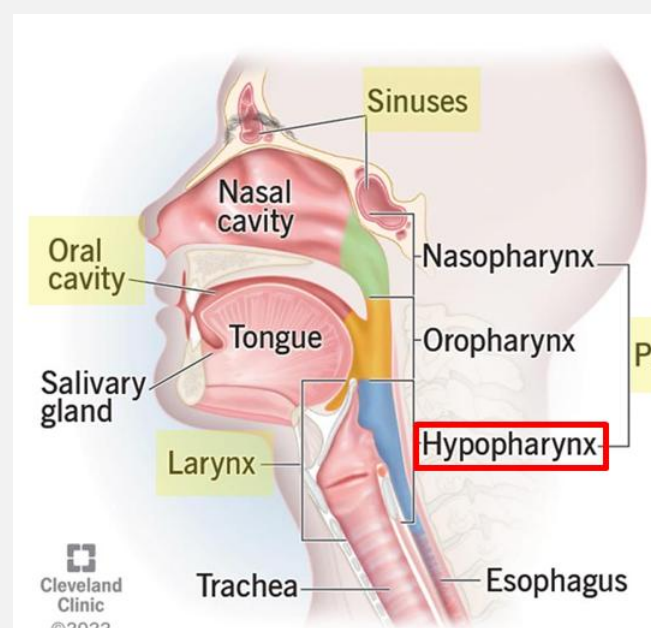




Head and Neck Squamous Cell Carcinoma (HNSCC)



- 7th most common cancer originating from mucosal epithelial cells
- FaDu is a cell line of HNSCC derived from a tumor in the Hypopharynx.
- I grew the FaDu cell line to specifically look at the extracellular vesicles produced.

Figure 1. Anatomy of head and neck. Image sourced from Cleveland Clinic.

Extracellular Vesicles (EVs)

- Contains cellular components like proteins, lipids, and nucleic acids
- Involved in cell-to-cell communication, transport of materials and waste removal, and immune response.

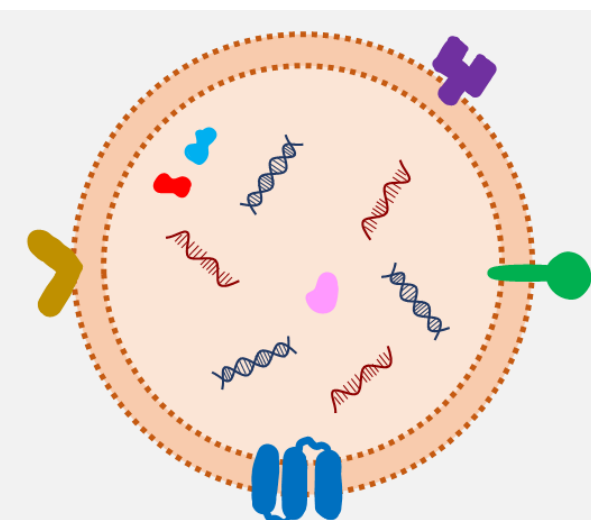


Figure 2. Extracellular vesicles, a nano-sized membrane bound sacs released by cells into the extracellular environment.

