Influenza vaccination in oncology populations

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Existing data

- Influenza clinical disease is more serious in patients on chemotherapy
- Viral shedding can be prolonged
- Titers to vaccines decline during chemotherapy in general
  - Recommendations exist to revaccinate after completion
  - Most centers wait 2-6 months to revaccinate
- Data on efficacy of influenza vaccine limited
  - During chemotherapy
  - Maintenance chemotherapy
  - Post-chemotherapy

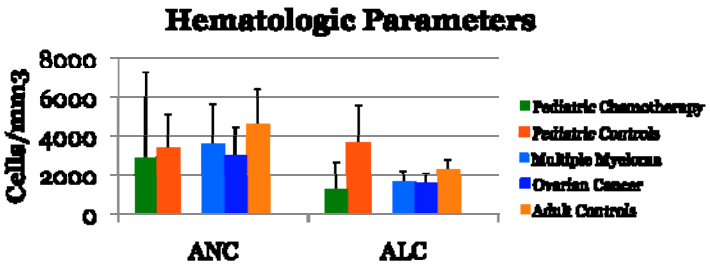
Existing Data

- Adults with malignancy on chemotherapy
  - 20-60% seroconversion for lymphoma Ortbals, DW Ann Int Med 1977 87: 552, Stiver, HG Can Med Assoc J 1978 119:733, Centkowski, P J Clin Imm 2007 27:339, Schafer, AI Cancer 1979 43: 25
  - 50-70% seroconversion for solid tumor Stiver, HG Can Med Assoc J 1978 119:733, Anderson, H Br J Can 1999 80:219, Ganz, PA Cancer 1978 42: 2244, Vilar-Compte, D Med Sci Mon 2006, 12: CR332
- Children with malignancy on chemotherapy
  - 70% seroconversion for solid tumors Bektas, O Ped Bl Can 2007 49:914
  - 50% seroconversion for lymphoid malignancies Chisholm, JC Arch Dis Child 2001 84:496, Steinherz, PG Cancer 1980, 45: 750
  - 60% seroconversion for miscellaneous tumors Matsuzaki, A Ped Bl Can 2005, 45:831

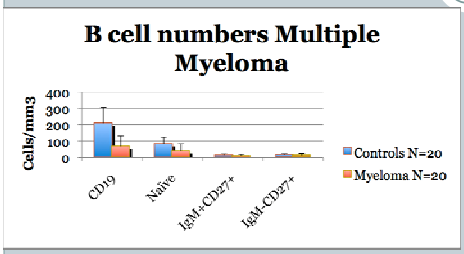
THREE POPULATIONS

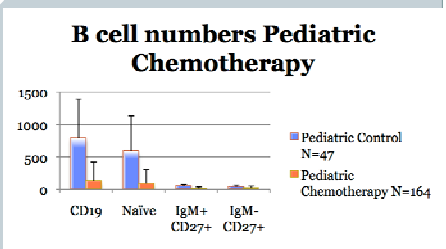
- We studied three populations with malignancies
  - Adult patients with multiple myeloma
    - Post- treatment with Melphalan/bortezomib/thalidomide analog and steroid
  - Adult patients with ovarian cancer
    - Post-treatment with cisplatinum
  - Pediatric patients with ALL and AML
    - Studied at various times on and off chemotherapy

