 6 months, the body can decrease in average of 0.70mmol/l form the baseline value the triglycerides.

Table 7: Index of action of Rosuvastatin on HDL

Patient number	HDL Baseline	impact of action 1st trimester	HDL 3Months	impact of action in the second trimester	HDL 6Months
1	0.84	+0.02	0.86	-0.11	0.75
2	1.09	+0.18	1.27	-0.27	1
3	0.72	+0.38	1.1	-0.11	0.99
4	0.1	+1.15	1.25	+0.07	1.32
5	0.88	-0.11	0.77	-0.08	0.69
6	1.23	-0.25	0.98	+0.22	1.2
7	0.53	+0.58	1.11	-0.24	0.87
8	1.1	-0.29	0.81	+0.89	1.7
9	0.49	+0.03	0.52	+0.04	0.56
10	0.87	+0.31	1.18	+0.19	1.37
11	1.04	-0.05	0.99	+0.1	1.09
12	0.5	+0.05	0.55	+0.12	0.67
13	1.35	+0.22	1.57	-0.17	1.4
14	0.8	-0.07	0.73	+0.37	1.1
15	0.76	+0.25	1.01	+0.69	1.7
16	0.97	+0.15	1.12	-0.11	1.01
17	0.69	+0.36	1.05	-0.01	1.04
18	0.88	-0.06	0.82	+0.29	1.11
19	1.19	+0.08	1.27	+0.03	1.3
20	1.3	-0.15	1.15	+0.01	1.16
average	0.8665	+0.139	1.0055	+0.096	1.1015
Index of action		+0.117			

Table 7 represents the index of action of Rosuvastatin on HDL. After we calculated the average value of impact of the first and second trimester ($0.139+0.96 / 2$) we found out the

index of action of Rosuvastatin on HDL for a period of 6 months, that is: 0.117 0.12 mmol/l.

Table 8: Index of action of Rosuvastatin on LDL

Patient number	LDL Baseline	Impact on 1st trimester	LDL 3Months	Impact on 2nd trimester	LDL 6Months
1	3.48	1.78	1.7	0.2	1.5
2	3.2	-0.1	3.3	0.1	3.2
3	3	1.5	1.5	0.2	1.3
4	5.2	0.9	4.3	0.2	4.1
5	1.5	-2.6	4.1	3	1.1
6	2.2	1	1.2	-0.1	1.3
7	1	0	1	0	1
8	4.5	3.08	1.42	-1.58	3
9	3	-0.02	3.02	0.02	3
10	3.1	2.1	1	0.1	0.9
11	1.7	0.5	1.2	-0.6	1.8
12	1.5	0.5	1	0.05	0.95
13	2.1	0.2	1.9	-0.7	2.6
14	1.5	-4.1	5.6	2.3	3.3
15	2.5	0.5	2	-1	3
16	2.2	-0.2	2.4	0	2.4
17	3.7	0.7	3	1.4	1.6
18	1.7	0.5	1.2	-0.9	2.1
19	2.8	1.7	1.1	-0.2	1.3
20	2	1	1	-0.1	1.1
Average	2.594	0.447	2.147	0.1195	2.0275
Index of action		0.9045			

Table 8 represents all the data collected from the blood laboratories. After finding out the average value of Rosuvastatin's impact on the first and second trimester, we calculated the index of action of Rosuvastatin on LDL in a period of 6-months. The index is $0.9045=0.90$ mmol/l.

To this analysis we also wanted to report, that from 20 patients, 2 were female and 18 participants were male. Meaning in the study 10% are female and 90% are male. The dominant age of the participants is 65 years (table 9 and Figure 2).

