24. IMMUNE MILIEU OF THE OVARY ACROSS THE FEMALE REPRODUCTIVE LIFESPAN

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Introduction. The ovarian pool represents the reservoir of primordial follicles in the ovaries and determines the reproductive potential of women. The intricate interplay of genetic, hormonal and metabolic factors shapes the maintenance of the ovarian follicle pool across the female reproductive life. However, in recent years, the ovarian immune microenvironment has emerged as an important regulator of follicular homeostasis.

Aim of study. To characterize the ovarian immune cell milieu across the female reproductive lifespan.

Methods and materials. A literature review of relevant peer-reviewed articles published in English between 2020 and 2025 was performed.

Results. The ovarian immune cell microenvironment is represented by cells of innate (macrophages, natural killer (NK) cells) and adaptive (B and T lymphocytes) immunity, which regulate the homeostasis of follicles by secretion of various growth factors and cytokines. The role of immune cells ranges from selection of resting follicles and ovulation, to tissue remodelling and repair, and immune surveillance. In particular, macrophages are involved in follicle rupture and oocyte release, post-ovulatory tissue remodeling, corpus luteum formation and removal of atretic follicles. Natural killer cells regulate follicle maturation, luteal angiogenesis and subsequent breakdown of corpus luteum (luteolysis). T lymphocytes are responsible for follicular development, local immune homeostasis and modulation of ovarian aging and inflammation. In the aging process, is observed a decline of macrophages with a concomitant increase of T lymphocytes. This shift is associated with a higher recognition and elimination capacity of senescent follicular cells and reduced inflammatory potential of immune cells. Alterations in immune cell profiles are linked to several pathological conditions that might occur along the reproductive lifespan, including premature ovarian failure, ovarian cancer, and polycystic ovary syndrome.

Conclusions. The local immune cell environment of the ovaries orchestrates a variety of structural and functional alterations of the follicles. Across the reproductive life, follicular aging is marked by a shift from innate to adaptive immunity cell predominance.

Keywords. Ovaries, reproductive lifespan, immune environment.

https://doi.org/10.66603/medespera2026.257