

Association between 1,3-Beta-D-Glucan and immune dysregulation in liver cirrhosis

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Objectives

Liver cirrhosis is a severe systemic disease with a high global prevalence across low-, middle-, and high-income countries. The aim of the present study was to investigate the association between serum levels of 1,3-beta-D-glucan (BDG) in patients with liver cirrhosis and soluble immune-inflammatory markers, reflecting immune dysregulation associated with cirrhosis.

Methods

In this non-interventional, single-center observational study conducted at the Medical University of Graz, 76 patients and four healthy donors were analyzed. Correlation between various biomarkers was calculated using Spearman's rho correlation analysis due to the non-normal data distributions. Correlation matrices were graphically depicted as heat diagrams. Logistic regression was used to assess predictors of positive 1,3 BDG serum levels (≥ 80 pg/mL). Immune profiling was performed using the ProcartaPlex™ Human Immune Monitoring Panel for MAGPIX (65-plex), a bead-based multiplex immunoassay employing Luminex xMAP technology for the simultaneous quantification of 65 cytokines, chemokines, and growth factors in human serum samples. All statistical analyses were performed using R software, version 4.6.0 (R Development Core Team).

Results

Heatmap of cytokines and BDG levels in the overall cohort (Figure 1) indicated significant correlations between positive BDG and Hepatocyte Growth Factor (p 0.26, p < 0.02) and Macrophage Inflammatory Protein-1 alpha (p 0.30, p < 0.01).

In univariate analysis, patients with cirrhosis Child-Pugh class (CPC) B and CPC-C had 3.2-fold higher odds (95% CI 1.009–10.1, p = 0.04) for a positive BDG (i.e., >80 pg/mL) result compared to CPC-A. Luminex analysis showed differential expression of various immune-related cytokines across the different stages of liver cirrhosis, with several cytokines showing increased expression in CPB and C as compared to healthy donors or CPA (Figure 2).

Conclusions

We observed trends for increased fungal translocation depending on the severity of liver cirrhosis and association of BDG with an immune-inflammatory environment. To gain more in-depth knowledge about (fungal-)dysbiosis and its detrimental consequences in the setting of liver cirrhosis, these trends need to be studied in more detail including mycobiome analyses. This will further elucidate complex host–pathogen interactions and potentially introduce points of application for therapeutic interventions.

Figure 1. Correlation matrix of 1,3-Beta-D-Glucan and various cytokines

