

CHANGES IN THE IMMUNOLOGIC MARKERS OF COLLAGEN TYPE IV DEGRADATION IN SUBJECTS WITH METABOLIC SYNDROME

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ABSTRACT:

Background: Collagen is the major protein component of the vessels. Collagen type IV is found exclusively in the basal membrane and doesn't form individual fibers, but instead is presented as a polygonal amorphous matrix that is associated with laminin and other matrix macromolecules to form the unique matrix basal membrane. Under the influence of the risk factors characterizing the metabolic syndrome, a variety of basal membrane degrading enzymes are activated. This leads to an early changes in vascular wall and accelerates the vascular aging. The early manifestation of the metabolic syndrome in younger people in the modern society, leads to earlier manifestation of the complications of early vessels aging. Loss of elasticity is a key component in the pathogenesis of cardiovascular complications.

Materials and methods: A study is conducted on 62 subjects with metabolic syndrome without vascular complications and 42 controls. The main objective of the study was to compare the immunological markers of Collagen type IV degradation in both groups and to assess their relationship with the risk factors characterizing the metabolic syndrome.

Results: When comparing the levels of Anti Coll IV Ab IgG in the control group and subjects with metabolic syndrome (respectively 0.28 ± 0.08 and 0.40 ± 0.11) a statistically significantly higher levels of Anti Coll IV Ab IgG were determined in the group with metabolic syndrome, $F = 30.299$, $p = 0.000$. In the whole sample Anti Coll IV Ab IgG showed negative correlation with HDL with a correlation Spearman coefficient $r = 0,26$, and $p = 0,02$. The antibodies showed positive correlation with the diastolic pressure (DP), blood sugar (Gluc), total cholesterol (Tchol), triglycerides (Tg) and LDL. The positive correlations were with Pearson correlation coefficient as follows: DP - $r = 0,22$, $p = 0,04$; Gluc - $r = 0,27$, $p = 0,01$; TChol - $r = 0,30$, $p = 0,005$; Tg - $r = 0,34$, $p = 0,002$; LDL - $r = 0,32$, $p = 0,002$.

Conclusion: It is proved that the ACol IVAb IgG and are significantly elevated in the subjects with metabolic

syndrome without manifested cardiovascular complications compared with the control group and there is a strong correlation between the Ab and the risk factors.

Key words: Metabolic syndrome, AEAb IgG, ATEAb IgG, risk factor

BACKGROUND:

Collagen is the major protein component of the vessels. Collagen type IV is found exclusively in the basal membrane and doesn't form individual fibers, but instead is presented as a polygonal amorphous matrix that is associated with laminin and other matrix macromolecules to form the unique matrix basal membrane. Under the influence of the risk factors characterizing the metabolic syndrome, a variety of basal membrane degrading enzymes are activated. This leads to an early changes in vascular wall and accelerates the vascular aging. The early manifestation of the metabolic syndrome in younger people in the modern society, leads to earlier manifestation of the complications of early vessels aging. Loss of elasticity is a key component in the pathogenesis of cardiovascular complications.

MATERIALS AND METHODS:

A study is conducted on 62 subjects with metabolic syndrome without vascular complications and 42 controls. The main objective of the study was to compare the immunological markers of Collagen type IV degradation in both groups and to assess their relationship with the risk factors characterizing the metabolic syndrome.

RESULTS:

When comparing the levels of Anti Coll IV Ab IgG in the control group and subjects with metabolic syndrome (respectively 0.28 ± 0.08 and 0.40 ± 0.11) a statistically significantly higher levels of Anti Coll IV Ab IgG were determined in the group with metabolic syndrome, $F = 30.299$, $p = 0.000$, Figure 1.