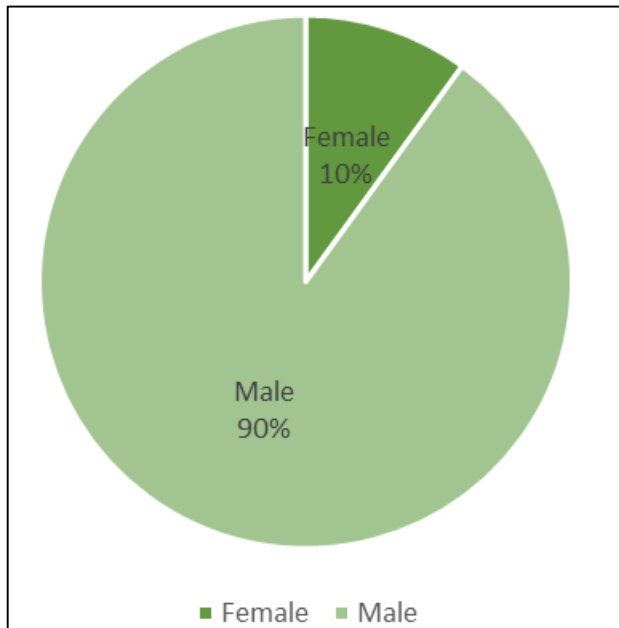


Fig 1: Gender distribution of participants in the research

Table 9: Age distribution

Patient number	Age distribution
1	65
2	70
3	57
4	58
5	80
6	90
7	75
8	56
9	45
10	69
11	81
12	75
13	65
14	71
15	63
16	59
17	66
18	67
19	63
20	80
Average	72.5
Mode	65

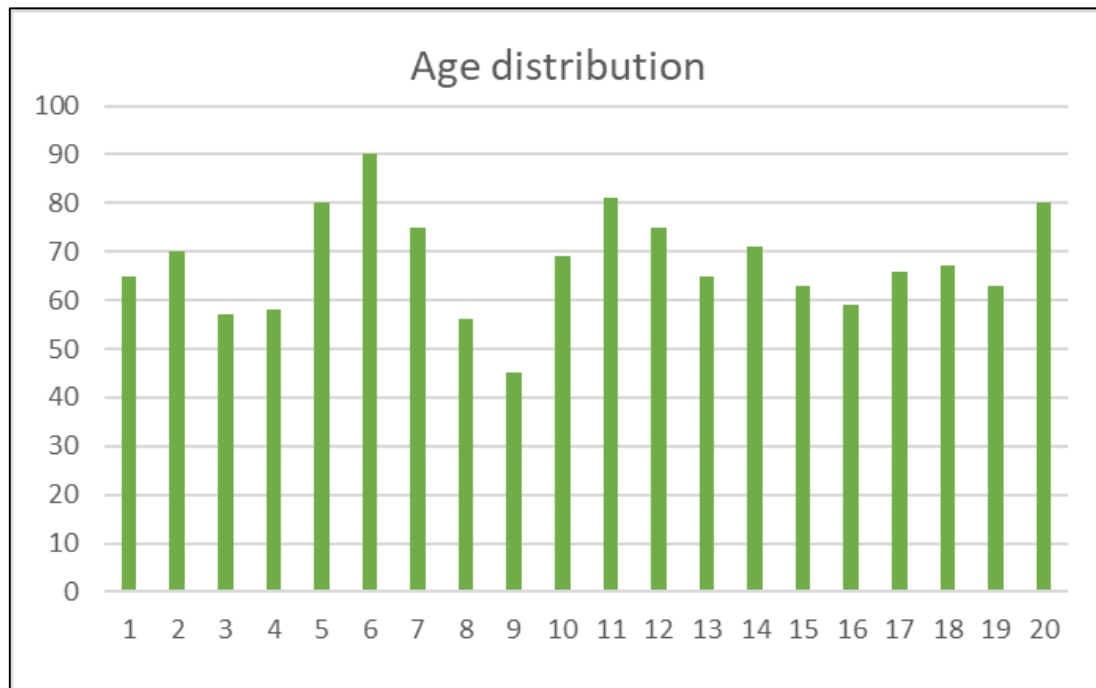


Fig 2: Age distribution

Discussion

By this research with 20 participants we wanted to analyze to mayor factors that occur in patients with AMI-STEMI; 1. The lipid status prior to the AMI event and 2. The impact of Rosuvastatin in reducing and regulating the lipid status in patients post AMI/PCI.

