**Session 1 On Health: Medical Applications**

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| **Faculty Presenter** | **Abstract Title** | **Abstract** |
| Thompson Mefford | Collaborative efforts utilizing magnetic nanoparticles | Over the past decade there has been extended interest in the use of magnetic nanoparticles for both imaging and therapeutic applications in medicine, as well as assessing the environmental impact of metal oxides. Key to the success of these opportunities is the preparation of well-characterized materials with tailored magnetic, thermal, colloidal, and bio-interaction properties. To address these issues, we have focused our efforts on three distinct areas in this problem: 1.) Surface-ligand interfaces, 2.) Controlling interparticle interactions through polymeric brushes, and 3.) Specialized surface moieties for additional imaging, therapy, and targeting. This talk will describe radioanalytical techniques to quantify the surface functionality, calculations of interparticle potential based on molecular weight considerations, and the addition of functional groups for therapeutic applications. |
| Pingshan Wang | High-throughput and label-free radio-frequency flow cytometry | We show radio-frequency (RF) spectroscopic measurement of single yeast cells in flow. Cell species, viability, activation state, and drug effects are determined by cell RF features instead of biorecognition elements. Approaches for sample preparation and high-throughput RF measurement are discussed. |
| Sara Sarasua  (POSTER) | Searching for the Genetic Cause of Language Delay in Phelan-McDermid Syndrome | Phelan-McDermid syndrome is a rare developmental disability syndrome where 100% of individuals have either absent or delayed speech. Deletions of up to 150 genes on the 22q13 region or pathogenic variants of the SHANK3 gene are the known causes of the syndrome, yet the specific gene(s) responsible for the loss of language ability is not known. The type of language delay is also not well characterized. We seek to perform in depth language assessments and perform gene sequencing to characterize the speech disorder and identify candidate genes that explain the speech disorder. |
| Luigi Boccuto | IGF-1 therapy: a new translational approach for treatment of developmental delay. | Insulin-like growth factor 1 (IGF-1) is a compound utilized in clinical trials for several neurodevelopmental disorders due to its capacity to improve synaptic number and stability, although clinical trials with IGF-1 have not always been successful, mostly because of the clinical and molecular variability presented by these conditions. We identified Phelan-McDermid syndrome (PMS) as a model disorder in which to investigate the metabolic effects of IGF-1 treatment: we analyzed the metabolic profiles of 54 individuals with PMS and identified 10 cell lines with abnormal metabolic findings and different responses to the exposure to IGF-1; we then plan to treat the selected cell lines with two concentrations of IGF-1 and assess the effect of this compound on the disrupted molecular pathways, the capacity to rescue normal metabolic profiles, and the eventual side effects.  Correlation of the results generated by this study with the clinical and molecular data available in the scientific literature and public databases will allow us to identify metabolic biomarkers that could be applied to identify ideal candidates for IGF-1 therapy among individuals with PMS, as well as to function as outcome measures to assess the efficacy of the treatment. If successful, the same approach can be utilized to design personalized IGF-1 treatments for individuals with other neurodevelopmental disorders. |
| H. Bryan Riley  (POSTER) | Global Manufacturing Within Automotive OEM Adaption for Design and Production of Medical Ventilators | This poster and verbal presentation shall present an approach relative to OEM adaptation of manufacturing processes and the assembly configurations to produce medical ventilators. The differences between high volume vehicle production and lifesaving health care equipment are significant and challenging. This poster presents a global manufacturing footprint and the implementation that satisfies design, production, and validation of FDA approved ventilators during a pandemic. |