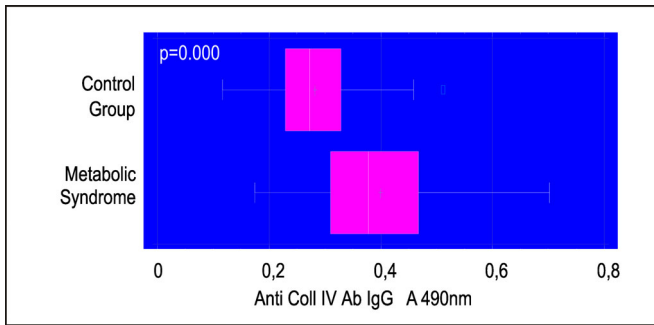


Fig. 1. Comparison of the levels of Col IV Ab IgG in the control group and subjects with metabolic syndrome

No significant difference was found when comparing the medians of Anti Col IV Ab IgM in healthy subjects and metabolics respectively 0.41 and 0.39, $p > 0.05$.

In all tested subjects ACollIVAb IgG showed weak positive but statistically significant correlation with the levels of diastolic blood pressure with Pearson's $r = 0,22$, and $p = 0,04$. Regression analysis best describes this relationship which is linear, $r = 0,22$, $p = 0,04$, Figure A Coll IV Ab IgG

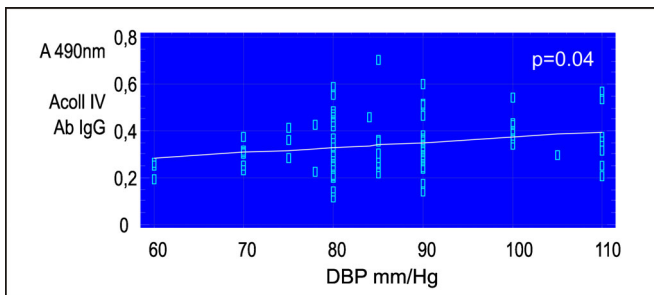


Fig. 2. Correlation analysis between A Coll IV Ab IgG and levels of DBP in the whole group

There is a weak positive statistically significant correlation between A Coll IV Ab IgG levels and blood sugar levels with a Pearson correlation coefficient of $r = 0,27$, and $p = 0,01$. Regression analysis best describes this relationship which is linear, $r = 0,27$, $p = 0,01$, Fig. 3.

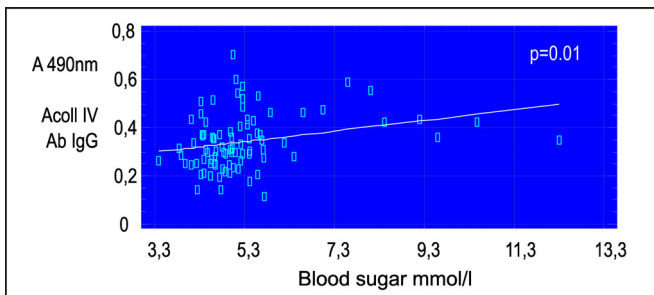


Fig. 3. Correlation analysis between A Coll IV Ab IgG

and glucose levels in the whole group

A moderate positive correlation was determined between the levels of A Coll IV Ab IgG and total cholesterol levels, with a Pearson correlation coefficient $r = 0,30$, $p = 0,005$. Regression analysis best describes this relationship which is linear, $r = 0,30$, $p = 0,005$, Fig.4

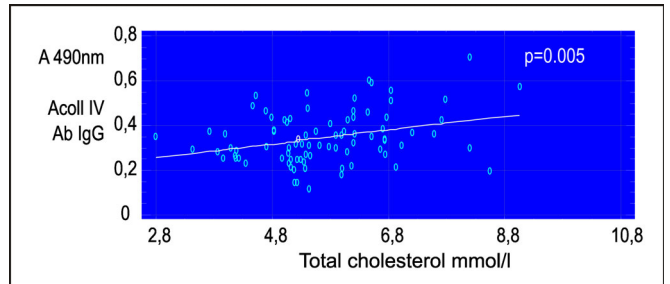


Fig. 4. Correlation analysis between A Coll IV Ab IgG and total cholesterol levels in the whole group

There is a moderate positive correlation between the A Coll IV Ab IgG levels and the triglycerides levels, with a Pearson correlation coefficient of $r = 0,34$, $p = 0,002$. Regression analysis best describes this relationship which is linear, $r = 0,34$, $p = 0,002$, fig.5