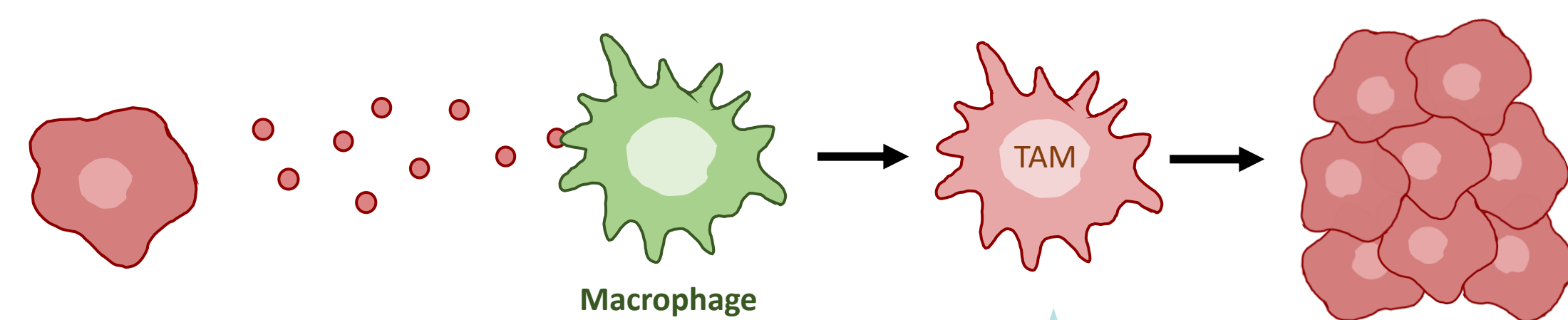
Macrophages

- Type of immune cell with various roles such as phagocytosis, activation of other immune cells, tissue repair, healing, homeostasis maintenance.

Macrophage Polarization

- Process where macrophages adopt distinct functional phenotypes in response to signals in the microenvironment.
- M1 – Classically activated macrophages – Anti-tumor
- M2 – Alternatively activated macrophages – Pro-tumor

Cancer-derived EVs influence in Immune Response



Tumor-associated macrophage (TAM): Resembles the M2 phenotype, resulting in TAM supporting the tumor microenvironment (TME) through immunosuppression, angiogenesis, lymphangiogenesis, and tumor metastasis.

Figure 3. Schematic of Cancer-derived EVs influence in Immune Response

Objective

Study how Head and Neck Cancer-derived extracellular vesicles (EVs) influence macrophage polarization and determine whether these EVs promote a tumor-supportive phenotype in macrophages. I wanted to see the role of extracellular vesicles from cancerous cells in comparison to non-cancerous cells in cancer's ability to evade the immune system.

