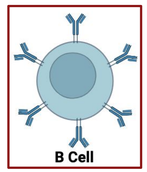
Potential Transformation of Age-Associated B Cell During Chronic CMV Infection Among Transplantation Patients

Brian Van Lee[1], Christiane Rollenhagen[2], Jonathan Maltzman[2]
[1]Department of Chemistry, Rice University
[2]Department of Medicine, Stanford University School of Medicine

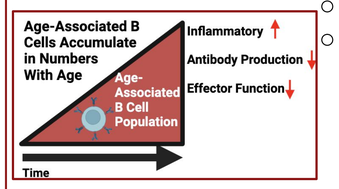
Collaborating for the Advancement of Interdisciplinary Research in Benign Urology

BACKGROUND

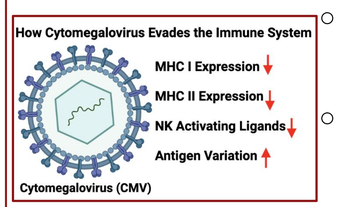
- **B cells:**
  - White blood cells
  - Produce antibodies
  - Able to recognize antigens
  - Antigen presenting
  - Responsible for humoral immunity



- **Age-associated B cells (ABCs) are a subset of general B cells**
  - Altered functions
  - Distinct phenotype
    - Expresses T bet and CD11c
    - Lack CD21 expression
  - Produce inflammatory cytokines and autoantibodies
  - Known to be enhanced in cases of autoimmune disorders and chronic viral infections



- **Cytomegalovirus (CMV) is a common viral infection**
  - Very high CMV prevalence in the US, 50% to 80%
  - Evolved multiple strategies to evade immune detection
  - Able to establish chronic viral infection in transplant recipients



- **T lymphocytes have been observed to expand in CMV+ transplant patients**
- **B cells and T cells interact closely with one another**

PURPOSE

This study aims to investigate the potential transformation and shift of B cell in the context of chronic CMV infection among transplantation patients

RESEARCH QUESTIONS

- What are the functional properties of ABCs in CMV-positive transplant patients, and how do they contribute to immune dysregulation?
- Can the measurement of ABCs and B cell populations serve as potential biomarkers for monitoring CMV infection and the immune status of transplant patients?
- Does the presence of CMV-specific antibodies or memory B cells correlate with the expansion of age-associated B cells (ABCs), and do these B cell subsets play a role in mediating protective immune responses against CMV reactivation?

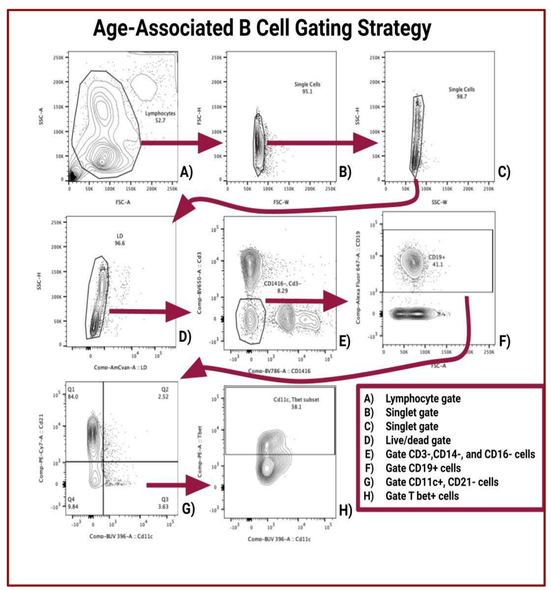
HYPOTHESIS

We hypothesize that chronic cytomegalovirus (CMV) infection in transplant patients leads to the expansion of age-associated B cells (ABCs) and B cell populations.

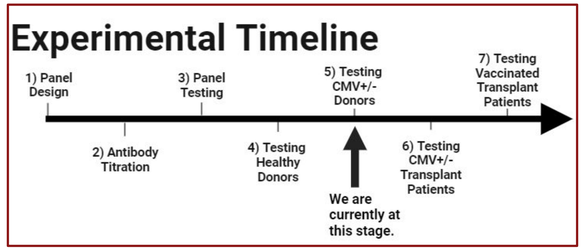
MATERIALS & METHODS

- **Flow cytometry was utilized as the primary method for B cell population analysis**
  - **Utilizing human peripheral blood mononuclear cells (PBMCs):**
    - **Healthy human donor**
    - **Transplant patients at times points post transplant**

General Age-Associated B Cell Panel	
Marker	**Function**
CD3-	Identifies T cells
CD14-	Identifies monocytes
CD16-	Identifies natural killer (NK) cells
CD19+	Identifies B cells
CD21-	Promotes B cell activation and immune responses
CD11c+	Involved in antigen presentation
T-bet+	Transcription factor in regulating immune responses



ANTICIPATED RESULTS



- **Mainly focused on the development of a flow cytometry panel to identify and measure age-associated B cells (ABCs)**
- **Analysis of PBMCs from both CMV+ and CMV- transplant patients**
- **Aims to compare the populations of ABCs and B cells between CMV+ and CMV- transplant patients**
- **Anticipated observation of an expansion effect, where CMV-positive transplant patients exhibit higher numbers of ABCs and B cells**
  - **Expansion may be driven by persistent viral antigen stimulation and chronic immune activation**

CONCLUSIONS

- **Successfully able to identify age associated B cells in the PBMCs of healthy human donors**

ACKNOWLEDGEMENTS

- Stanford Pre-renal Initiative (NIDDK-KUH R25)
- Stanford University School of Medicine Pre-Renal Scholars Program