ME-CFS26-003 - The sweet side of ME/CFS treatment: Glycan analysis in Korean medicine

Abstract

During this fellowship, I will apply analytical methods I developed during my Master's thesis to samples collected in a longitudinal interventional clinical study. The overarching aim is to validate previous findings on glycosylation alterations in post-acute infectious syndromes (PAIS), including ME/CFS and Long COVID, using an independent and clinically well-characterized Long COVID patient cohort that fulfills the phenotypic criteria of post-exertional malaise (PEM).

My previous work identified elevated blood serum free sialic acid, suggesting persistent viral or neuraminidase-mediated damage; altered IgG heavy-chain glycosylation indicative of immune modulation; and reduced red blood cell surface sialylation associated with impaired erythrocyte deformability [1]. Together, these findings point toward a glycosylation-driven mechanism contributing to impaired oxygen delivery and immune dysfunction in post-viral fatigue.

Building on these findings, this fellowship will examine how improvements in clinical symptoms relate to changes in red blood cell surface de-sialylation and antibody glycosylation. Using samples collected at Daejeon University from a clinical study involving an intervention with traditional Korean herbal medicine [2], I will evaluate the biological relevance of novel glycan-based biomarkers. Free sialic acid in blood serum will be analyzed as an indirect indicator of neuraminidase activity and virus-induced glycan damage.

Variations in free sialic acid, antibody N-glycosylation, and erythrocyte surface sialylation will be quantitatively analyzed and correlated with patient-reported symptom severity to evaluate their relevance as markers of disease burden and treatment response. Additionally, neuraminidase inhibition by the herbal extract will be investigated in vitro, and the potential mechanisms of ME/CFS will be explored in vivo.

[1] S. M. Qadri et al., May 2018, doi: 10.1111/ejh.13047[2] Y.-J. Choi et al., Apr. 2025, doi: 10.1186/s12879-025-10984-6

Scientific disciplines:
Pharmaceutical and drug analysis (30%) | Glycobiology (40%) | Medical molecular biology (30%)

Keywords:
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Further links to the persons involved and to the project can be found under
https://www.gmbh.wwtf.at/funding/programmes/ei/ME-CFS26-003/