The general overview of the lipid status emphasizes total cholesterol and Ldl as main risk factors that contribute in the formation of atherosclerotic plaques in the human vessels especially in the coronary arteries.

The formation of cholesterol stars with the junction of Acetyl CoA and Acetoacetyl CoA under the impact of HMG CoA synthetize, that results with the formation of 3-hydroxyl-3metilglutaril-COA. HMG Reductase act on HMG CoA by creating the Mevalonic Acid that later on turns in to: iso-

phentenil-priophosphat, squalene, larosterol and at the end cholesterol. Rosuvastatins act on inhibiting the enzyme HMG Reductase which prevents on creating the mevalonic cycle, indirect stopping the formation of cholesterol.

From our analysis in the baseline laboratory values, we have concluded that prior to AMI and aiding to AMI the lipid status in all our selected patients were disbalanced. Some patients had total lipid disordered values and others had isolated substances that had deviant lab values. In the bassline labs we found out that in all our patients HDL levels were very low (according to our Accredited Clinical Laboratory the levels of HDL were in the critical range).

In the second blood laboratory, we found out that the values of total cholesterol, triglycerides and LDL were evidently corrected, whereas the values of HDL were increased for 0.13

mm/l but still remaining in the critical range. After processing the 3rd laboratory of these patients, we came in to a conclusion the Rosuvastatin acts wonderful in creating a perfect balanced lipid status in patients post AMI. Most of the patients in the last visit came with normal values of total cholesterol, triglycerides and LDL. In these data also we have noticed that there is a slight increase in the value of HDL, with an index of action $+0.117 = 0.12$ mmol/l, but the overall values of HDL were still low but not in the critical range. Presumably if the index of action of Rosuvastatin in this research is 0.12mmol/l in a period for 6 months, after 12 months of Rosuvastatin the index may increase in linear value being 0.24 mmol/l and only after 24 months the index of action may increase in 0.48 mmol/l that may boost HDL function in the organism.

From the research we concluded that not only total cholesterol, triglycerides and LDL play a great role in precipitating AMI events, HDL should not be neglected also, due to the fact that in the baselines reports we have 11 patients out of 20 with isolated HDL with critical low values that have resulted in AMI. On the other side Rosuvastatin has an impact on maintaining the lipid status in normal ranges, but Rosuvastatin help very little and very slowly in the formation of HDL (in the third lab we have only 2 patients that have shown a normal value of HDL 1.70mmol/l but associated with high levels of triglycerides.)

References

1. Alberico L Catapano, Ian Graham, Guy De Backer, Olov Wiklund, M John Chapman, Heinz Drexel *et al*, ESC/EAS Guidelines for the Management of Dyslipidaemias, European Heart Journal 2016;37(39):2999-3058
<https://doi.org/10.1093/eurheartj/ehw272>
2. Harrison's Principles of Internal Medicine, Cardiology 17 edition, editors A. Fauci *et al*. Mc Graw Hill Medical, Cardiology 2008;217:1527-1532.
3. Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine, Single Volume, 11th Edition, Douglas P. Zipes & Peter Libby & Robert O. Bonow & Douglas L. Mann & Gordon F Tomaselli, 2019
4. ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation: Task Force for the Management of Acute Coronary Syndromes in Patients Presenting without Persistent ST-Segment Elevation of the European Society of Cardiology (ESC) Marco Roffi, Carlo Patrono, Jean-Philippe Collet, Christian Mueller, Marco Valgimigli, Felicita Andreotti, Jeroen J. Bax, Michael A. Borger, Carlos Brotons, Derek P. Chew European Heart Journal 2016;37(3):267-315.
5. Fourth universal definition of myocardial infarction, Kristian Thygesen, Joseph S Alpert, Allan S Jaffe, Bernard R Chaitman, Jeroen J Bax, David A Morrow, Harvey D White, ESC Scientific Document Group, European Heart Journal 2019;40(3):237-269.
6. Mayo Clinic cardiology, Joseph G. Murphy, MD Margaret A. Lloyd, MD, Oxford University press, 2013.
7. 2019 ESC/EAS Guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk. Eur Heart J 2019. doi/10.1093/eurheartj/ehz455