

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

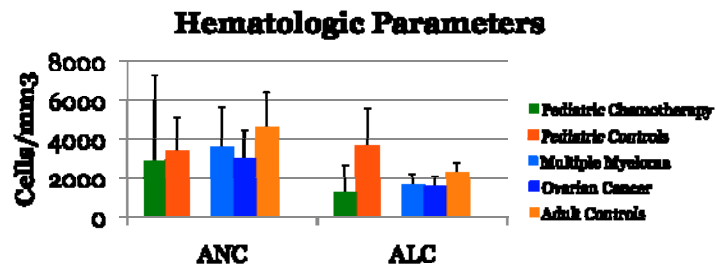
Existing Data

- **Adults with malignancy on chemotherapy**
 - ✦ **20-60% seroconversion for lymphoma** Ortvals, 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

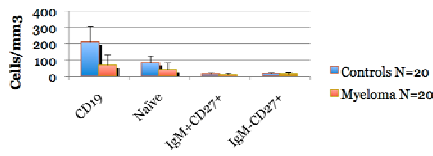
- **We studied three populations with malignancies**
 - **Adult patients with multiple myeloma**
 - ✦ Post- treatment with Melphalan/bortezomib/thalidomide analog and steroid
 - **Adult patients with ovarian cancer**
 - ✦ Post-treatment with cisplatin
 - **Pediatric patients with ALL and AML**
 - ✦ Studied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

ANC and ALC vary widely

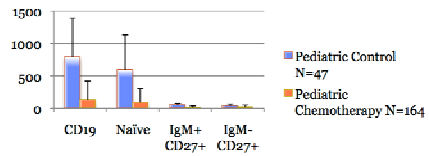


Immunologic consequences: B cells

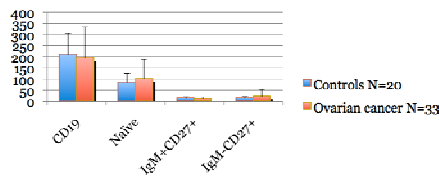
B cell numbers Multiple Myeloma



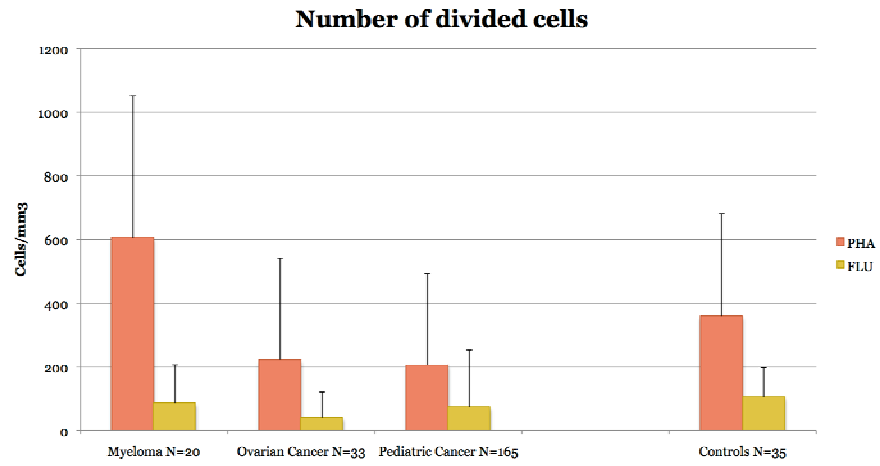
B cell numbers Pediatric Chemotherapy



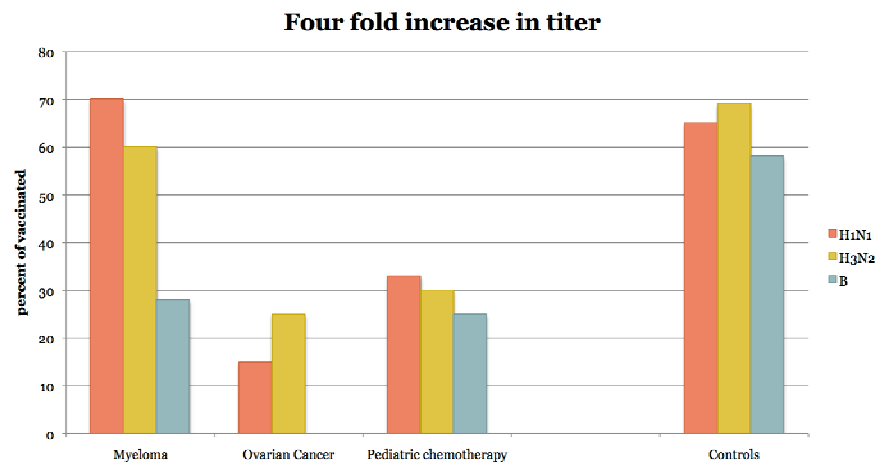
B cell numbers Ovarian Cancer



T cell proliferation is relatively spared



Responses vary widely

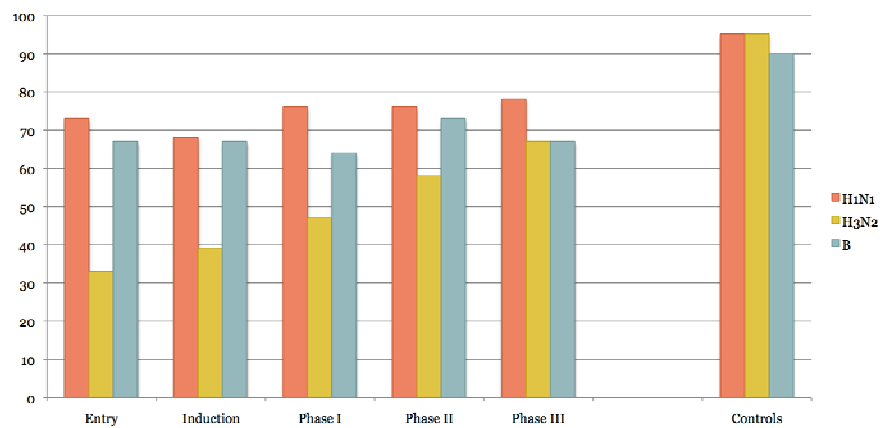


Pediatric patients: Phase of chemotherapy

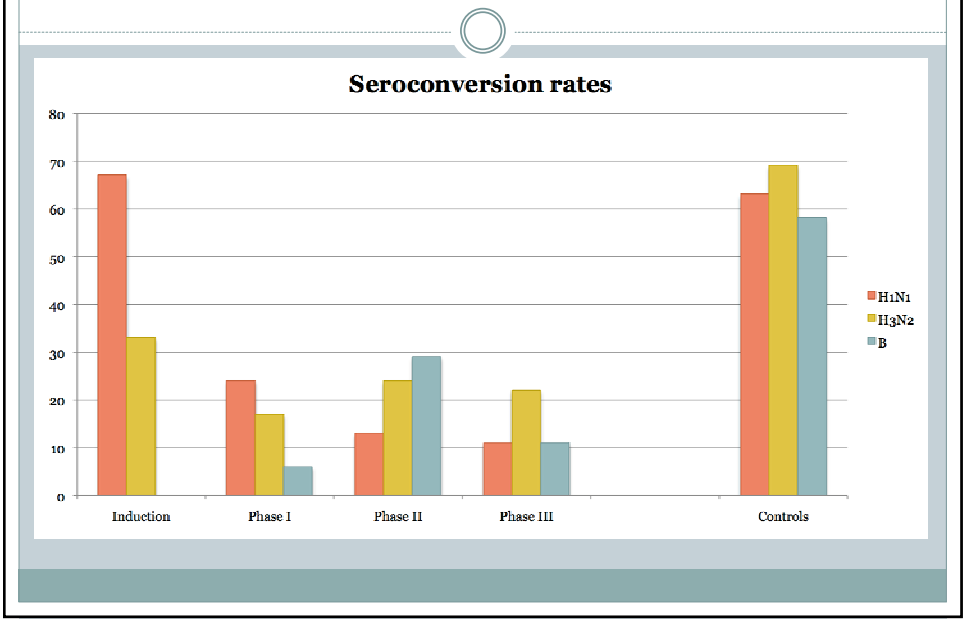
- **Induction** (glucocorticoid, L-asparaginase, vincristine)
- **Phase I – post-induction** (similar chemotherapy to induction)
- **Phase II- maintenance** (6-MP, MTX, vincristine, steroid)
- **Phase III- off therapy**
- **Most Pediatric ALL is a B cell precursor malignancy**
- **80% ten year survival**

Seroprotection according to time of vaccination

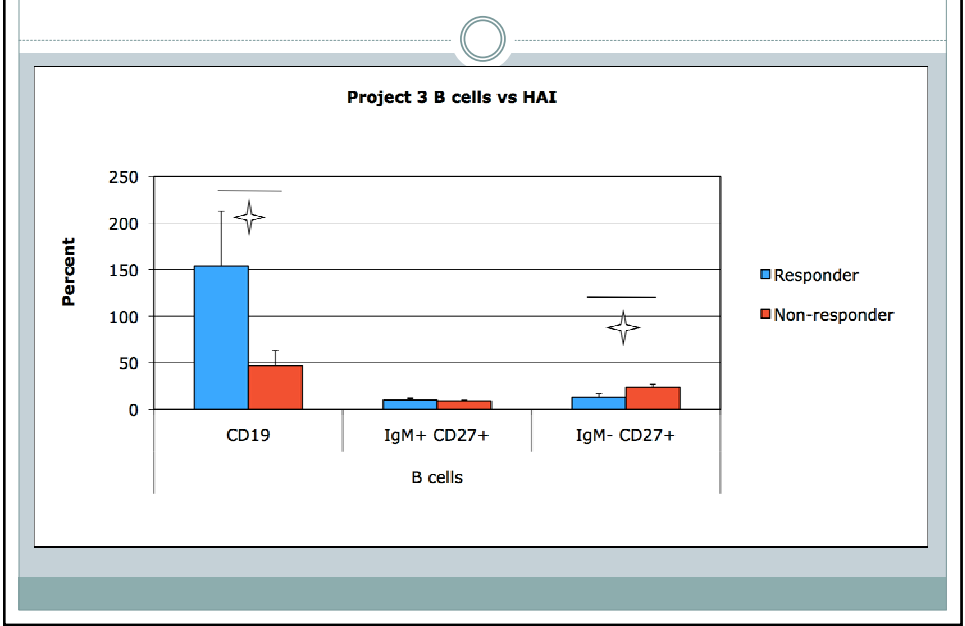
Seroprotection rates



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