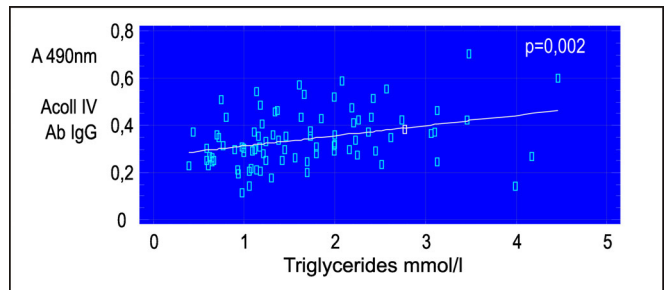


Fig. 5. Correlation analysis between A Coll IV Ab IgG and triglyceride levels in the the whole group

Moderate positive correlation was determined between the levels of A Coll IV Ab IgG and the levels of LDL, with a Pearson correlation coefficient of $r = 0,32$, $p = 0,002$. Regression analysis best describes this relationship which is linear, $r = 0,32$, $p = 0,002$, fig.6.

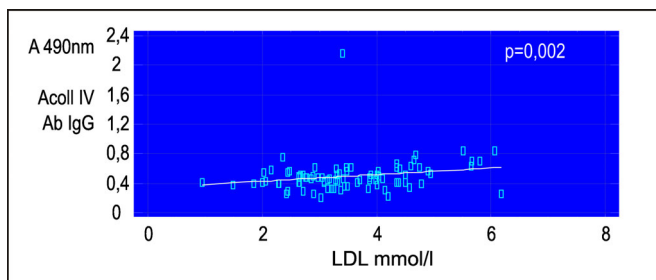


Fig. 6. Correlation analysis between AColIVAb IgG and levels of LDL in the whole group

There is a moderate negative correlation between the levels of AColIVAb IgG and the levels of HDL-C with a correlation coefficient of Spearman $c = -0,26$, and $p = 0,02$. Regression analysis best describes this relationship which is linear, $c = -0,26$, $p = 0,02$, fig.7 ACol IVAb IgG

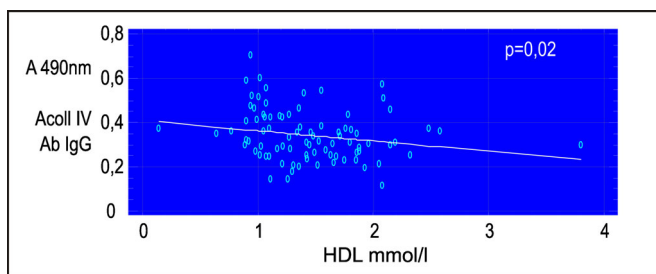


Fig. 7. Correlation analysis between AColIVAb IgG and levels of HDL in the whole group

CONCLUSION:

Collagen type IV is found mainly in the basal membrane. With the launch of endothelial dysfunction in the early stages of the atherosclerotic process, the anti-inflammatory endothelial protective function is depleted, allowing more aggressive intervention of the humoral and hemostatic components of the blood, followed by damage and accelerated degeneration of the basal membrane and collagen type IV. Our results reveal statistically significant higher levels of AColIVAb IgG in the group of subjects with metabolic syndrome compared with the control group, while a significant difference was not detected in AColIVAb IgM in both groups. When assessing the correlation between the antibody levels and the studied risk factors (components of the metabolic syndrome) in both groups were found statistically significant linear correlations between the levels of IgG AColIVAb with diastolic blood pressure and the serum levels of blood sugar, total cholesterol, triglycerides, LDL, HDL.

Therefore, even in the early stages of the atherosclerotic process there are changes in the metabolism of collagen type IV which is a main component constituting the basal membranes. Anticollagen type IV antibodies of class IgG, characterizing the secondary immune response are elevated in the long-term chronic inflammation characterizing the metabolic syndrome and atherosclerosis, respectively, and characterize the vascular aging process, whereas antibodies of class IgM, in serum during the initial response in the early stages of vascular aging are already depleted.

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