

Effect of immunosuppressive treatment of glomerulonephritis on nutritional status, body composition and musculoskeletal system – preliminary results

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INTRODUCTION

Glomerulonephritis (GN) is a common name for numerous renal disorders caused by immune system dysregulation. Damage to the glomerular filtration membrane in the course of glomerulopathy leads to the loss of plasma proteins in the urine, i.a. albumins, proteins of the hemostasis system, transport proteins, hormones, enzymes, and, as a result, to numerous complications, including metabolic disorders, coagulopathy, malnutrition, muscle weakness, bone disorders, and immunity disorders. Untreated GN may lead to impaired renal function, up to end-stage chronic kidney disease requiring renal replacement therapy - dialysis or kidney transplantation.

The basis of GN treatment is nephroprotection, including angiotensinconverting enzyme inhibitors or angiotensin receptor blockers in the maximal tolerated dose, proper blood pressure control, limiting salt and moderate protein intake. In some cases, especially in patients with persistent proteinuria > 1 g/day and preserved glomerular filtration, treatment must be supplemented with immunosuppression.

IgA nephropathy (IgAN) is one of the most frequently diagnosed GN, the therapy of which begins with corticosteroids and, in case of persistent disease, is supplemented with other immunosuppressive drugs. The basis of its treatment is steroid therapy according to the Pozzi scheme, which includes three pulses of methylprednisolone in the 1st, 3rd, and 5th month of treatment in a cumulative dose of 9 g, supplemented with oral preparations of prednisone 0.5 g/kg of body weight every other day for 6 months (between iv infusions). Both the disease and the applied therapy can cause numerous metabolic disorders, complications, and side effects. Long-term glucocorticosteroid therapy may be associated with numerous side effects, including increased protein catabolism, skeletal muscle weakness, remodeling and excessive adipose tissue growth, osteoporosis, and glucose and lipid metabolism disorders.

PRELIMINARY RESULTS

7 (1F, 6M) patients with a median age of 36.9 (28.9-65.8) years, median CKD-EPI eGFR 43 (31-44) ml/min/1.73 m², median proteinuria 4.4 (3.2-5.4) g/24h were included to the analysis.

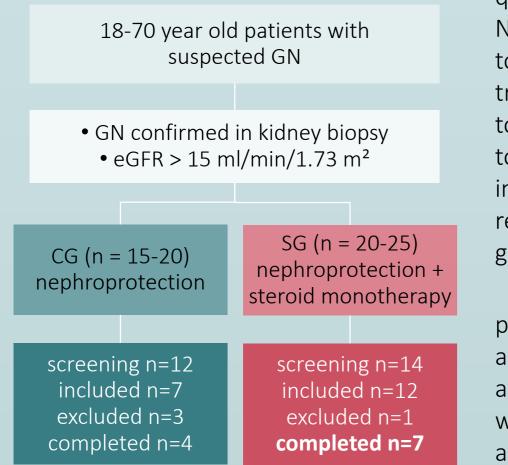
Table 1 – Assessments before and after 6-months GKS treatment

