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Summary

EOSINOPHIL SUBSET DYNAMICS AND TRANSCRIPTIONAL SIGNATURES IN COLORECTAL CANCER PROGRESSION

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Colorectal | Digestive Oncology | IBD | Mechanisms & Personalised Medicine

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Eosinophils exhibit stage-dependent functional shifts in colorectal cancer, protecting against early adenoma formation but preventing metastatic spread in advanced disease through suppression of immunosuppressive Spp1+ tumor-associated macrophages.

KEY POINTS

- Eosinophil depletion with anti-IL-5 antibodies in late-stage CRC mouse models increased liver metastases and peritoneal dissemination and reduced survival, despite not affecting primary tumor growth.
- In the absence of eosinophils, Spp1+ tumor-associated macrophages, an immunosuppressive subset linked to immune evasion and metastatic spreading, underwent drastic expansion and differentiation.
- Eosinophils prevented Spp1+ macrophage differentiation in vitro after responding to tumor-derived signals and adopting an activated phenotype.
- In human CRC, eosinophil numbers declined as TNM stage progressed while their activation status (PD-L1+) increased, mirroring the dynamic shifts observed in murine models.
- Single-cell RNA sequencing revealed that tumor-associated eosinophils adopted an activated profile with upregulation of cytokines, chemokines, MHC-I components, and tissue remodeling enzymes such as Mmp9, distinct from eosinophils in non-tumoral tissue.
- The findings establish a previously unrecognized eosinophil-macrophage axis in CRC progression and metastasis.

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