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## Testicular macrophages: guardians of fertility

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### Abstract:

Macrophages are innate immune cells present in essentially every organ of the body with dedicated tissue specific functions. We will present in this review the unique properties and functions of macrophage populations residing in the testis, an immune-privileged organ. Testicular macrophages (tMΦ) could be seen as guardians of fertility due to their immunosuppressive functions protecting spermatogenesis from auto immune-attack. They exhibit testis specific functions with essential roles in normal testis homeostasis and fetal testicular development. Recently, two distinct testicular macrophage populations have been characterized based on different localization, morphology, gene expression profiles, developmental origin and postnatal development. We will discuss the importance of these two testicular macrophage populations for organ specific functions such as testosterone production and spermatogenesis, as well as their role in establishing immuno-privilege highlighting the contributions of macrophages to male fertility.

### Introduction:

Traditionally macrophages have been principally known for their ability to ingest bacteria and other invading pathogens through the process of phagocytosis. Although the first to recognize this capacity as an immunological defense mechanism of the body, Ilya Metchnikoff himself already proposed a more versatile role for phagocytes in tissue homeostasis and organization[1, 2]. It is now clear that besides their immune function, macrophages, have major roles in tissue development, homeostasis and regeneration, as well as contributing to many organ specific functions [3], including in the gonads [4, 5]. As part of the male reproductive system, the testis contains seminiferous tubules, which are the anatomical site of spermatogenesis. They house spermatogonial stem cells (SSC) that give rise to spermatozoa in a multistep differentiation process. Metchnikoff and Lansteiner already discovered in the 19<sup>th</sup> century the highly

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