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[**Embryonic stem cell-derived factors inhibit T effector activation and induce T regulatory cells by suppressing PKC-θ activation.**](http://www.ncbi.nlm.nih.gov/pubmed/22412871)

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**Source**

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**Abstract**

Embryonic stem cells (ESCs) possess immune privileged properties and have the capacity to modulate immune activation. However, the mechanisms by which ESCs inhibit immune activation remain mostly unknown. We have previously shown that ESC-derived factors block dendritic cell maturation, thereby indirectly affecting T cell activation. Here, we show that ESC-derived factors also directly affect T cell activation. We provide the first demonstration that ESC-derived factors significantly down-regulated the expressions of IL-2 and IFN-γ, while markedly up-regulating the expression of IL-10, TGF-β, and Treg transcription factor Foxp3 in CD4+ CD25+ T cells. Furthermore, ESC-derived factors robustly suppressed T cell proliferation in response to the protein kinase C-θ (PKC-θ) activator phorbol 12-myristate 13-acetate (PMA). Western blot analysis indicated that ESC-derived factors prevented PKC-θ phosphorylation without influencing total PKC-θ levels. Moreover, IκB-α degradation was abrogated, confirming absence of PKC-θ activity. The impact of ESC-derived factors on PKC-θ activation appeared to be specific since other upstream T cell signaling components were not affected. In conclusion, ESCs appear to directly impact T cell activation and polarization by negatively regulating the PKC-θ pathway.