

# NASA HRP INVESTIGATORS MEETING

## INTEGRATED IMMUNE

February 2, 2009



## Objectives

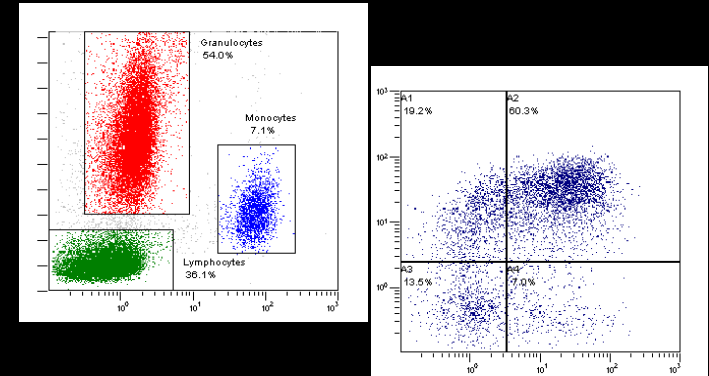


- Address significant lack of data regarding immune status *during* flight.
- Replace several recent immune studies with one comprehensive study that will include in-flight sampling.
- Determine the in-flight status of immunity, physiological stress, viral immunity/reactivation.
- Determine the clinical risk related to immune dysregulation for exploration class spaceflight.
- Determine the appropriate monitoring strategy for spaceflight-associated immune dysfunction, that could be used for the evaluation of countermeasures.

# ASSAYS FOR *INTEGRATED IMMUNE*

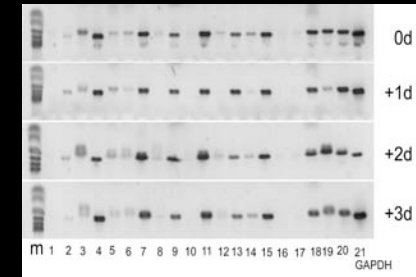
JSC  
Immunology  
Laboratory

- Leukocyte subsets
- T cell function
- Intracellular/secreted cytokine profiles



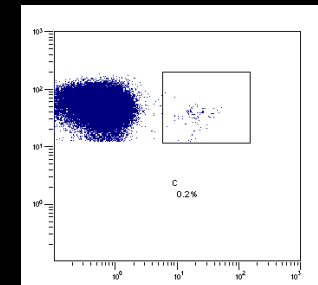
Mercer  
University

- Plasma cytokine balance
- Leukocyte cytokine RNA



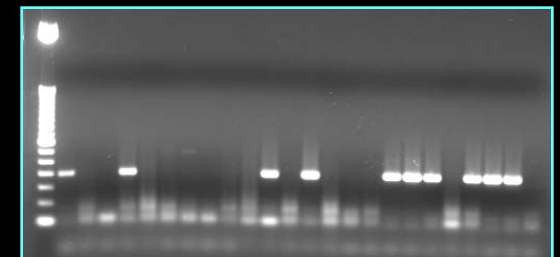
Microgen  
Laboratories

- Virus specific T cell number
- Virus specific T cell function
- Plasma stress hormones



JSC  
Microbiology  
Laboratory

- Latent herpesvirus reactivation (saliva/urine)
- Saliva/urine stress hormones
- Circadian rhythm analysis



# INTEGRATED IMMUNE – EXPERIMENT TEAM



# SUBJECTS

Completed to date:

10 Short duration

5 Long duration



Total 'n':

17 Short duration

17 Long duration

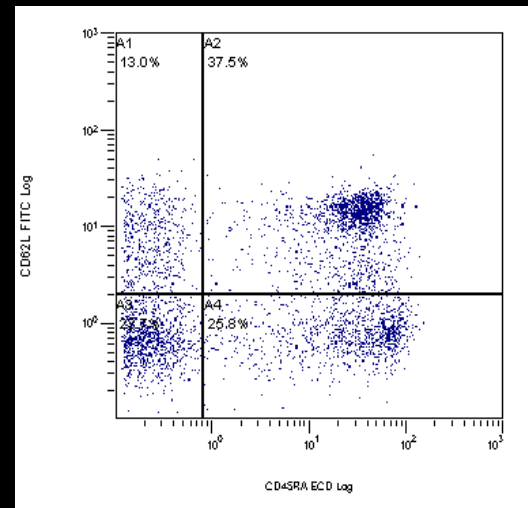
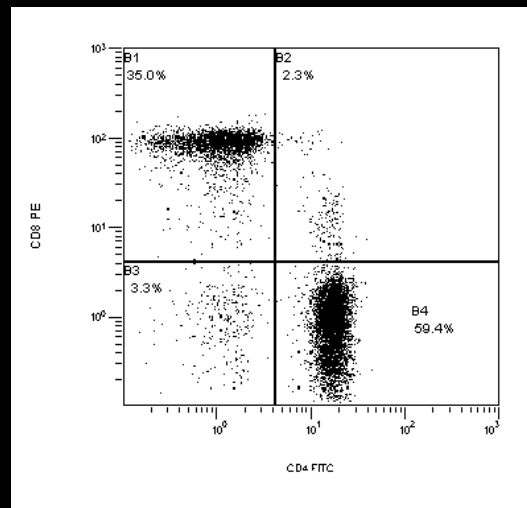




