**Study Design**

Title: SYSTEMS BIOLOGY APPROACH TO STUDY INFLUENZA VACCINE IN CHILDREN WITH AUTOIMMUNITY

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Aim – Grant: This Project will study vaccine responses in healthy and sick children. It will address the following questions:

1. Which are the best biomarkers of protective immune response to influenza vaccine in healthy children.
2. How unique autoimmune backgrounds set the stage for responsiveness/unresponsiveness to vaccines.
3. Whether vaccination contributes to increase the breadth of autoimmunity in a disease-specific manner. Ultimately, we expect that these studies will shed light on basic aspects of humoral immune responses to vaccines and will permit us to discover biomarkers of response that can be applied to healthy children and to the general population.

* AIM 1 will establish immune parameters of response to Flu vaccine in healthy children.
* AIM 2 will assess the immune response to Flu vaccine in children with SLE.
* AIM 3 will assess the immune response to Flu vaccine in children with JDM.

Objective: To evaluate the effects of TIV and LAIV immunization on immune cell populations in children. To assess differences in seroprotection and seroconversion between LAIV and TIV.

Subjects: Healthy children; in 2010 also healthy adults.

IRB number: 09-00262 Nationwide Childrens Hospital Columbus Ohio.

Season 2013/14 HIPC Flu vaccine Nationwide Children's Hospital, conducted from August 2013 to November 2014.

TIV: trivalent inactivated influenza vaccine (intramuscular injection);

LAIV: live atenuated influenza vaccine (nasal spray).

2013-2014 Vaccines Components: A/California/7/2009 (H1N1), A/Victoria/361/2011 (H3N2), B/Wisconsin/1/2010 and B/Massachusetts

22 Subjects: 22 pediatric TIV donors.Time points: Days 0-1-7-30.

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| Project\_name | Vaccine\_Season | Age\_group | Disease | Patient\_ID | Day | Date |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-152 | 0 | 8/12/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-131 | 0 | 8/12/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-132 | 0 | 8/12/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-133 | 0 | 8/12/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-134 | 0 | 8/12/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-135 | 0 | 8/12/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-136 | 0 | 8/14/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-137 | 0 | 8/14/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-138 | 0 | 8/14/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-139 | 0 | 8/14/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-140 | 0 | 8/14/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-141 | 0 | 8/26/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-142 | 0 | 8/26/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-143 | 0 | 8/26/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-144 | 0 | 8/26/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-145 | 0 | 8/26/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-146 | 0 | 8/26/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-147 | 0 | 8/28/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-148 | 0 | 8/28/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-149 | 0 | 8/28/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-150 | 0 | 8/28/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-151 | 0 | 8/28/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-152 | 1 | 8/13/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-131 | 1 | 8/13/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-132 | 1 | 8/13/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-133 | 1 | 8/13/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-134 | 1 | 8/13/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-135 | 1 | 8/13/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-136 | 1 | 8/15/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-137 | 1 | 8/15/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-138 | 1 | 8/15/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-139 | 1 | 8/15/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-140 | 1 | 8/15/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-141 | 1 | 8/27/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-142 | 1 | 8/27/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-143 | 1 | 8/27/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-144 | 1 | 8/27/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-145 | 1 | 8/27/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-146 | 1 | 8/27/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-147 | 1 | 8/29/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-148 | 1 | 8/29/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-149 | 1 | 8/29/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-150 | 1 | 8/29/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-151 | 1 | 8/29/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-152 | 7 | 8/19/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-131 | 7 | 8/19/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-132 | 7 | 8/19/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-133 | 7 | 8/19/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-134 | 7 | 8/19/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-135 | 7 | 8/19/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-136 | 7 | 8/21/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-137 | 7 | 8/21/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-138 | 7 | 8/21/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-139 | 7 | 8/21/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-140 | 7 | 8/22/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-141 | 7 | 9/3/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-142 | 7 | 9/3/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-143 | 7 | 9/3/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-144 | 7 | 9/3/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-145 | 7 | 9/3/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-146 | 7 | 9/3/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-147 | 7 | 9/4/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-148 | 7 | 9/4/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-149 | 7 | 9/4/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-150 | 7 | 9/4/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-151 | 7 | 9/4/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-152 | 30 | 9/13/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-131 | 30 | 9/10/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-132 | 30 | 9/10/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-133 | 30 | 9/10/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-134 | 30 | 9/10/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-135 | 30 | 9/10/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-136 | 30 | 9/11/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-137 | 30 | 9/11/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-138 | 30 | 9/11/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-139 | 30 | 9/12/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-140 | 30 | 9/12/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-141 | 30 | 9/24/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-142 | 30 | 9/24/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-143 | 30 | 9/27/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-144 | 30 | 9/27/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-145 | 30 | 9/24/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-146 | 30 | 9/24/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-147 | 30 | 9/26/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-148 | 30 | 9/30/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-149 | 30 | 9/26/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-150 | 30 | 9/26/2013 |
| HIPC P4-Ramillo | Season 2013/14 | pediatric | Healthy | NCH-VK-151 | 30 | 9/26/2013 |

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| Visit | V1 | V2 | V3 | V4 |
| Day | D0 | 1 | 7 | 28 |
| TIV (Fluzone) | Immunization |  |  |  |
| Sample collection | 3 ACD, 2 Tempus | 3 ACD, 2 Tempus | 3 ACD, 2 Tempus | 3 ACD, 2 Tempus |
| Progeny samples | Plasma, PBMC, WB | Plasma, PBMC, WB | Plasma, PBMC, WB | Plasma, PBMC, WB |
| Patient ID | Sample ID | Sample ID | Sample ID | Sample ID |
| Clinical data | collected for all time points |  |  |  |
| CBC | collected for all time points |  |  |  |
| Microarray (WB, illumina) | RNA not yet extracted |  |  |  |
| Flow cytometry | WB phenotyping for all donors all time points |  |  |  |
| Serology | not yet done |  |  |  |