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In vitro and in vivo studies of the immunomodulatory effect of Echinacea purpurea on dendritic cells

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Background: Extracts of Echinacea have been used traditionally for the treatment of diverse types of infections and wounds. They have become very familiar immunostimulant herbal medicine. However, the specific immunomodulatory effect of Echinacea remains to be elucidated.

Aim: In our study, the effect of E. purpurea extract on the generation of immature DCs from monocytes was described, as well as its effect on DCs differentiation. In addition, an in vivo experiment was conducted to investigate whether treatment of mice with extracts derived from E. purpurea has immunomodulatory effect on murine splenic DCs.

Methods: Immature DCs were generated by incubating peripheral blood monocytes with cytokine cocktail (GM-CSF + IL-4) and matured by tumor necrosis factor- α (TNF- α). The cells were randomized to 5 groups to investigate E. purpurea effect in different stages. Phenotypic analysis of cell marker CD83-expressed on DCs was performed by flow cytometry. Mice were randomly divided into 3 groups; control, E. purpurea treated and E. purpurea-TNF- α treated group. The murine splenic DCs were isolated and phenotyped for CD83 and CD11c by flow cytometry.

Results: Treatment of monocytes with E.purpurea prior to addition of the maturation factor TNF- α resulted in a significant decrease in the yield of DCs expressing CD83. On the other hand, immature DCs generated in the culture in presence of GM-CSF and IL-4, when treated simultaneously with E. purpurea and TNF- α , exhibited insignificant change in the yield of CD83-expressing DCs compared with untreated control. The in vivo experiments showed that splenic DCs obtained from mice treated with E. purpurea with or without TNF- α did not exhibit significant changes in CD83 or CD11c compared with those obtained from control mice.

Conclusion: Our findings suggest that the immunomodulatory mechanisms of E. purpurea impact generation fate of DCs rather than differentiation stages. The results obtained in the in vivo study utilizing murine splenic DCs supported those observed in vitro.

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Sustainability indicators for agricultural land use based on GIS spatial modeling in North of Sinai-Egypt

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Sustainable agriculture focuses on production that renews resources. Egypt has a lot of sustainability constraints such as salinity and alkalinity, lack of infrastructure and credit utilization. The current study focuses on assessment of sustainability factors for agricultural utilization through integrated biophysical, economic viability and social acceptability in the North Sinai area. Sustainable agricultural spatial model (SASM) was developed using Arc GIS 10 to identify and classify the area, according to sustainability degree of agricultural utilization, where the factors of productivity, security, protection, economic viability, and social acceptability in the different mapping units were assessed. The investigated area is classified into three different classes, I, II, are covered in about 7% of the total area where land management practices are marginally below the threshold for sustainability located in the northern part of the study area, where the sustainability values are ranging between 0.1 and 0.3. The areas characterized as class III do not meet sustainability requirements where the sustainable values <0.1. The current work shows how the decision-makers can increase the land sustainability classes I, II to 10% of the total area by controlling just two factors: social and economic factors.

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