A. Immunophenotype, T cell function,  
intracellular/secreted cytokine profiles.

# LEUKOCYTE SUBSET DISTRIBUTION

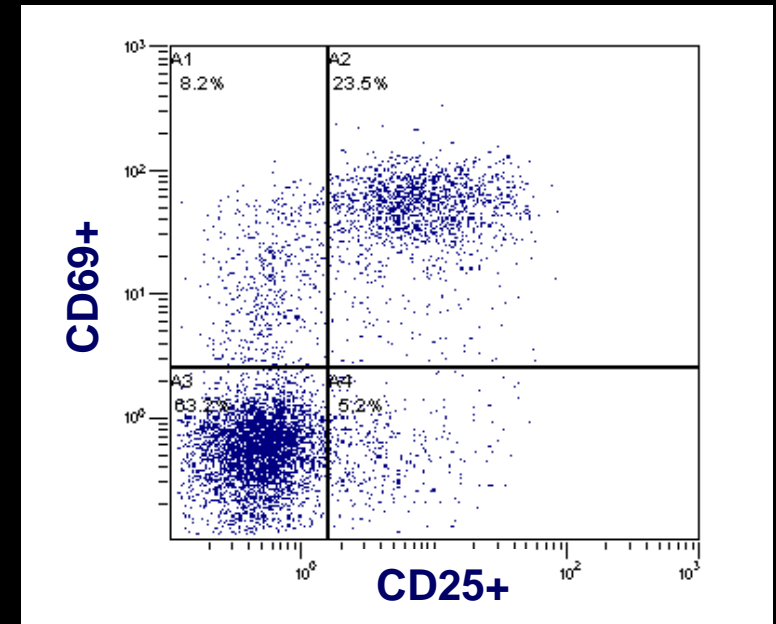
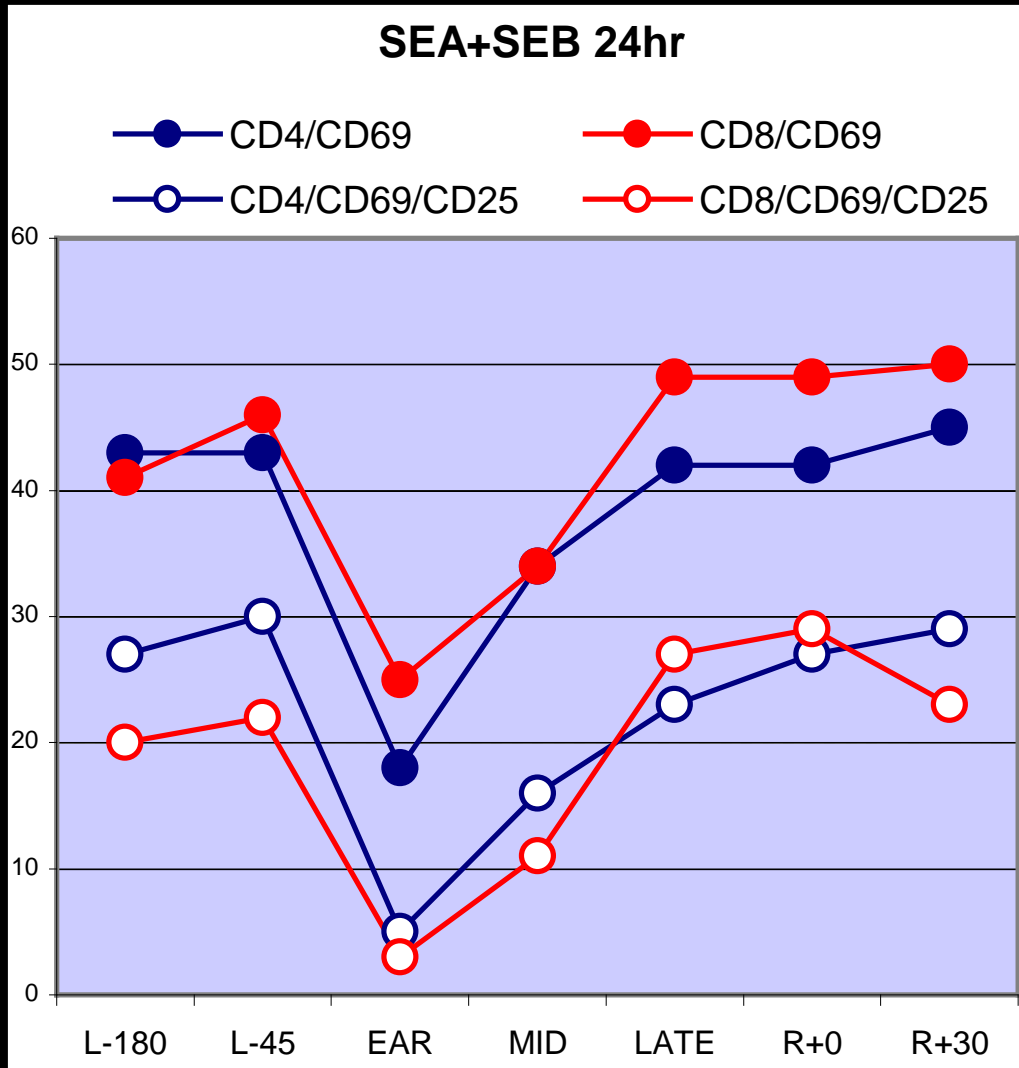
- No in-flight changes in bulk leukocyte subsets
- Post-flight granulocytosis
- Late in-flight/postflight elevated B cells, reduced NK cells
- In-flight, post-flight trend towards elevated CD4:CD8 ratio, elevated memory T cell subsets
- Elevated effector memory, central memory in-flight
- No change in peripheral constitutively activated T cells