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$\begin{tabular}{ c c c c c } Lear tissue mask [k] & 4.3.2 (36.9-49.9) & 57.7 (39.1.70.8) & 0.046 \\ lean tissue mask [k] & 1.3.7 (12.9-14.1) & 1.7.3 (12.4-21.9) & 0.046 \\ lean tissue percentage [%] & 4.5.7 (42.3.47.9) & 60.4 (43.2.76.7) & 0.116 \\ fart tissue index [kg/m2] & 15.9 (14.6-20.0) & 12.5 (8.1-19.3) & 0.075 \\ fart tissue index [kg/m2] & 15.9 (14.6-20.0) & 12.5 (8.1-19.3) & 0.075 \\ fart tissue index [kg/m2] & 13.2 (12.9-26.8) & 31.1 (20.8-42.7) & 0.043 \\ tissue percentage [%] & 4.2.7 (37.5-52.8) & 31.1 (20.8-42.7) & 0.043 \\ tissue percentage [%] & 4.2.7 (37.5-52.8) & 31.1 (20.8-42.7) & 0.043 \\ tissue parcentage [%] & 4.2.7 (32.5-52.8) & 31.1 (20.8-42.7) & 0.043 \\ tissue parcentage [%] & 4.2.7 (32.5-52.8) & 28.6 (24.1-32.4) & 0.028 \\ extracellular water [1] & 22.4 (13.9-21.6) & 12.8 (20.5-26.3) / 22.1 (20.5-26.3) & 22.8 (20.5-26.3) / 22.1 (20.5-26.3) & 22.8 (20.5-26.3) / 22.1 (20.5-26.3) & 22.8 (20.5-26.3) / 22.7 (20.5-26.3) & 22.8 (20.5-26.3) / 22.7 (20.5-26.3) & 22.8 (20.5-26.3) / 22.7 (20.5-26.3) & 22.8 (20.5-26.3) / 22.7 (20.5-26.3) & 22.8 (20.5-26.$		-16/2611)	22(52(05))	0.210	
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		· ·	28.6 (24.1-32.4)	0.028	
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$\begin{array}{c c} {\rm STC \ score \ (dietary \ habits)} & 7 \ (7-9) & 6 \ (5-6) & 0.059 \\ {\rm SNAQ \ score \ (appetite)} & 31 \ (28-33) & 30 \ (29-31) & 0.787 \\ {\rm GPPAQ \ score \ (physical \ activity)} & 16.0 \ (9.0-19.0) & 16.5 \ (15.0-19.0) & 0.225 \\ \hline \\ \hline \\ {\rm Quality \ of \ life \ self-assessment} & & & & & & & \\ \\ {\rm SF36} & 77.3 \ (59.6-79.6) & 68.6 \ (63.7-77.3) & 0.916 \\ {\rm Physical \ functioning} & 90.0 \ (80.0-95.0) & 90.0 \ (70.0-100.0) & 0.686 \\ {\rm Limitations \ physical} & 75.0 \ (31.3-100.0) & 62.5 \ (50.0-75.0) & 0.800 \\ {\rm Limitations \ embiand \ 175.0 \ (66.7-100.0) & 66.7 \ (58.3-100.0) & 1.000 \\ {\rm Energy/fatique} & 56.3 \ (43.8-62.5) & 62.5 \ (50.0-75.0) & 0.225 \\ {\rm Social \ functioning} & 75.0 \ (37.5-65.0) & 87.5 \ (50.0-100.0) & 0.106 \\ {\rm General \ health} & 67.5 \ (42.5-90.0) & 90.0 \ (67.5-100.0) & 0.116 \\ {\rm General \ health} & 55.0 \ (40.0-70.0) & 50.0 \ (45.0-75.0) & 0.612 \\ {\rm Health \ change} & 25.0 \ (25.0-50.0) & 50.0 \ (25.0-50.0) & 0.109 \\ \hline {\rm Laboratory \ data} & & & & & & & & & & & & & & & & & & &$		9.3 (0.3-13.0) / 10.3 (0.7-13.3)	15.0 (10.4-15.4) / 15.0 (11.5-17.0)	0.275 / 0.008	
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$\begin{tabular}{ c c c c c } \hline $F36$ & $77.3 (59.6-79.6) & $68.6 (63.7-77.3) & 0.916 \\ Physical functioning & $90.0 (80.0-95.0) & $90.0 (70.0-100.0) & 0.686 \\ limitations physical & $75.0 (31.3-100.0) & $62.5 (50.0-75.0) & 0.800 \\ limitations emotional & $75.0 (66.7-100.0) & $66.7 (58.3-100.0) & 1.000 \\ Energy/fatique & $56.3 (43.8-62.5) & $62.5 (50.0-62.5) & 1.000 \\ Emotional well being & $65.0 (55.0-70.0) & $70.0 (65.0-75.0) & 0.225 \\ social functioning & $75.0 (37.5-65.0) & $87.5 (50.0-100.0) & 0138 \\ Pain & $67.5 (42.5-90.0) & $90.0 (67.5-100.0) & 0.116 \\ General health & $55.0 (40.0-70.0) & $50.0 (45.0-70.0) & 0.116 \\ dentral health & $55.0 (25.0-50.0) & $50.0 (25.0-50.0) & 0.109 \\ \hline \begin{tabular}{lllllllllllllllllllllllllllllllllll$. ,		
$\begin{array}{c cccc} {\rm SF36} & 77.3 (59.6-79.6) & 68.6 (63.7-77.3) & 0.916 \\ {\rm Physical functioning} & 90.0 (80.0-95.0) & 90.0 (70.0-100.0) & 0.686 \\ {\rm Limitations physical} & 75.0 (31.3-100.0) & 62.5 (50.0-75.0) & 0.800 \\ {\rm Limitations emotional} & 75.0 (66.7-100.0) & 66.7 (58.3-100.0) & 1.000 \\ {\rm Energy/fatique} & 56.3 (43.8-62.5) & 62.5 (50.0-62.5) & 1.000 \\ {\rm Emotional well being} & 65.0 (55.0-70.0) & 70.0 (65.0-75.0) & 0.225 \\ {\rm Social functioning} & 75.0 (37.5-65.0) & 87.5 (50.0-100.0) & 0118 \\ {\rm Pain} & 67.5 (42.5-90.0) & 90.0 (67.5-100.0) & 0.116 \\ {\rm General health} & 55.0 (40.0-70.0) & 50.0 (45.0-70.0) & 0.612 \\ {\rm Health change} & 25.0 (25.0-50.0) & 50.0 (25.0-50.0) & 0.109 \\ \end{array}$		16.0 (9.0-19.0)	16.5 (15.0-19.0)	0.225	
Physical functioning 90.0 (80.0-95.0) 90.0 (70.0-100.0) 0.686 Limitations physical 75.0 (31.3-100.0) 62.5 (50.0-75.0) 0.800 Limitations emotional 75.0 (66.7-100.0) 66.7 (58.3-100.0) 1.000 Energy/fatique 56.3 (43.8-62.5) 62.5 (50.0-62.5) 1.000 Emotional well being 65.0 (55.0-70.0) 70.0 (65.0-75.0) 0.225 Social functioning 75.0 (37.5-65.0) 87.5 (50.0-100.0) 0138 Pain 67.5 (42.5-90.0) 90.0 (67.5-100.0) 0.116 General health 55.0 (40.0-70.0) 50.0 (45.0-70.0) 0.612 Health change 25.0 (25.0-50.0) 50.0 (25.0-50.0) 0.109 Laboratory data 52 (46-69) 59 (55-76) 0.249 Serum urea [mg/dL] 1.69 (1.45-2.72) 1.86 (1.60-2.39) 0.735 Serum albumin [g/dL] 35.3 (33.2-40.5) 42.0 (39.0-43.8) 0.028 Serum reatinine [mg/dL] 59.9 (57.4-63.3) 64.6 (60.4-67.0) 0.753 Total cholesterol 164 (157-229) 169 (138-216) 0.398	Quality of life self-assessment				
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This study aims to evaluate the impact of nephroprotective treatment and steroid therapy on the nutritional status, body composition and muscle strength of patients with biopsy confirmed glomerulonephritis. The study was approved by Medical University of Lodz Bioethical Comitee – approval no. RNN/128/22/KE from June 14, 2022.

STUDY GROUP

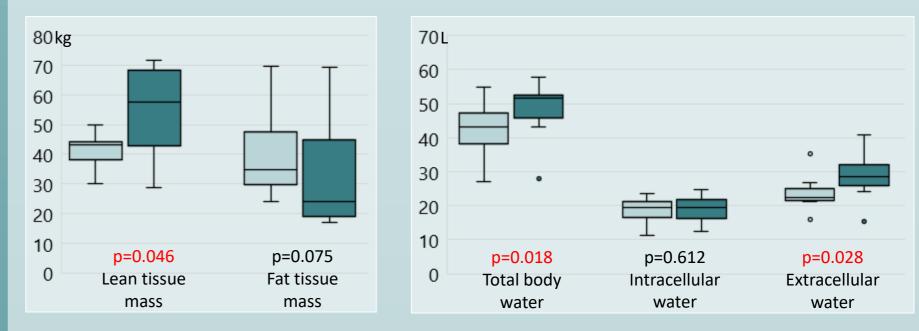
The study will include 40 patients aged 18-70 with GN diagnosis based on kidney biopsy, with kidney disease grade 1-4 (eGFR > 15 ml/min/1.73 m²)



qualified per Polish Society of Nephrology or KDIGO guidelines to only nephroprotective treatment (control group, CG) or to nephroprotective treatment togethter with a 6-month immunosuppressive therapy regimen in Pozzi scheme (study group, SG).

Assessments will be performed at the baseline visit and after 24 weeks ±14 days (CG) and at the baseline visit, after 8 weeks ±7 days, 16 weeks ±7 days and 24 weeks ±14 days (SG).

The preliminary statistical analysis has been performed in SG patients who have completed the study (n=7).



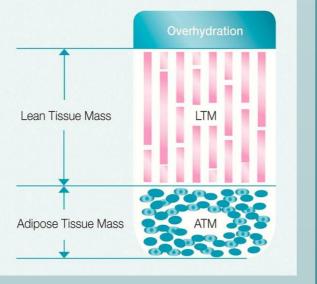
During the study period, 42.9% (n=3) of patients reported any kind of adverse effects, including post-steroid acne (n=2), insomnia (n=1), and pneumonia (n=1).

CONCLUSIONS

6-month GCS treatment results in significant changes in the body composition

METHODS

- Medical history, comorbidities, medications
- Anthropometric data sex, age, height, weight, waist, hip, arm circumference, blood pressure
- Body composition analysis with bioelectrical impedance - Body Composition Monitor Fresenius[™] - estimation in unique, three compartment model adjusted to patients with renal disease and fluid retention, including lean tissue mass, fatty tissue mass and overhydration



- Muscle strength assessment analysis of the isometric strength of the six muscles/muscle groups of the lower limbs using a hand-held dynamometer
- Assessment of quality of life (Short Form 36, SF36), nutritional status (Malnutrition-Inflammation Score, MIS), diet (Staring The Conversation, STC), appetite (Council on Nutrition Appetite Questionnaire, CNAQ), level of physical activity (General Practice Physical Activity Questionnaire, GPPAQ)
- Laboratory data: complete blood count, lipid profile, serum concentration of: glucose, electrolytes, CRP, urea, creatinine, albumin, total protein, TSH; general urine test; loss of protein in the 24-hour urine collection

of patients with KZN, namely an increase in fat-free mass, a decrease in the percentage of body fat and an increase in the water content in the form of intracellular water, and also improves the nutritional status (albuminemia). There was no significant effect yet observed on changes in muscle strength, appetite, eating habits, level of physical activity or quality of life.

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