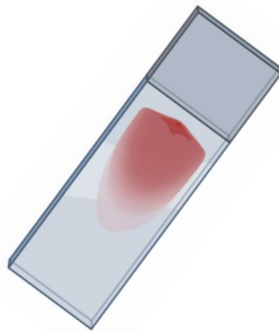


Combined MSC-antiviral treatment for systemic inflammation and lymphoid tissue regeneration in cats with FIP

Rachel Formaker

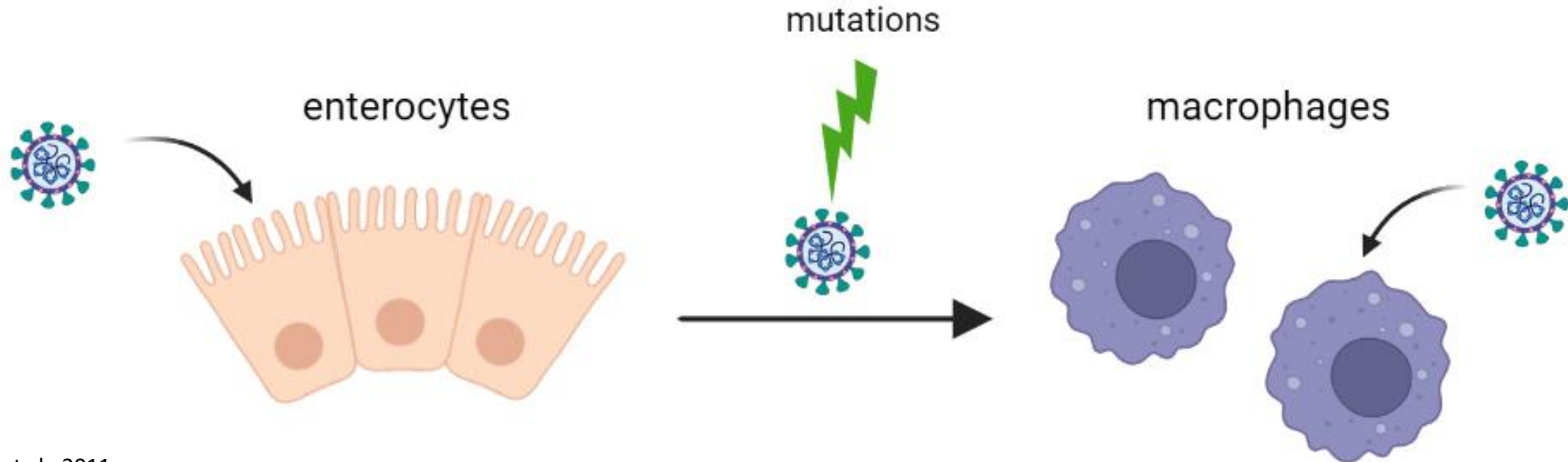
Kol Lab

STAR 2023



Feline Infectious Peritonitis (FIP)

- Occurs mostly in cats <16 months
- Highly fatal if untreated
- Caused by feline enteric coronavirus (FECV)



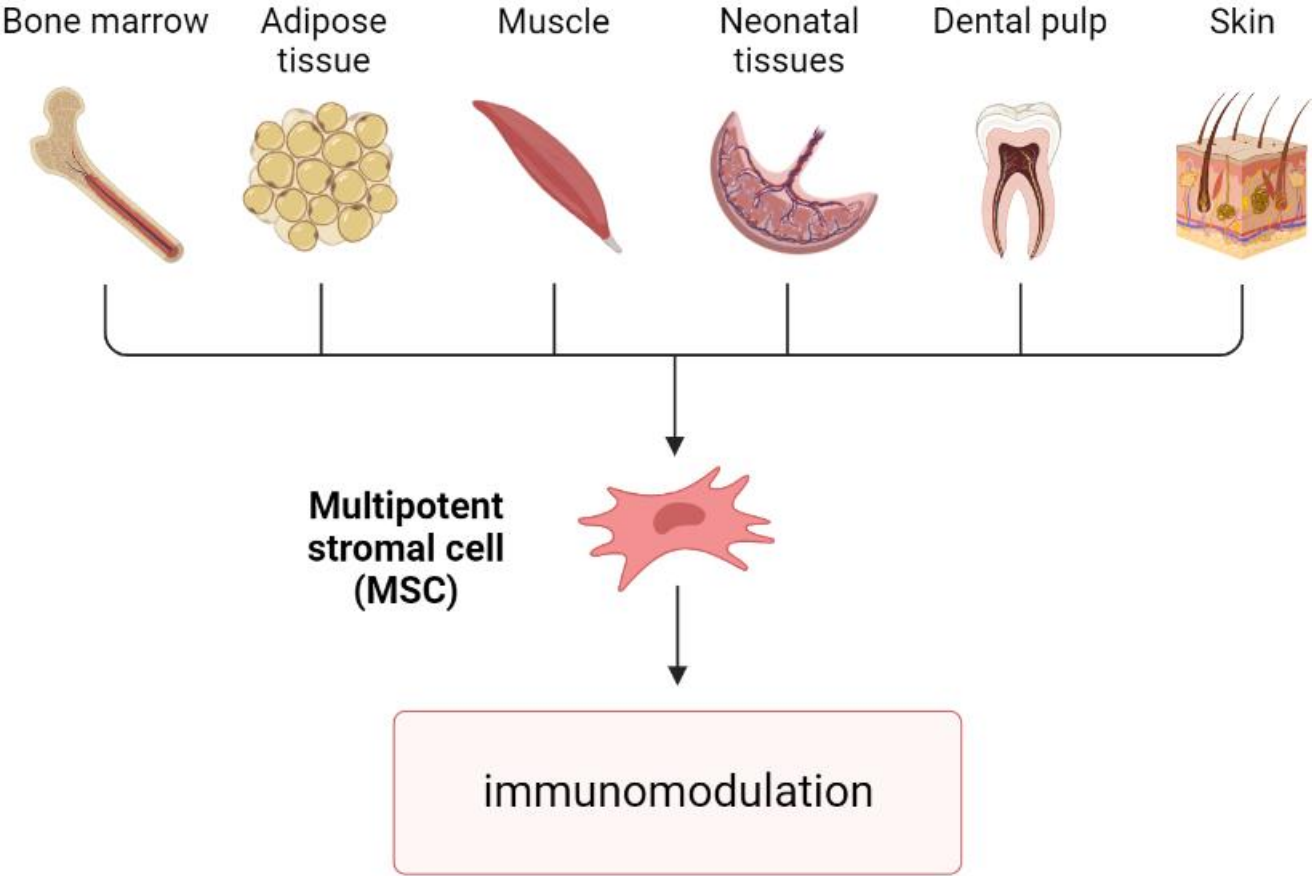
FIP Clinical Disease

- Multi-system inflammation
- Pyogranulomas
- Lymphopenia
- Effusive (“wet”) and non-effusive (“dry”) forms



Niels C. Pedersen, 2009

Multipotent Stromal Cells (MSCs)



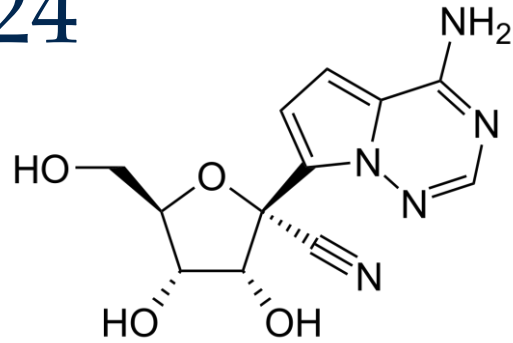
Multipotent Stromal Cells (MSCs)

- Successfully treated refractory chronic oral inflammatory disease in cats
- Use in other viral inflammatory disease
 - Increased survival, reduced levels of pro-inflammatory cytokines, and increased lung tissue regeneration in patients with severe COVID-19 infection and pneumonia



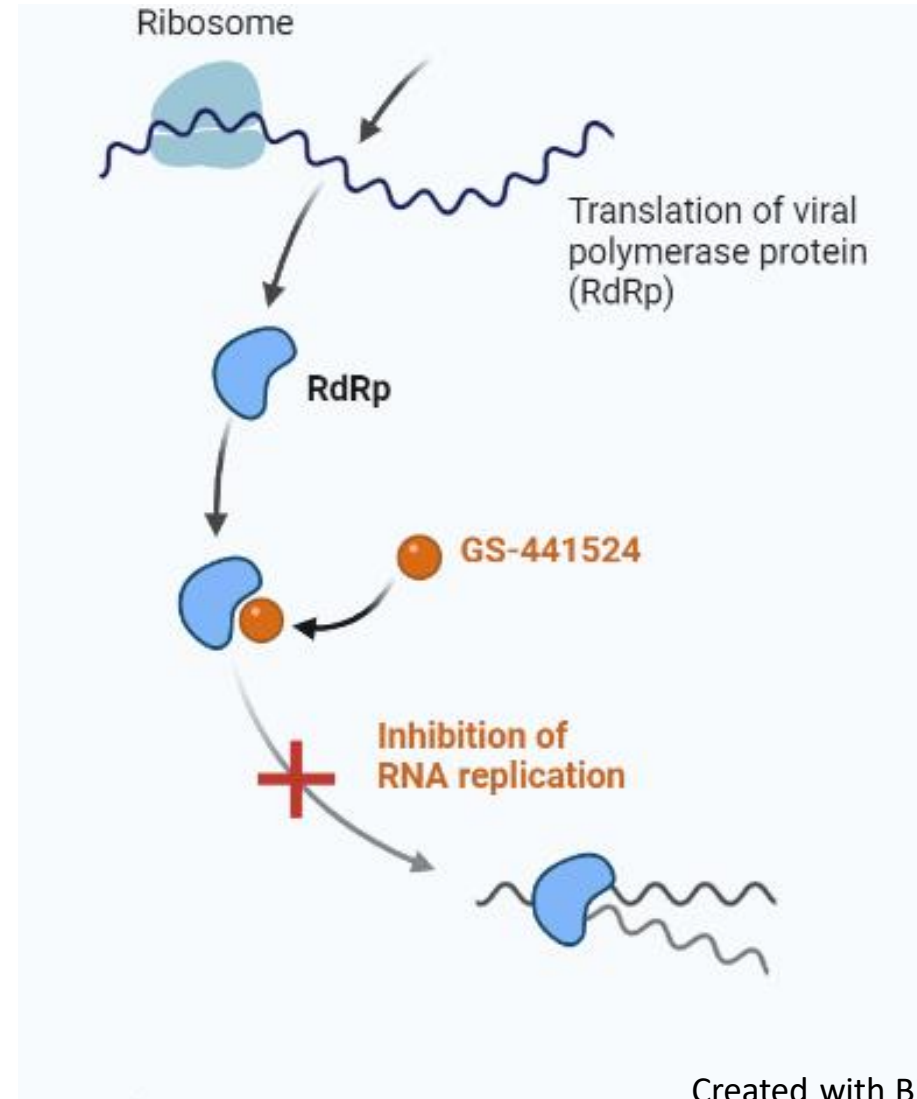
Natasha Holden 2022

GS-441524



<https://en.wikipedia.org/wiki/GS-441524>

- Nucleoside analog
- Effective in ~80% of FIP cases
 - Some cats relapse post-treatment



Rationale

- Poor understanding of immune recovery with GS-441524 alone
- MSC potential to:
 - improve immune recovery
 - shorten treatment duration