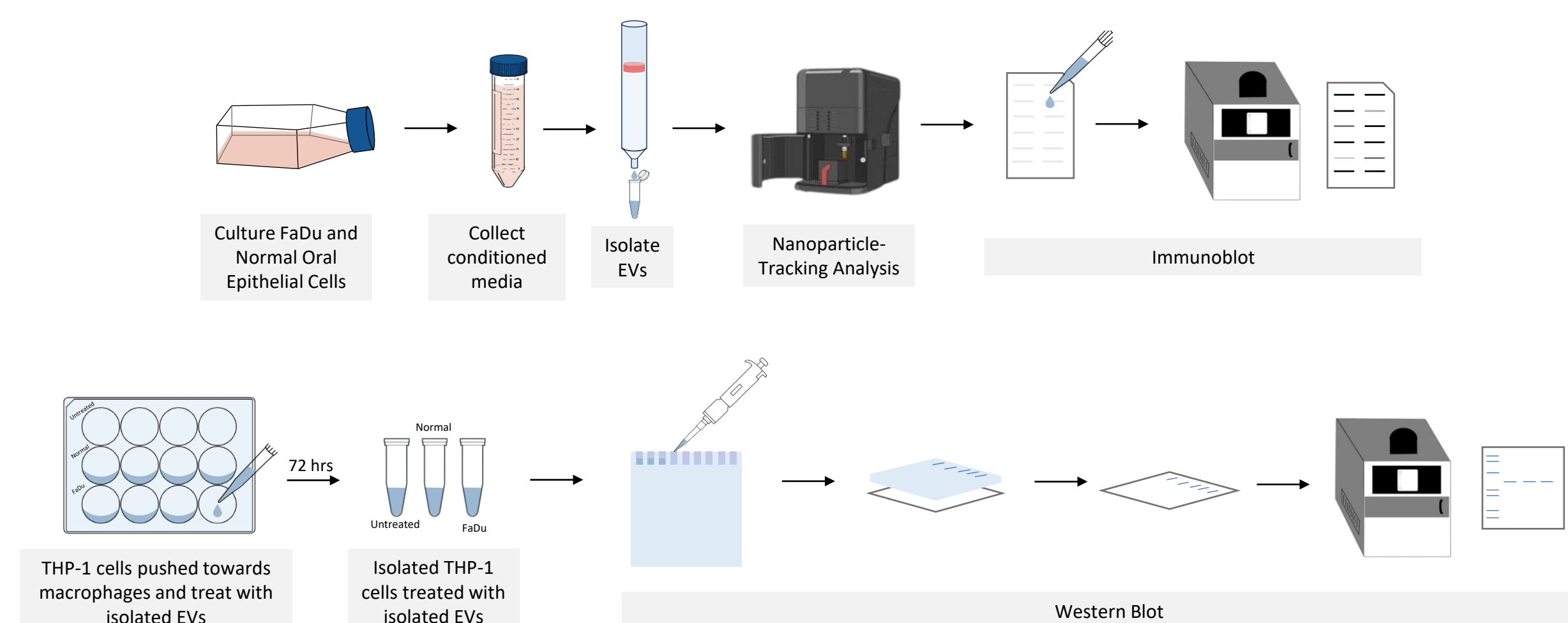
Significance

Our study highlights the significant role of HNSCC-derived extracellular vesicles (EVs) in modulating macrophage phenotypes toward a pro-tumorigenic (M2-type) state, that can promote tumor growth and metastasis. These findings provide valuable insight into the tumor microenvironment and its in depth studies can underscore the potential of targeting EV-mediated signaling as a novel therapeutic strategy for Head and Neck Squamous Cell Carcinoma.

