

Seasonal Effects on the Immune System

Xiangqi Kong, MPH Candidate

College of Public Health & Health Professions, University of Florida

Background:

Type 1 diabetes (T1D) results from the self-destruction of beta cells in the pancreas, leading to a deficiency in insulin production. Although T1D is classified under a single entity, this multi-faceted disease is complicated by the vast genetic diversity of humans and the infinitesimal possible interactions with the environment throughout the duration of life. It is postulated that season may contribute to variations in the number and function of related immune cells, resulting in heterogeneity in the proportion of certain immune cell populations and different immune responses.

Objectives:

To assess whether seasonal effects exist for immune cell populations and if so, does this confound the immune system's involvement in autoimmunity?

Methods:

Peripheral blood of participants were analyzed within 24 hours after collection. In this special project, 360 subjects were chosen randomly from the 2014 UF Diabetes Institute human immunophenotyping project (HIP). Study groups were designated based on clinical status. After omitting those subjects with missing data, the sample size we used to analyze contains 252 subjects.

Results:

- Among the significant variables yielded by multinomial model, there are 2 variables showed significant difference among clinical groups both in Summer and Fall.
- In the cosinor model, CD38-HLADR+ % of Naive CD8 and CD183+ % of Naive CD8 show significantly higher levels in summer in T1D group.

Conclusions:

- The hierarchy clustering indicates variables from different cell panels also highly correlated, and both the positively and negatively correlated variables need further examination across clinical status groups.
- Multinomial logistic modeling yielded significant variables that are shared between season (summer and fall).
- The cosinor model exhibits the variables gained from multinomial model showing different trend between seasons.

MPH Competencies:

- Identify multilevel factors that influence the health and wellbeing of populations
- Monitoring health status to identify and solve community health problems.
- Diagnosing and investigating health problems and health hazards in the community using an ecological framework.
- Developing policies and plans that support individual and community health efforts.
- Evaluating effectiveness, accessibility, and quality of personal and population-based health services.
- Communicating effectively with public health constituencies in oral and written forms.

Biostatistics Concentration Competencies:

- Describe the roles biostatistics serve in the discipline of public health research.
- Apply descriptive and inferential methodologies according to the type of data model to answer a particular public health research question.
- Interpret and critique statistical analysis for/in public health studies.
- Develop presentations based on statistical methods and analysis for both public health professionals and educated lay audiences.

Public Health Relevance:

- The international incidence and prevalence of T1D is increasing around the world.
- Understanding the immune profile throughout the progression of the disease will allow for a greater comprehension of the complex immune environment associated with T1D.
- It is essential to identify immune cell populations to better understand the multifaceted events associated with the development and progression of T1D.
- Better understanding of T1D is needed so that evidence driven therapies can be developed.