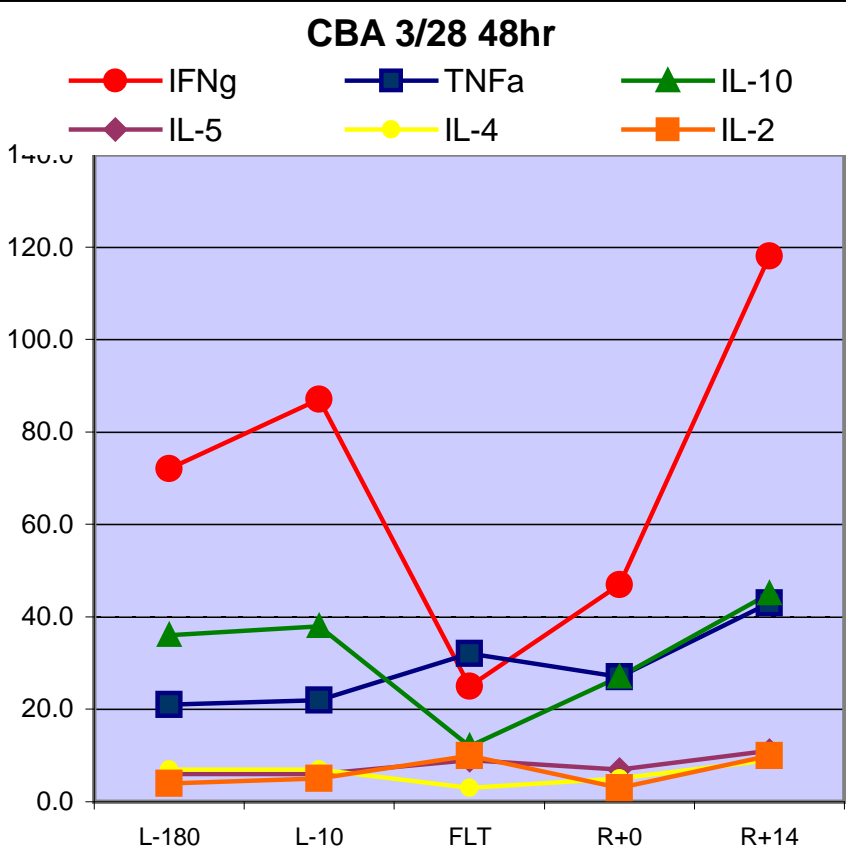
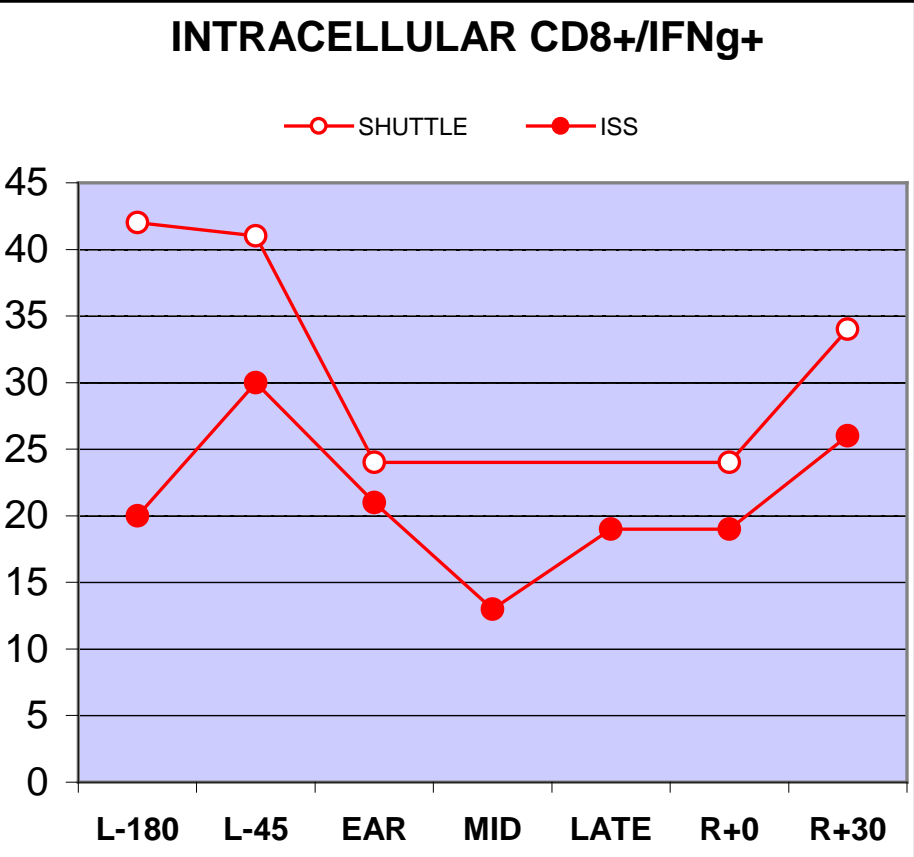
# CD8+ T CELL FUNCTION: A+B 24 hours

## ISS



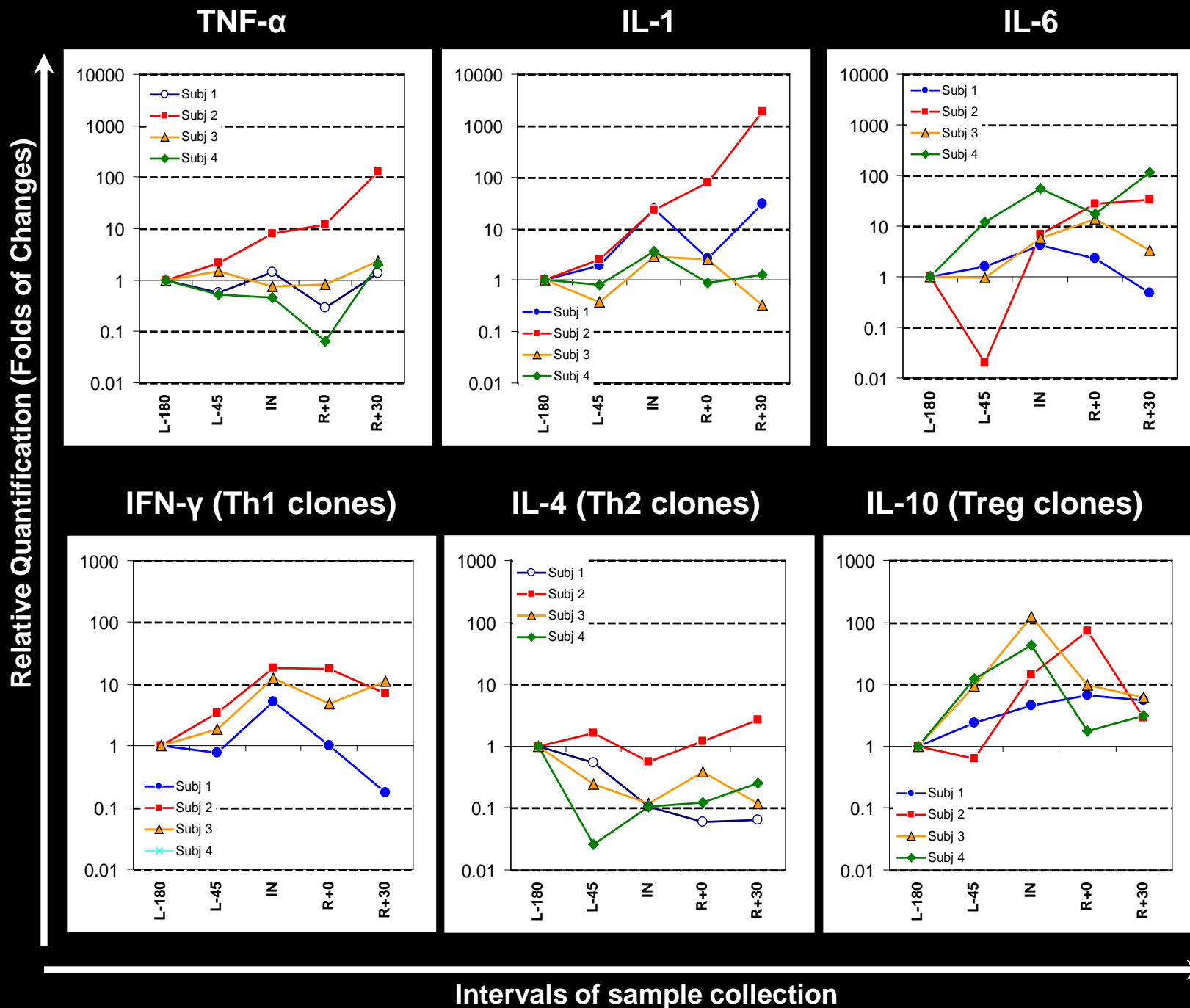
# Secreted Cytokine Profiles (CD3/CD28 48hr)

## CD8+ T cell – Intracellular IFN $\gamma$

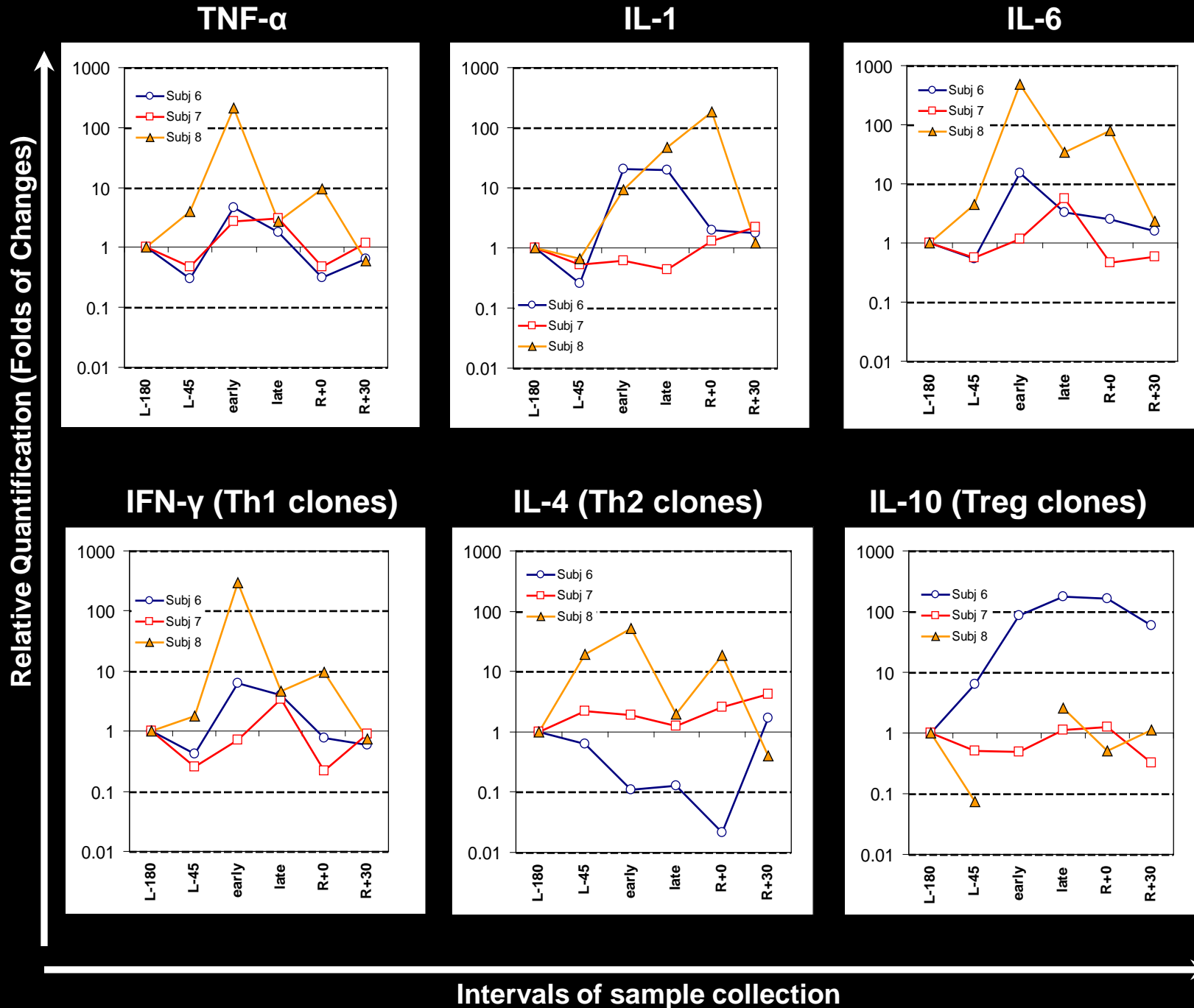


## B. Leukocyte cytokine mRNA

# Gene Expression of Markers of Innate (A) and Adaptive (B) Immune Responses (short-duration flights).



# Gene Expression of Markers of Innate (A) and Adaptive (B) Immune Responses (long-duration flights).

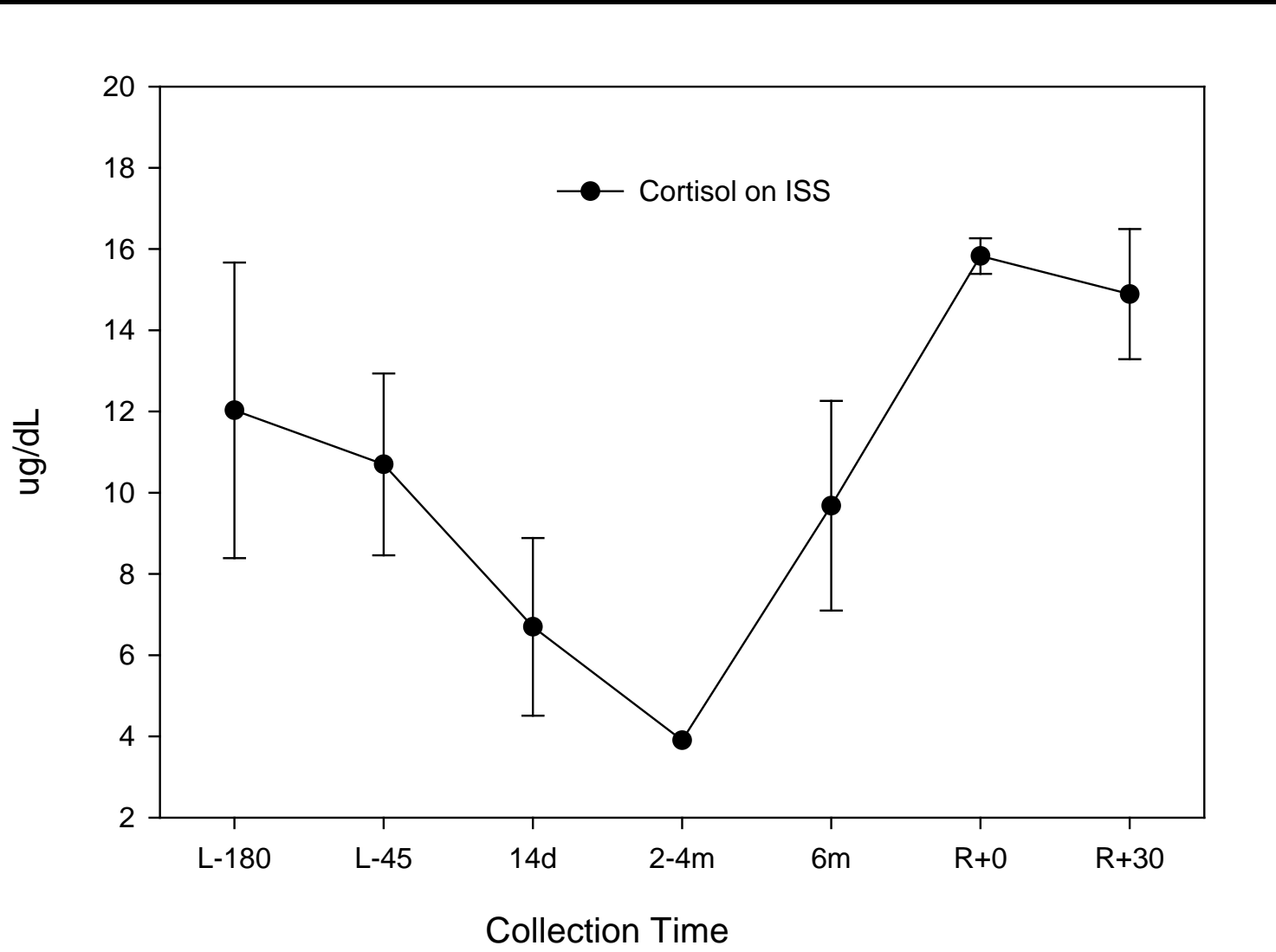


**A.**

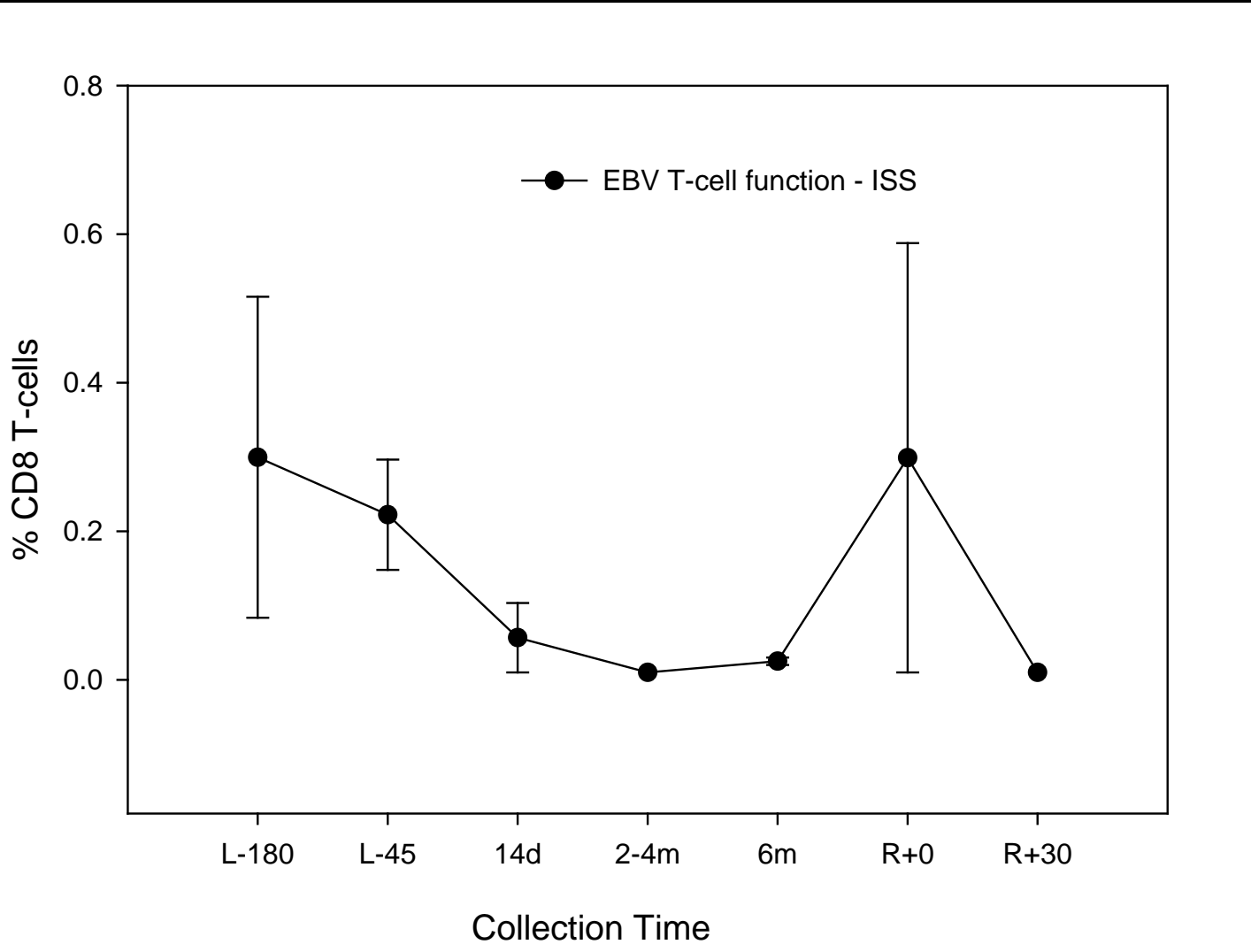
**B.**

C. Virus specific T cell number,  
function, plasma stress hormone levels.

# Plasma cortisol levels - ISS



# EBV T cell function - ISS

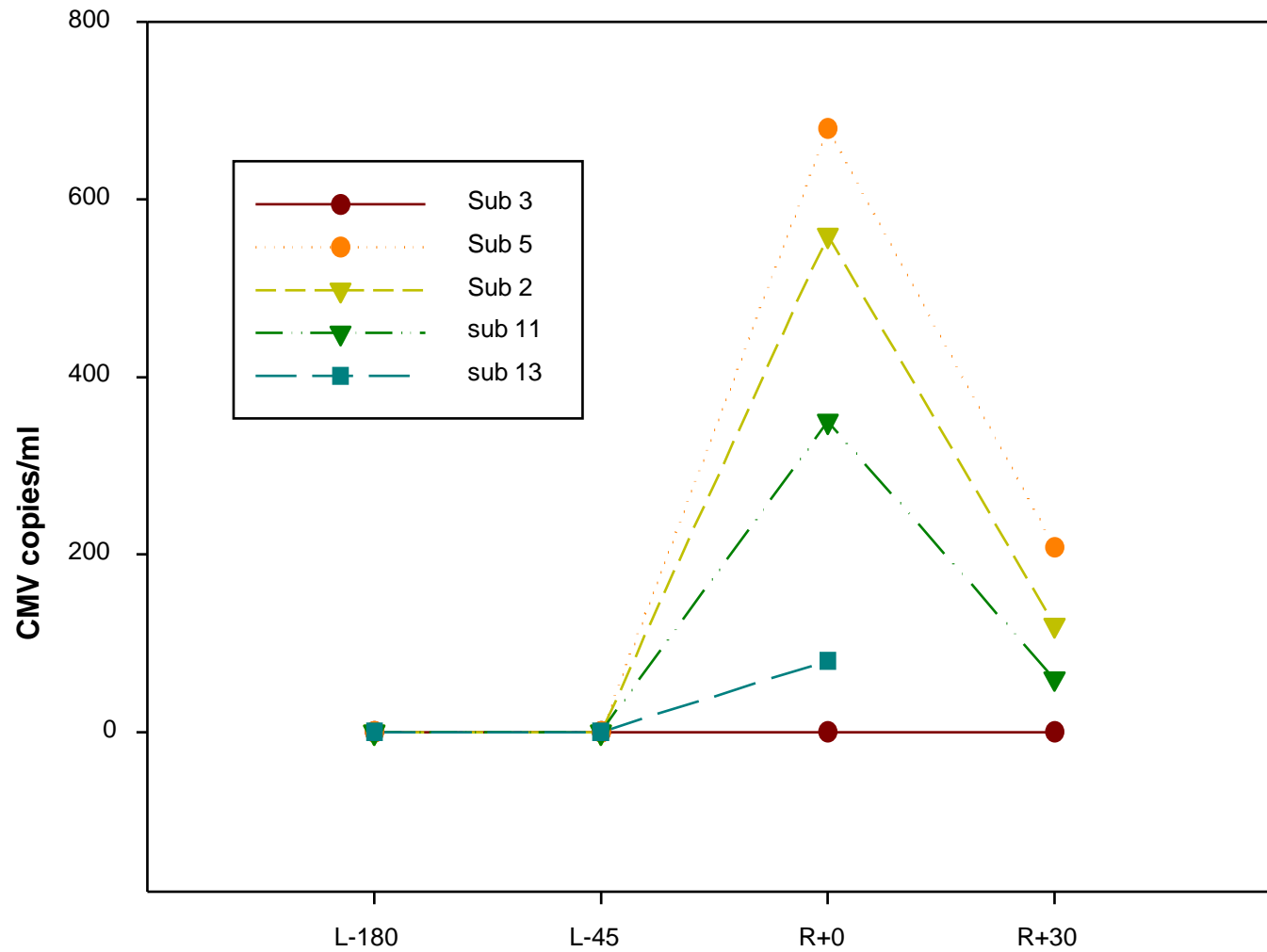




D. Latent herpesvirus reactivation  
(saliva/urine), saliva/urine stress  
hormones, circadian rhythm analysis.

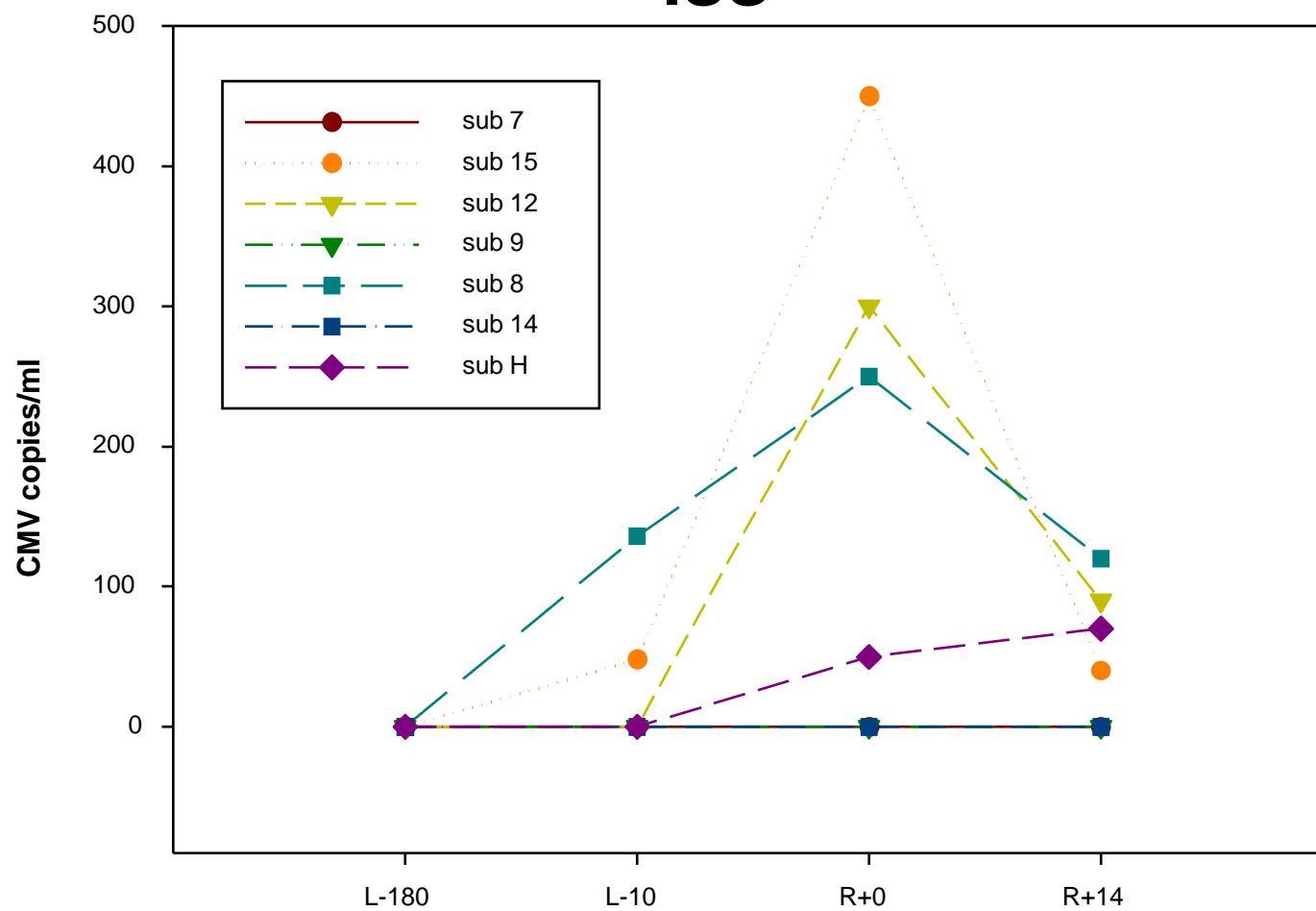
# Urine CMV Assessment

## SHUTTLE

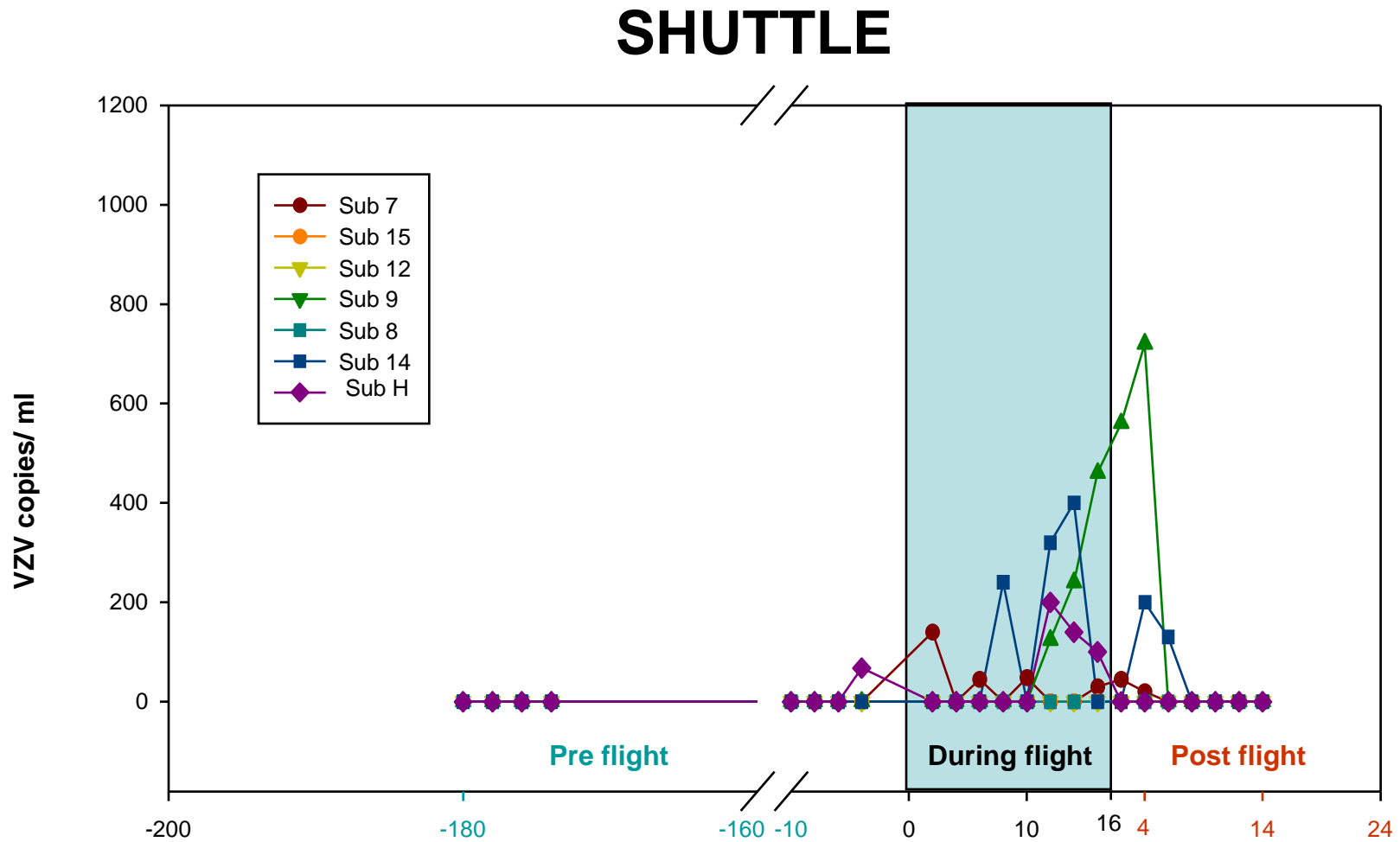


# Urine CMV Assessment

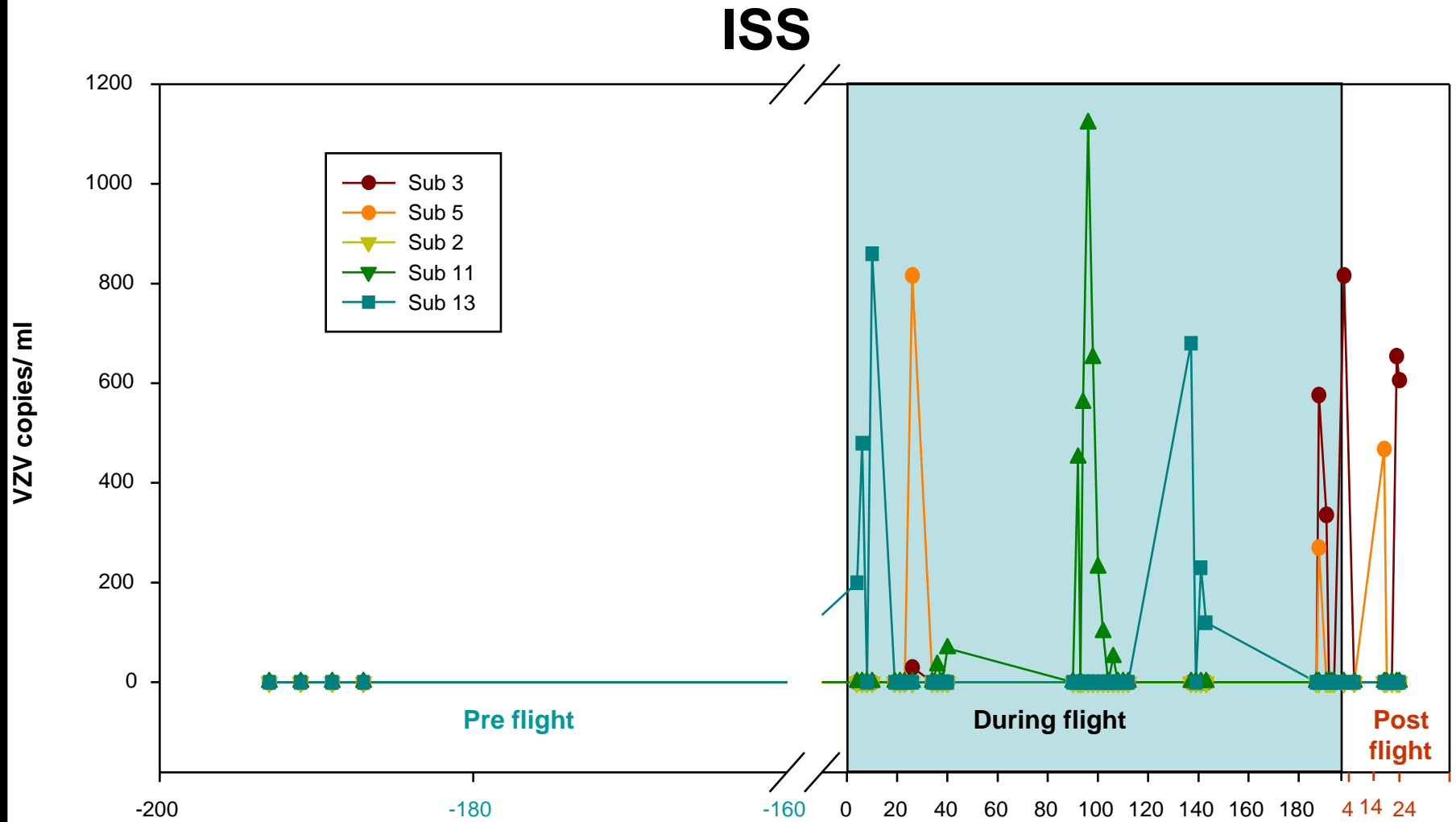
## ISS



# Saliva VZV Assessment



# Saliva VZV Assessment



Questions?