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Workflow and Methods



EV Characterization: Nanoparticle-Tracking Analysis and Immunoblot

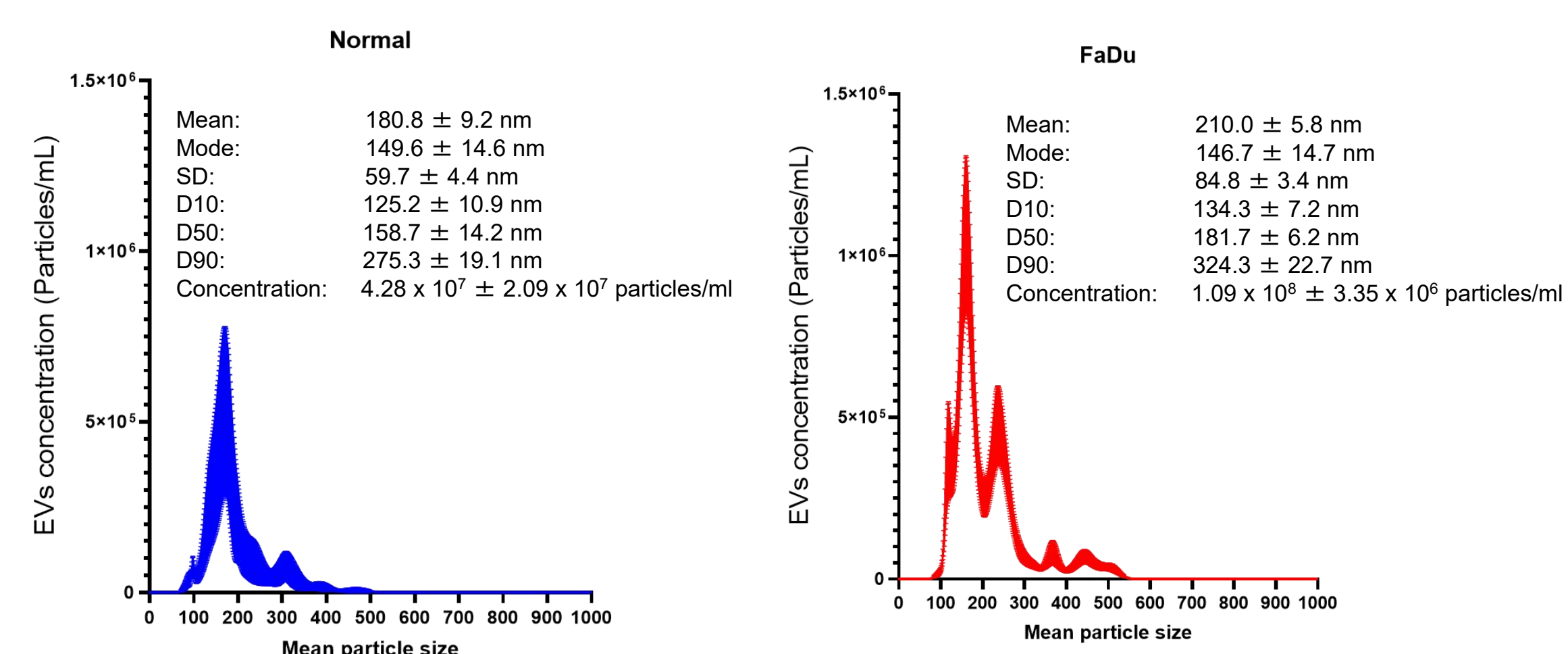


Figure 4. Nanoparticle distribution of Extracellular vesicles from normal cells and cancerous cells (FaDu). Expected small-EV size is approximately 200 nm.

