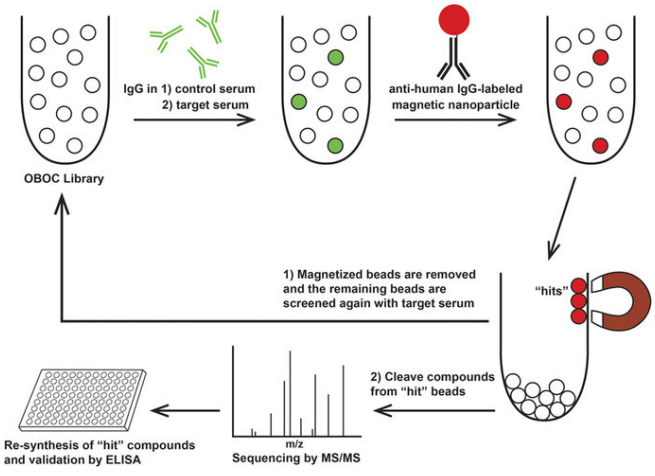
JOHNSON CENTER

The Ted Lindsay Foundation Research Report 2016

We are so very grateful to The Ted Lindsay Foundation for their continued support of our autism research program. With current statistics estimating that 1 in every 68 children (1 in 42 boys) are diagnosed with autism, understanding the causes of this disorder, and how to implement the very best treatments and interventions, have never been more important.

We have recently completed a large study examining the safety of pediatric vaccines that contained ethyl mercury (found in the vaccine preservative, thimerosal). This 5 year multi-disciplinary study employed an animal model to examine the development, cognition, and behavior of vaccinated infant macaque monkeys. Two papers have been published so far, one of which examined whether exposure to vaccines containing ethyl mercury were linked to the development of autism-like symptoms in non-human primates. Data collected looked for any behavioral changes during development in the animals as well as any changes in three brain regions, known to be affected in individuals with autism. The results from this study strongly support the conclusion that pediatric vaccines do not produce autism-like brain or behavioral changes in this animal model. This research was chosen by the Interagency Autism Coordinating Committee (who coordinate all autism research efforts within the U.S. Department of Health and Human Services) as one of the top 20 research papers deemed most important to the field of autism for 2015.

Our clinical research studies have been focused on the identification of potential blood biomarkers in children with autism. In the first study, we used a peptoid approach to identify a novel biomarker that could distinguish between the majority of children with autism versus a control group of similarly aged children. In addition, this biomarker was significantly correlated with the level of impairment in communication in children with autism, suggesting that the blood test may give insight into the level of autism severity. More testing, including analysis of additional blood samples from girls with autism, is needed to further validate these findings, especially since girls made up only a small part of the study group, and the biomarker did not correlate as strongly with autism diagnosis in girls as it did with boys.

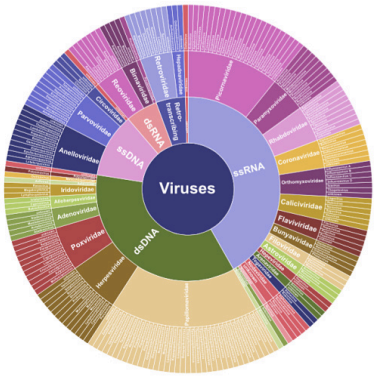


The second study used a multi-analyte profiling assay to screen for hundreds of proteins in blood samples from children with and without autism. The levels of 11 proteins were found to be

significantly different between the autism and control groups, 2 of which (TSH and IL-8), were selected for further testing. The diagnostic accuracy for predicting autism based upon TSH or IL-8 levels alone was ~75% but this increased to 82% when using both proteins together. In addition, TSH levels were negatively correlated with autism severity. These data suggest that a *panel of proteins* may be useful as a blood biomarker for autism. A paper summarizing these findings has been submitted for publication.

With continued funding from The Ted Lindsay Foundation, we are now working on expanding these biomarker studies by collecting additional blood samples from boys with and without autism, as well as more samples from girls, as there appears to be gender-specific differences in biomarkers for autism. In fact, biomarker profiles of unaffected siblings may be closer to their sibling with autism, rather than to healthy control children. This further underscores a strong genetic and environmental component to autism. Identification of a panel of biomarkers that are common to children with autism may lead to the development of a novel diagnostic assay to assist in earlier autism screening and identification. We feel strongly that this research will provide important insight into the molecular mechanisms involved in both the etiology of autism, allowing us to also develop possible targets for therapeutic intervention.

Finally, a ground–breaking study recently published in Science reported a novel DNA sequencing method to systematically characterize all current and past viral exposures in a single drop of blood. Researchers at Harvard University performed a comprehensive analysis of antiviral antibodies in blood samples from healthy adults to determine which viruses have infected an individual. This unbiased approach could uncover unexpected factors affecting an individual's health, and also expands opportunities to analyze and compare viral infections in larger populations. With funding from The Ted Lindsay Foundation, we are working with researchers at Harvard and Johns Hopkins to examine viral exposures in children. Using a single drop of blood, we are examining past viral histories of children with and without autism to identify 'commonalities' in exposures that may be involved in the etiology of autism.



I would like to extend our sincerest thanks to the Ted Lindsay Foundation for their continued support, and to all of you who have contributed to our research over the years. Together we are moving autism research forward, and making meaningful differences in the autism community.

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