Diabetic Complications Consortium

Application Title: Neurocognitive complications and retinal imaging in type 1 diabetes

Principal Investigator: Karen Nunley PhD

1. Project Accomplishments:

The project goal, as stated in the proposal, was to examine how changes in brain imaging markers and changes in retinal vascular imaging markers relate to changes in cognitive function. This pilot study allowed us to "collect 5-year follow-up MRI data from participants of the ongoing Pittsburgh Epidemiology of Diabetes Complications study who have … repeated assessments of RVI and multiple health factors. These participants have existing baseline MRI and cognitive data (2011-12) and are returning for cognitive and clinical follow-up in 2016-17."

Using the funds provided by this grant over 6 months (Feb 1, 2017 – July 31, 2017), we accomplished the following:

1. Conducted follow-up brain MRI on N=32 participants (proposed N=40 over 12 months); an additional five brain MRIs were collected in 2016 using another funding source, for a total of N=37 follow-up brain MRIs.
2. Using FLAIR images, I rated the severity of cerebral white matter hyperintensities per the Fazekas visual rating scale
3. Volumes of cerebral white matter hyperintensities and gray matter atrophy are currently being determined; changes in volumes since time of baseline brain imaging will then be calculated.

2. Specific Aims:

Specific Aim 1. Define retinal vascular imaging (RVI) measures as candidate biomarkers of progression of cerebral microvascular complications (CMC).

Results: We have data on changes in RVI measures. Analyses to detect relationships between longitudinal changes in RVI measures with changes in brain imaging markers of CMC will be completed when the brain imaging volumes are completed (see "Accomplishments section, 3).

Specific Aim 2. Identify the pathophysiological pathways underlying progression of CMC.

Results: Once the changes over time in volumes of cerebral white matter hyperintensities and gray matter atrophy (i.e., brain imaging markers of CMC)

have been determined, analyses will be conducted to identify risk/protective factors for worsening CMC markers.

Specific Aim 3. Ascertain the clinical relevance of MRI markers of progression of CMC

Results: We have cognitive testing completed on the 37 participants with follow-up brain imaging. Once changes in volumes of brain imaging markers of CMC have been determined, analyses will be conducted to identify neuroanatomical profile(s) associated with clinically relevant cognitive impairment.

3. Publications:

To date, we have no publications using the follow-up brain imaging data collected by this grant.