As the average life expectancy increases, so does the need to address chronic diseases associated with aging. The mammalian target of rapamycin (mTOR) is dysregulated in many diseases including cancers, immunosuppression and neurodegeneration, and is a clinically validated therapy target. The currently available mTOR-targeted drugs (rapamycin derivatives and Torin) act by inhibiting all functions of mTOR, including both mTOR complex 1 (mTORC1) and complex 2 (mTORC2). mTORC1 is the primary regulator of protein biosynthesis, cell growth, cell proliferation, and cell survival, while mTORC2 is the primary regulator of metabolism. Blocking mTORC1 signaling pathways can increase lifespan and displays efficacy in the treatment of diseases, however, inhibiting the metabolic pathways regulated by mTORC2 leads to new-onset type 2 diabetes. Thus, there is a significant unmet need for new and selective mTOR-targeted therapies.

The current invention addresses the need for therapeutically advantageous mTOR-based treatments without the detrimental side effects. This invention utilizes small molecules which inhibit mTORC1 signaling while leaving mTORC2 function unaffected, resulting in comparatively lower risk of developing new-onset type 2 diabetes. Utilizing a distinctively different mechanism for inhibiting mTOR signaling, this invention has the potential to augment currently approved cancer and neurodegeneration therapies without the additional metabolic side effects.

Summary:
- The invention involves novel small molecules that may be used for the prevention of various age-related diseases
- The molecules of this invention relate to pharmaceutical compositions comprised of mTORC1 inhibiting compounds (i.e., CB3A) and a pharmaceutically acceptable carrier
- The compounds in this invention, including CB3A, utilize a unique mechanism of action compared to currently available therapies
- CB3A-related compounds have the therapeutic potential as effective treatments to prolong aging, and for neurodegenerative diseases, diabetes, and cancer (including combination therapies)

Advantages:
- The novel mTOR inhibitors of this invention may be safer and more effective than the current mTOR-related therapies
- By preferentially blocking translation/protein synthesis, these molecules function in a manner superior to rapamycin, the current state-of-the-art mTOR inhibitor
- CB3A-related compounds may eliminate new-onset type 2 diabetes as a side effect of current mTOR therapies
- The invention may be beneficial in the treatment of neurodegeneration common in Alzheimer’s and Parkinson’s diseases