Hypothesis

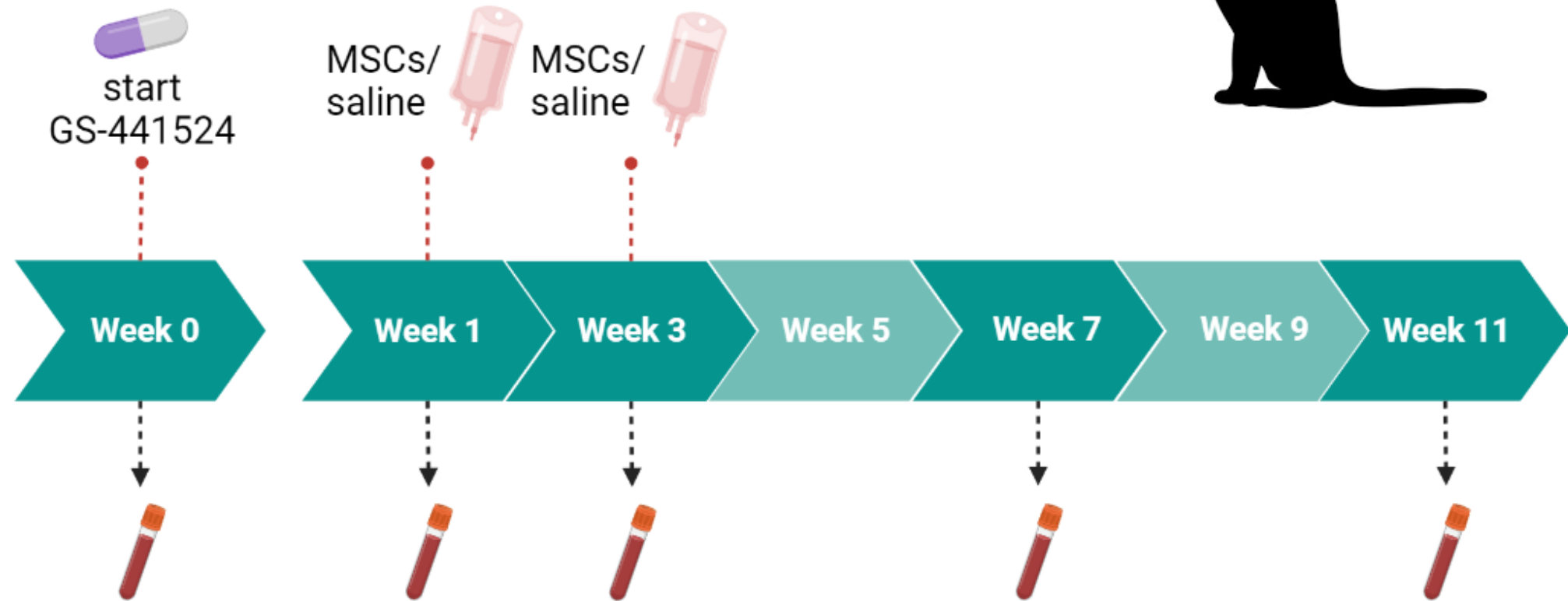
- Addition of MSCs to GS-441524 antiviral treatment for FIP will decrease systemic inflammation and facilitate lymphoid recovery

Expectations:

↓ Pro-inflammatory cytokines

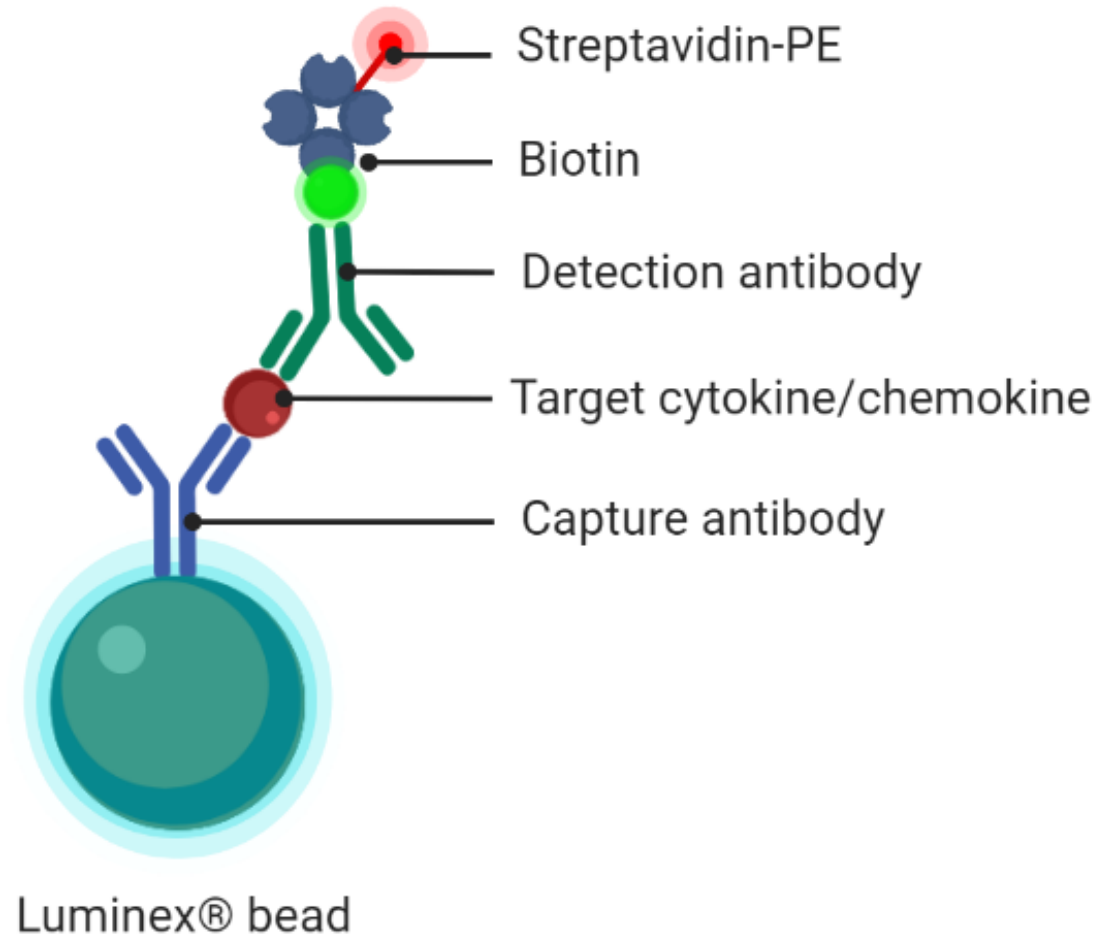
↑ Lymphocyte counts

Clinical Trial Study Design



Cytokine Assay

- Combination of ELISA and flow cytometry techniques
- Millipore Multiplex Feline-Specific Cytokine Assay



Blood Smear Interpretation

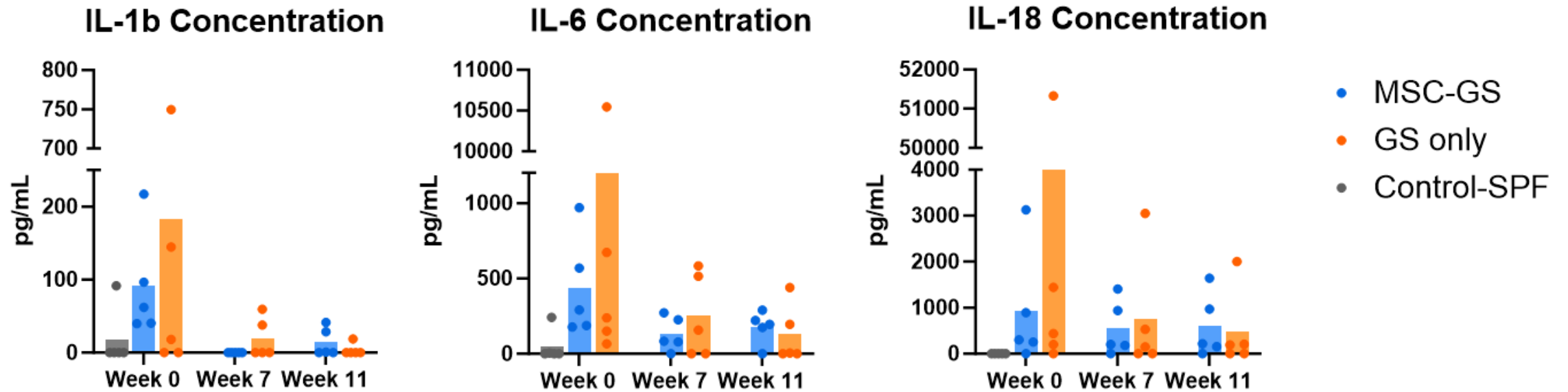
- Manual 400-cell differential leukocyte counts
- Calculate cell populations using differential % x total leukocytes from CBC



