Evaluation of IMMBO on Neutrophil Activation in Immunosuppressed Rats

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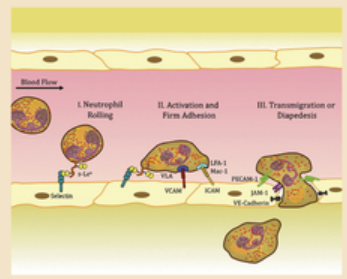
Introduction

Neutrophils are essential effector cells in the innate immune system, participating in early defense mechanisms against pathogens. Their adhesion to surfaces is a crucial step in migration to sites of infection and inflammation. Impaired neutrophil adhesion, as observed in states of
immunosuppression, can compromise host defense mechanisms.

Cyclophosphamide, a chemotherapeutic agent, is known to induce immunosuppression, including the suppression of neutrophil function. This study focuses on assessing the restoration of neutrophil adhesion in cyclophosphamide-treated rats following administration of IMMBO, a herbo-mineralAyurvedic formulation, and compares its effects to Levamisole, a known immunostimulant..



Methodology

Animals & Design

- Subjects:
Healthy Wistar albino rats
(6-8 weeks)
- Conditions:
20 ± 3°C, 30-70% humidity,
12-h light/dark cycle
- Acclimatization:
5 days before randomization

Induction of Immunosuppression & Treatments

- ·Cyclophosphamide (CPH):
100 mg/kg on Day O
- SRBC Challenge:
Days 7 & 14
- IMMBO (oral):
200, 400, 800 mg/kg
- Levamisole (Reference):
20 mg/kg (oral)

Neutrophil Adhesion Assay

- Blood Collection (Day 14):
· G1: Native control
. G2: CPH alone
. G4: CPH + SRBC + Levamisole
· G5-G7: CPH + SRBC + IMMBO (200, 400, 800 mg/kg)
- Neutrophil Index (NI): NI = TLC x% Neutrophils
- Neutrophil Adhesion (%): Nlu-NItNlux100\frac{Nlu - Nlt}Nlu}\times 100

Statistical Analysis

- Software:
MS Excel, GraphPad Prism v9.0
- Tests:
One-way ANOVA, Dunnett's post-hoc
- Significance:p ≤ 0.05

Result

Cyclophosphamide treatment significantly suppressed neutrophil adhesion compared to the native control. Levamisole administration restored neutrophil activation, and IMMBO treatment demonstrated dose-dependent effects. The detailed results are presented in Table 1.

Table 1. Effect of IMMBO on Neutrophil Adhesion in Rats

Group	Treatment Description	% Neutrophils Adhered to Nylon
G1	Native control	6.06
G2	Cyclophosphamide alone	-11.36
G3	Cyclophosphamide + SRBC + Levamisole (20 mg/kg)	5.19
G4	Cyclophosphamide + SRBC + IMMBO (200 mg/kg)	1.95
G5	Cyclophosphamide + SRBC + IMMBO (400 mg/kg)	5.19
G6	Cyclophosphamide + SRBC + IMMBO (800 mg/kg)	6.06

Discussion

Neutrophils play a crucial role in immune defense through their ability to adhere and migrate to inflammation sites. This study shows that cyclophosphamide-induced immunosuppression significantly reduces neutrophil adhesion, as reflected by a decreased neutrophil index after nylon fiber exposure. Levamisole, a known immunostimulant, reversed this suppression, confirming the assay's validity.

IMMBO demonstrated a dose-dependent restoration of neutrophil adhesion. While the low dose (200 mg/kg) showed no significant effect, the mid (400 mg/kg) and high (800 mg/kg) doses effectively restored neutrophil function to normal levels. This indicates IMMBO's immunomodulatory potential in enhancing neutrophil activity in immunocompromised conditions.

Although the precise mechanisms remain unclear, IMMBO's ability to counteract immunosuppression suggests potential for therapeutic use in managing immune-related disorders.

Conclusion

The findings indicate that IMMBO, particularly at mid and high doses, is effective in restoring neutrophil function in cyclophosphamide-induced immunosuppressed rats. By reinstating neutrophil adhesion to near-normal levels, IMMBO shows promise as a potent immunomodulatory agent. Further studies are warranted to elucidate the detailed mechanisms of action and to explore its potential clinical applications in immune-related disorders.

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