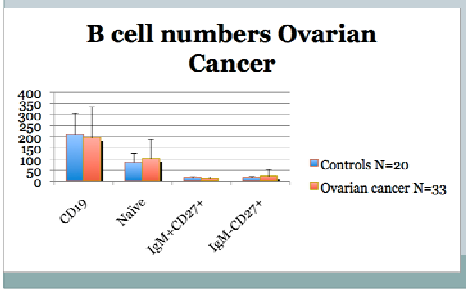
ANC and ALC vary widely



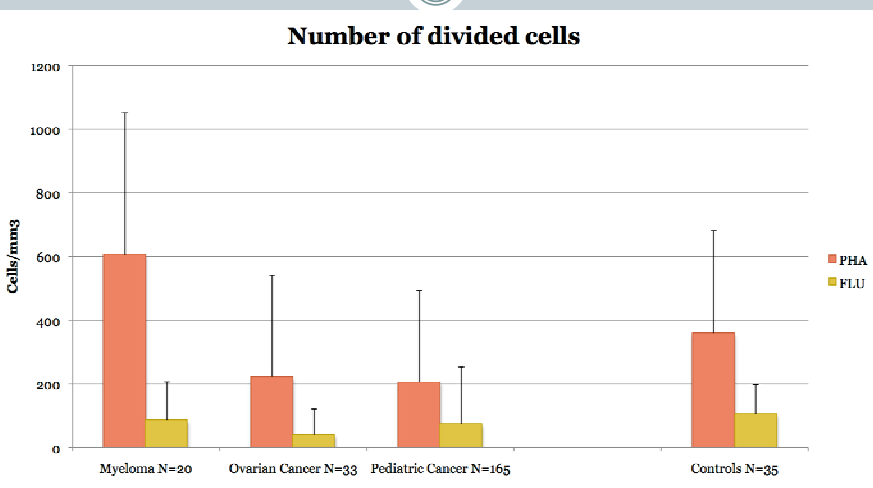
Immunologic consequences: B cells



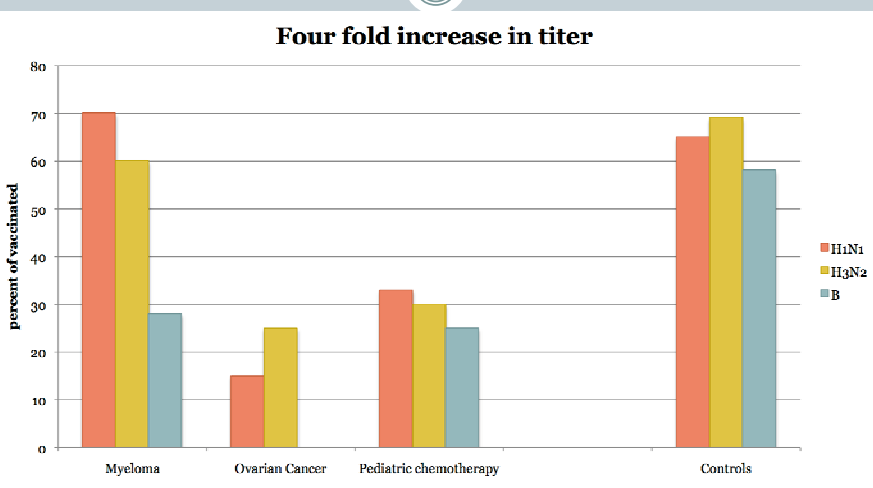




T cell proliferation is relatively spared



Responses vary widely

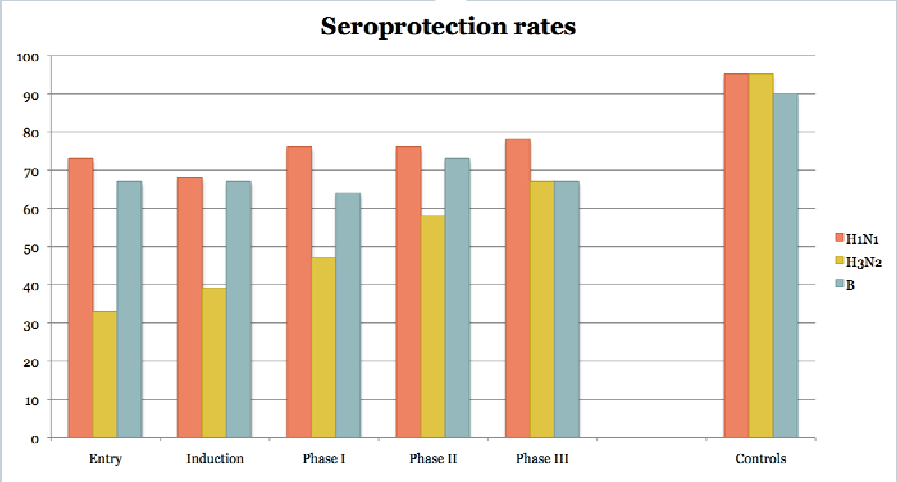


Pediatric patients: Phase of chemotherapy

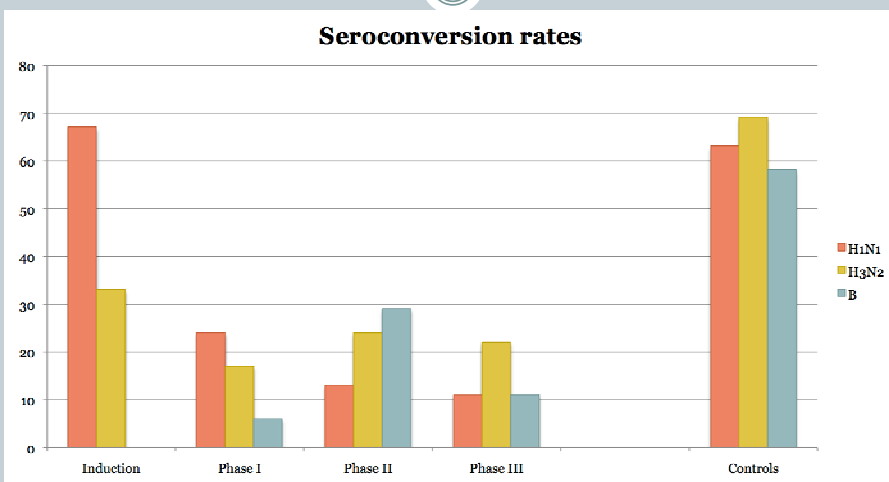
- Induction (glucocorticoid, L-asparaginase, vincristine)
- Phase I – post-induction (similar chemotherapy to induction)
- Phase II- maintenance (6-MP, MTX, vincristine, steroid)
- Phase III- off therapy

- Most Pediatric ALL is a B cell precursor malignancy
- 80% ten year survival

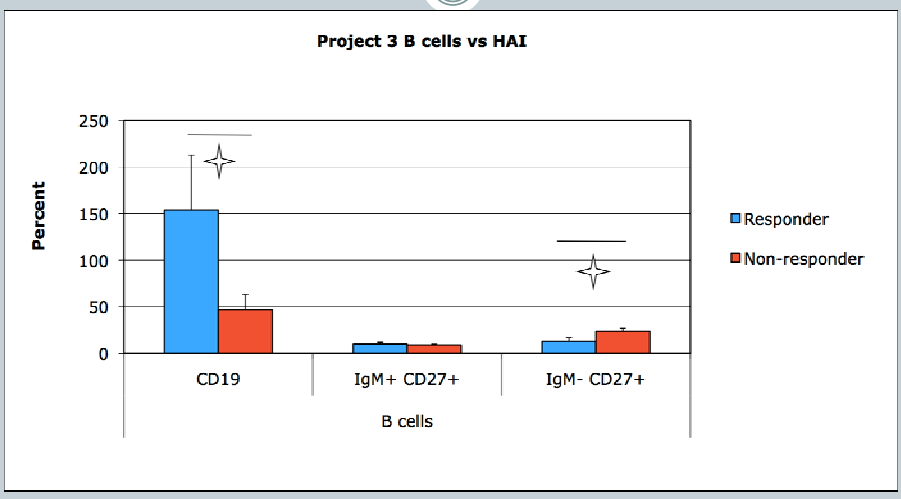
Seroprotection according to time of vaccination



Seroconversion rates according to time of vaccination



Seroconversion correlates with B cells



Summary

- Oncology patients represent a particular challenge for vaccination programs
- 1,500,000 people are diagnosed with cancer each year
  - 10,000 children are on chemotherapy each year
  - Adults
    - 200,000 breast cancer
    - 150,000 colon cancer
    - 60,000 lymphoma
- Responses to influenza vaccination are poor and vary with chemotherapy regimen
  - Significant variation with time on chemotherapy

References

- Taisan et al. Pediatr Blood Cancer 2008, 50:983-7
  - Pediatric chemotherapy patients have serious disease with influenza
- Mendoza Sánchez. Journal of Pediatric Hematology/Oncology 2006, 28: 154-159
  - Disease severity