https://en.wikipedia.org/wiki/Blood_smear

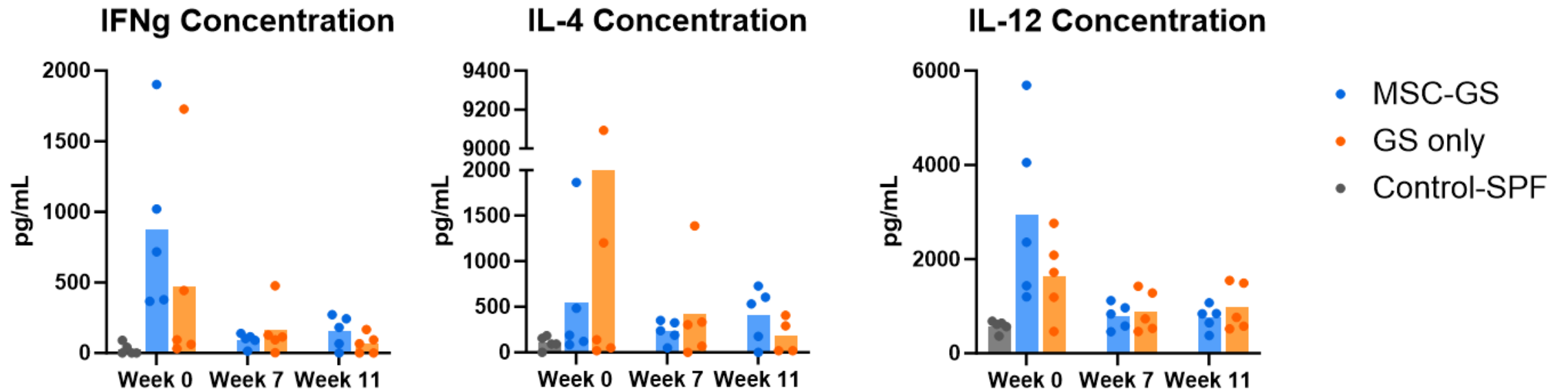
Results: Cytokine Panel

Innate Immunity

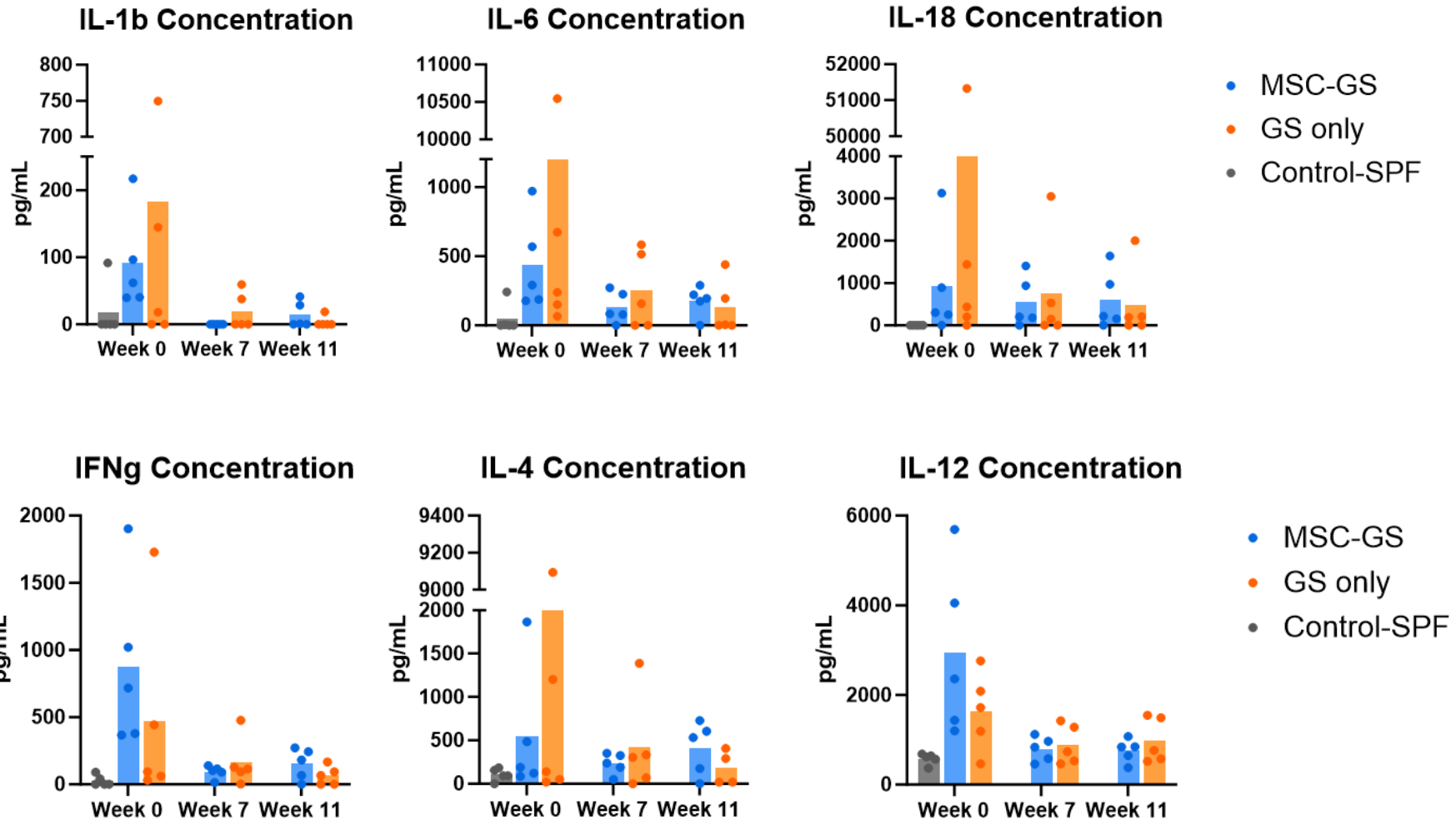


Results: Cytokine Panel

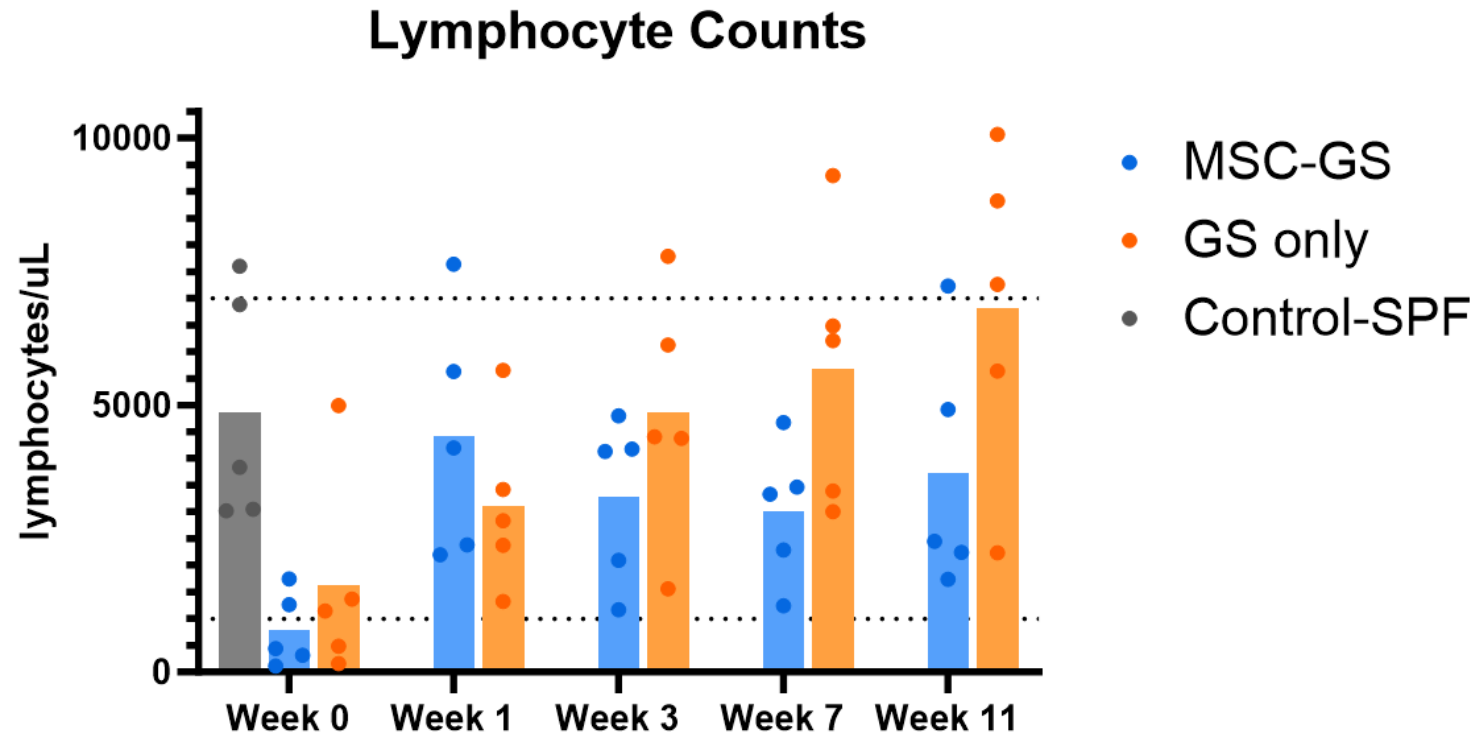
T-Cell Polarization



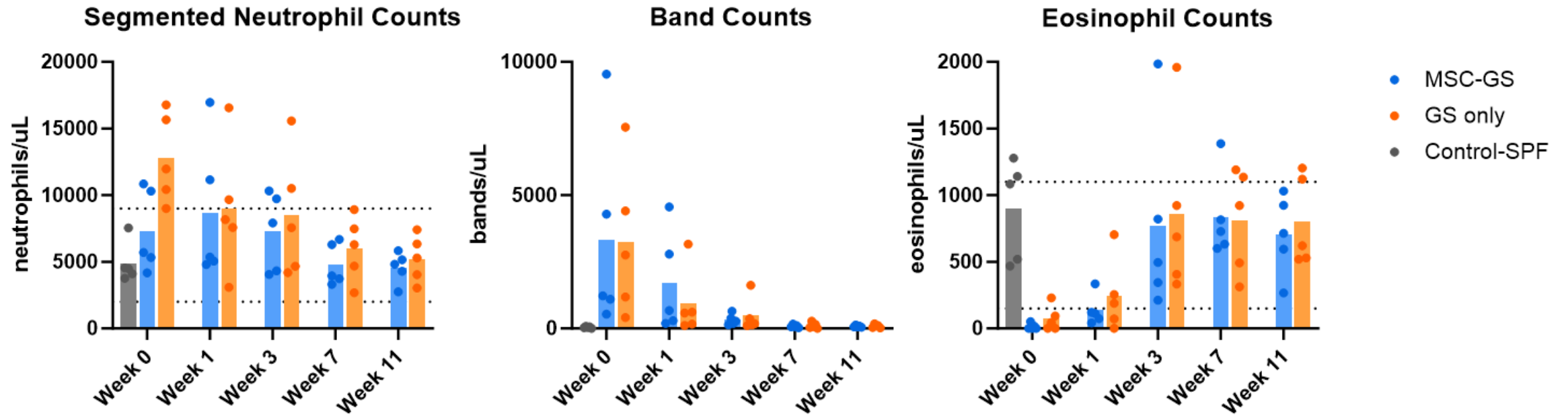
Results: Cytokine Panel



Results: Hematology Data



Results: Hematology Data



Discussion

- No adverse effects of MSCs
 - No “immunosuppressive” effects
 - No thrombosis



Virginia Luis Fuentes 2012

Discussion

- Why didn't we see a difference with the addition of MSCs?
 - Effusive FIP is effectively treated by GS-441524
 - Sample size too small
 - Naturally-occurring FIP – different stages of disease on presentation
 - Screening selected for less severely affected cats

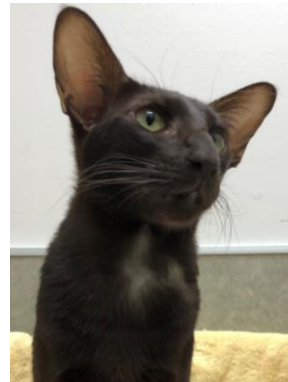
Future Directions

- Correlation of cytokine patterns and hematologic results
- Use of MSCs with non-effusive FIP
 - Harder to treat with antiviral alone

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