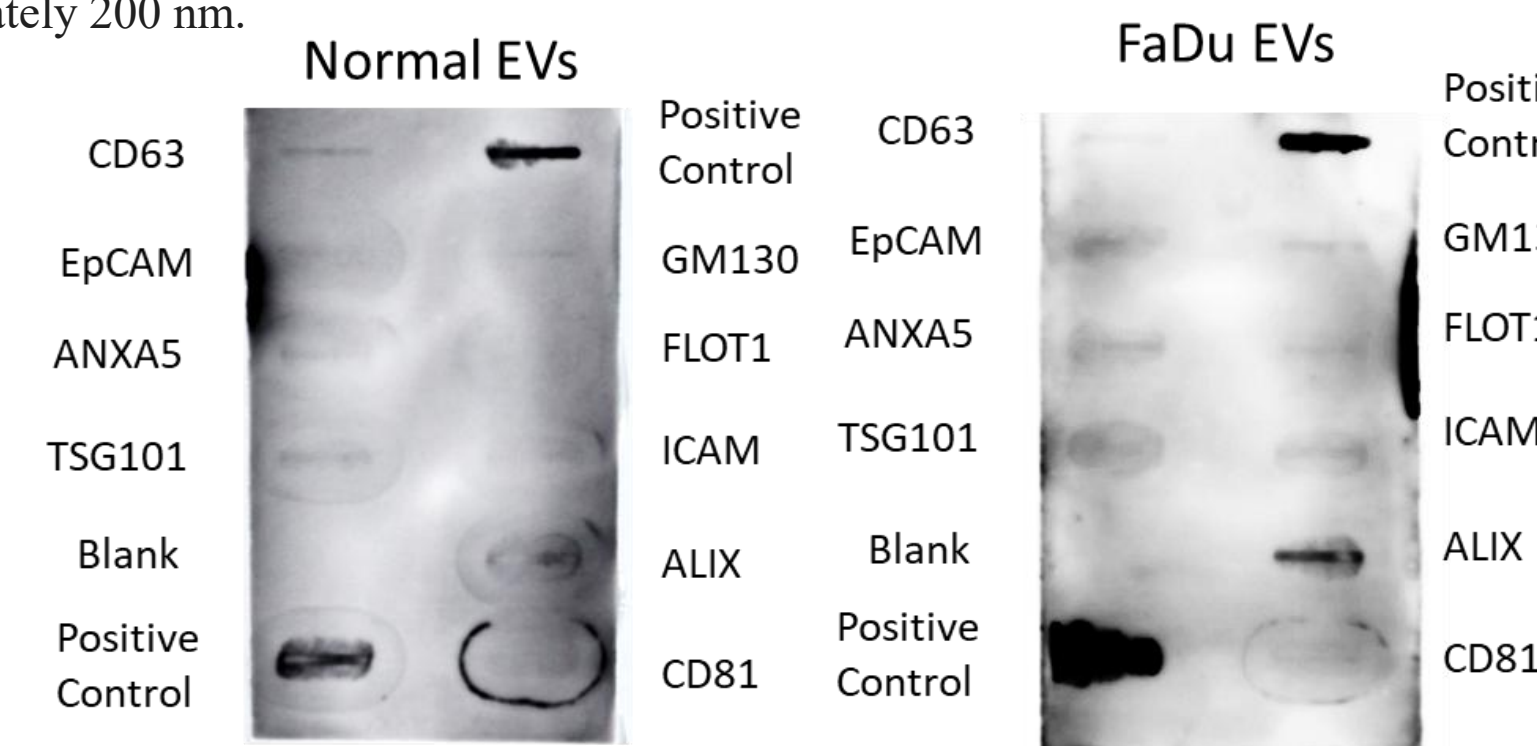


Figure 5. Immunoblots of Extracellular vesicles from normal cells and cancerous cells (FaDu).

Macrophage Polarization: THP-1 Treatment and Western Blot

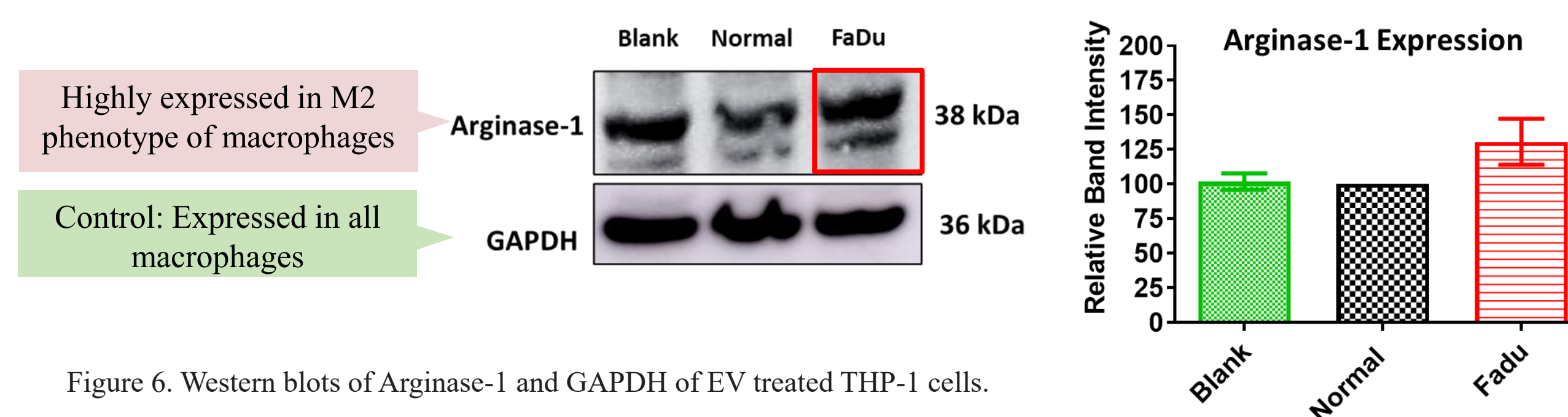


Figure 6. Western blots of Arginase-1 and GAPDH of EV treated THP-1 cells.

Conclusion

The macrophages treated with FaDu (cancer)-derived EVs has more Arginase-1 compared to the Normal Oral Epithelial cell EV-treated macrophages and Untreated macrophages. This difference indicates that the FaDu-derived EVs result in macrophage polarization into a Tumor Associated Macrophage.

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