# Cell Signaling by Extracellular Vesicles in Cancer and Inflammation

Principal Investigator Aida Solhøj Hansen

## Key focus area

We investigate how **extracellular vesicles (EVs)** mediate cell–cell communication in inflammatory diseases and cancer. EVs are nanosized particles that transfer proteins, nucleic acids, metabolites, and lipids between cells in health and disease. Our work centers on two main areas:

**Tumor-derived EVs and immune supression in breast cancer**

We examine how EVs from treatment-resistant breast cancer cells promote immune suppression and therapy failure by 1) comparing EV composition in resistant versus sensitive tumors; 2) assessing their impact on the tumor immune microenvironment; and 3) evaluating how they influence therapy response.

**T cell-derived EVs in psoriasis**

We study a novel mechanism of immune activation in psoriasis in which pro-inflammatory molecules are packaged into EVs and delivered to other cells. Our aims are to identify disease-driving EV subpopulations by 1) characterize T cell-derived EVs from patient blood and skin; 2) determine how EV subsets affect immune cell function; and 3) explore strategies to block pathogenic EVs.

Together, these studies aim to uncover novel therapeutic targets at the intersection of EV biology and immune regulation to improve outcomes in cancer and chronic inflammatory conditions.

**Methods and techniques**

We use human samples and mouse models; and employ a wide range of cell- and molecular biology techniques including 2D and 3D cell culturing, immunomagnetic cell isolation, genetic manipulation, RNA-sequencing, spectral- and nano flow cytometry, mass spectrometry, western blotting and ELISA.

**Join us!**

If you are interested in conducting a project in the group, please contact:

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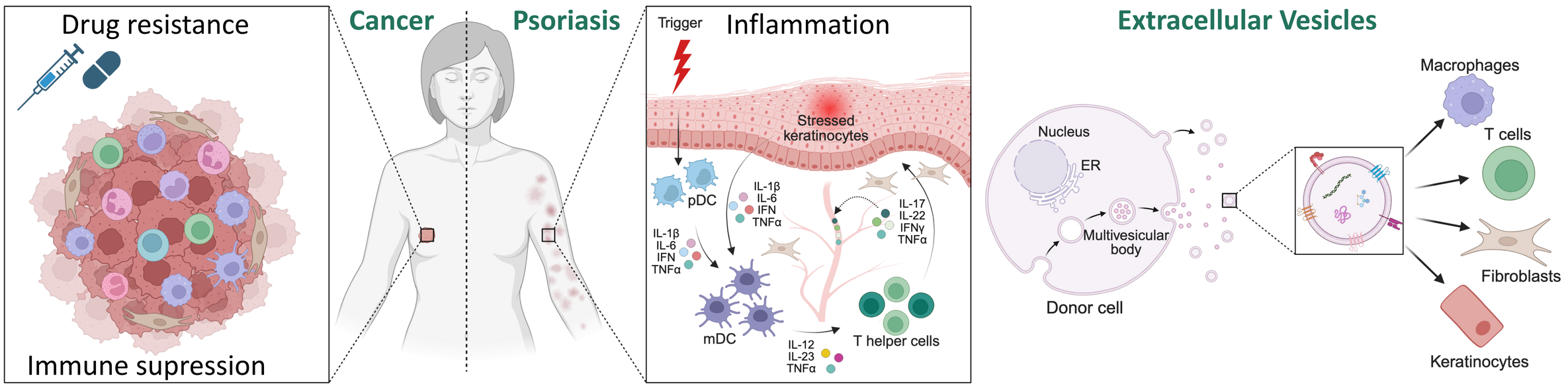
## Research overview

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| Projects | Description |
|---|---|
| **Heterogeneity of T cell-derived EVs in psoriasis** | Activated T helper cells release high numbers of EVs containing distinct proinflammatory molecules. Using nano flow cytometry and single-EV proteomics screening, we aim to investigate the heterogeneity of EVs released from resident T helper cells isolated from inflamed skin tissue. |
| **Investigate the how T cell-derived EVs modulate keratinocytes** | Hyperproliferation of keratinocytes is a key hallmark of psoriasis. Using live-cell imaging and RNA-sequencing, we aim to investigate how stimulation with T cell-derived EVs modulate the proliferation and phenotype of keratinocytes in vitro. |
| **Tracking the uptake of EVs from resistant breast cancer cells** | Therapy resistant breast cancer cells show increased release of EVs. By tagging the EVs with a protease stable construct, we will investigate in a murine breast cancer model, which cells in the tumor microenvironment that take up the EVs. |