100 Semi-supercentenarians and older as a proposed sample set for the Archon Genomics X PRIZE Validation Protocol

While the X Prize is first and foremost about incentivizing a particular technology to move much further and faster than it would otherwise we believe that this is also a tremendous opportunity to obtain whole diploid genome sequence data on a large sample of subjects that could be an invaluable resource to the medical genetics research community for many years to come. We propose that the ideal phenotype for such an effort would be 100 people achieving the age of 105 years and older. People who achieve these extreme ages have markedly delayed or escaped age-related diseases such as cardiovascular disease, stroke, diabetes, Alzheimer’s disease and many others. Centenarians also markedly delay disability well into their nineties. Such extreme survival and successful aging is likely strongly influenced by genetic variation, an influence that increases with ages beyond 100 years. With this in mind, we hypothesize that their genomes could serve as ‘gold standards’ for healthy aging.

Whole or select genome sequences from people with specific diseases could be compared against these data for the discovery of specific disease-predisposing and very importantly protective genetic variants and pathways. The provision of associated phenotypic data including medical history, medication use and exposure data (e.g. tobacco and alcohol use) will make the potential utility of these sequence data even greater. Furthermore, this genome can be studied for epigenetic modification including whole genome methylation studies, micro-RNA studies, and the lymphoblasts may serve as a platform for functional data. These discoveries could greatly facilitate the development of screening, prevention and treatment strategies for a very broad range of common and rare illnesses.

A random selection of younger healthy subjects won’t achieve the same broad impact goals because many of these subjects will go on to develop as of yet unknown diseases (censoring) and nearly all of them will not have the demonstrated genetic predisposition for extreme survival and the delay or escape of disability and the common age-related diseases.

We have gathered many such subjects, and are members of the National Institute on Aging-funded Longevity Consortium (http://www.longevityconsortium.org/) which includes centenarian studies from around the world. The Consortium is a highly collaborative environment which we believe can be a focus for the coordinated collection of cell lines and associated phenotypic data from 100 subjects age ≥105 years old from within and outside of the Consortium. The
Consortium is also an ideal environment for the sharing and coordinated analyses of the resultant data that will be produced by the Archon Genomics X Prize.

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References: