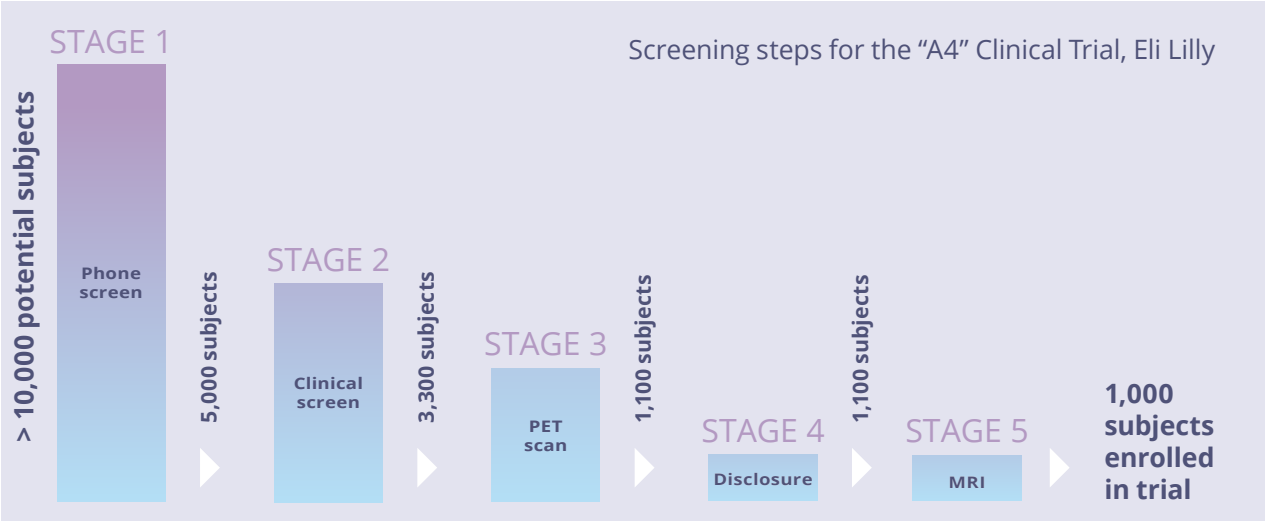
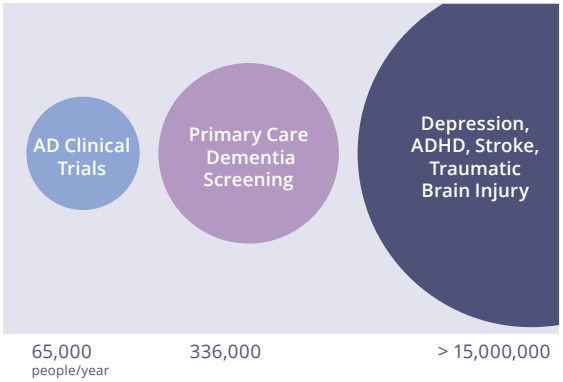
Immediate Strategy: **Alzheimer's Disease (AD)**



Clinical Trial Prescreening
Screening for Alzheimer's disease (AD) in clinical trials has a 90% fail rate: a clinical trial has to screen 10 people to enrol one participant. Screening can span five visits (see above), takes a total of 15 hours, and costs over $8,000 for each participant. By accurately predicting who is likely to pass this screening, our technology can help pharmaceutical companies save money in two important ways: 1) by reducing screening costs, saving $500,000 per clinical trial, given enrolments of 1000 participants, and 2) reducing the total screening period and ultimately completing the trial sooner, saving an additional $0.6 to $1.8 million. With over 200 currently active clinical trials for dementia in North America, our technology can save over $32 million in pre-screening 625,000 individuals.

Our fully-automated self-assessment can be done entirely without the help of a clinician, saving time and money while providing a rich and detailed analysis of an individual's cognitive performance.

Primary Care AD Screening
Every year in the U.S., 236,000 individuals are diagnosed with AD, and an equal number develop the disease but are undiagnosed. Based on previous research, we estimate that an additional 100,000 healthy individuals over the age of 60 seek AD screening. The number of people over 65 is expected to more than triple by 2050, and the Alzheimer's Association estimates that 13.5 million individuals in the U.S. will acquire AD. This demographic shift, along with new therapies that are coming to market in coming years, will result in a projected market size of over 1 million screens for AD per year in the U.S. alone.



Long Term Strategy: **Mental & Cognitive Health**

Our technology can be applied to speech and language in multiple healthcare verticals. Some examples:

Depression
- 15.7 million adults in the U.S. experience at least one depressive episode per year.
- Over half of these are not identified due to misdiagnosis, lack of trained healthcare professionals, and social stigma.
- Self-assessment through automated analysis of speech, such as prosodic patterns, monotone pitch, and lexical choices, can help more people get treatment, and monitor its effectiveness over time.

Stroke
- 800,000 people in the U.S. suffer a stroke each year.
- Aphasia (a language disorder) is a common side-effect, which can be improved with therapy.
- Sensitive, repeatable assessment is needed to design a therapy plan and track improvements over time.

Developmental Disorders
- Autism (3.5 million, U.S.) and ADHD (6.4 million, U.S.) both have language symptoms that may go untreated.
- Early detection and identification of specific impairment is crucial to positive long-term outcomes.

Ultimately, we aim to shift neuropsychological assessment away from pen-and-paper tests, and towards sophisticated and unobtrusive analysis of natural biomarkers.

Our Technology

Language changes can be one of the earliest signs of cognitive decline. We use a simple, speech-based interface to extract and analyze hundreds of relevant variables.

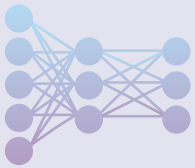
Record spontaneous speech through mobile applications

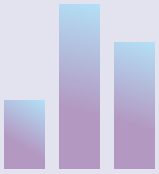
Obtain text transcripts using adapted automatic speech recognition

$\{x_1 \ldots x_N\}$

Extract acoustic, lexical, syntactic, and semantic measures from transcripts and speech

Input these measures into machine learning models trained on large, longitudinal datasets





Output probability of diagnosis (healthy vs dementia)

The Winterlight Team

Frank Rudzicz is an international expert on speech technology for individuals with speech disorders. He is the President of the international joint ACL/ISCA special interest group on Speech and Language Processing for Assistive Technology, a Young Investigator of the Alzheimer's Society a Scientist at Toronto Rehab, and an Assistant Professor at the University of Toronto.

Liam Kaufman has published peer reviewed articles in cognitive neurology, human computer interaction and neuroscience. He is an experienced software developer, and has successfully launched Understoodit, a startup acquired by EventMobi, and featured in The Toronto Star, CTV News, and TechCrunch.

Katie Fraser has published a number of peer-reviewed papers in both computer science conferences and neuroscience journals about her research on the automatic detection of dementia, and post-stroke aphasia. She was awarded a Google Canada Anita Borg scholarship and an NSERC scholarship and was named a 2015 MIT Rising Star in Computer Science.

Maria Yancheva conducts research on the automatic detection of dementia longitudinally, for which she was awarded an NSERC scholarship. She has experience developing software for Scotiabank's trade floor, and has co-founded GroceryGo, a startup featured on BlogTO.

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WINTERLIGHT

Monitoring cognitive health through speech

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