

# Publikujeme v zahraničí

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## SUPPORTÍVNA LIEČBA

Gvozdjakova A, Sumbalova Z, Kucharska J, Rausova Z, Kovalcikova E, Takacsová T, Navas P, Lopez-Lluch G, Mojto V, **Palacka P.**

**Mountain spa rehabilitation improved health of patients with post-COVID-19 syndrome: pilot study**

**Environ Sci Pollut Res Int. 2022 Sep 23:1-12.**

European Association of Spa Rehabilitation (ESPA) recommends spa rehabilitation for patients with post-COVID-19 syndrome. We tested the hypothesis that a high-altitude environment with clean air and targeted spa rehabilitation (MR - mountain spa rehabilitation) can contribute to the improving platelet mitochondrial bioenergetics, to accelerating patient health and to the reducing socioeconomic problems. Fifteen healthy volunteers and fourteen patients with post-COVID-19 syndrome were included in the study. All parameters were determined before MR (MR1) and 16-18 days after MR (MR2). Platelet mitochondrial respiration and OXPHOS were evaluated using high resolution respirometry method, coenzyme Q<sub>10</sub> level was determined by HPLC, and concentration of thiobarbituric acid reactive substances (TBARS) as a parameter of lipid peroxidation was determined spectrophotometrically. This pilot study showed significant improvement of clinical symptoms, lungs function, and regeneration of reduced CI-linked platelet mitochondrial respiration after MR in patients with post-COVID-19 syndrome. High-altitude environment with spa re-

habilitation can be recommended for the acceleration of recovery of patients with post-COVID-19 syndrome.

Sumbalova Z, Kucharska J, Rausova Z, **Palacka P**, Kovalcikova E, Takacsova T, Mojto V, Navas P, Lopez-Lluch G, Gvozdjakova A.

**Reduced platelet mitochondrial respiration and oxidative phosphorylation in patients with post COVID-19 syndrome are regenerated after spa rehabilitation and targeted ubiquinol therapy**

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European Association of Spa Rehabilitation recommend spa rehabilitation for patients with post COVID-19 syndrome (post C-19). We studied effects of special mountain spa rehabilitation program and its combination with ubiquinol (reduced form of coenzyme Q10-CoQ10) supplementation on pulmonary function, clinical symptoms, endogenous CoQ10 levels, and platelet mitochondrial bioenergetics of patients with post C-19. 36 patients with post C-19 enrolled for rehabilitation in mountain spa resort and 15 healthy volunteers representing the control group were included in this study. 14 patients with post C-19 (MR group) were on mountain spa rehabilitation lasting 16-18 days, 22 patients (MRQ group) were supplemented with ubiquinol (2 × 100 mg/day) during the rehabilitation and additional 12-14 days at home. Clinical symptoms and functional capacity of the lungs were determined in the patients before and after the spa rehabilitation program. Platelet bioenergetics by high-resolution respirometry, plasma TBARS con-

centration, and CoQ10 concentration in blood, plasma and platelets were evaluated before and after the spa rehabilitation program, and in 8 patients of MRQ group also after additional 12-14 days of CoQ10supplementation. Pulmonary function and clinical symptoms improved after the rehabilitation program in both groups, 51.8% of symptoms disappeared in the MR group and 62.8% in the MRQ group. Platelet mitochondrial Complex I (CI)-linked oxidative phosphorylation (OXPHOS) and electron transfer (ET) capacity were markedly reduced in both groups of patients. After the rehabilitation program the improvement of these parameters was significant in the MRQ group and moderate in the MR group. CI-linked OXPHOS and ET capacity increased further after additional 12-14 days of CoQ10 supplementation. CoQ10 concentration in platelets, blood and plasma markedly raised after the spa rehabilitation with ubiquinol supplementation, not in non-supplemented group. In the MRQ group all parameters of platelet mitochondrial respiration correlated with CoQ10 concentration in platelets, and the increase in CI-linked OXPHOS and ET capacity correlated with the increase of CoQ10 concentration in platelets. Our data show a significant role of supplemented ubiquinol in accelerating the recovery of mitochondrial health in patients with post C-19. Mountain spa rehabilitation with coenzyme Q10 supplementation could be recommended to patients with post C-19. This study was registered as a clinical trial: ClinicalTrials.gov ID: NCT05178225.