

MEASURES OF SUCCESS

I. Expected impact and project deliverables

Impact on:

Field of Research - The results of *this research* will address outstanding questions in our field by **1)** identifying prebiotics key in conveying resistance to infection while accounting for inter-individual microbiome variability, **2)** establishing a model system capable of simulating microbial response to dietary nutrients and pathogens, and **3)** uncovering mechanisms that can be used to develop precision prebiotics to prevent infection, reduce colon cancer risk, and improve cancer therapy response. *Conducting this study is expected to identify those dietary prebiotic fibers capable of preventing infection.* Through metabolic modeling of prebiotics in healthy and diseased stool communities, dieticians and clinicians would be able to optimize dietary recommendations for high-risk patients, and personalize treatment strategies. Ultimately, this evidence is expected to result in reduced infections, improved therapeutic response and, subsequently, reduced deaths from infections.

Baylor University achieving R1 – By establishing this microbial modeling system (MBRA) and area of research, we will become a major stakeholder and **leader in precision prebiotic therapy and infectious disease research**, which will ultimately lead to the following outcomes: **1)** Established leader in microbial modeling of dietary nutrients and prebiotic trials, combining the expertise from Baylor University (Greathouse/Lavado), Baylor College of Medicine (Britton), and Mayo Clinic (Chia), **2)** Competitive position for multiple government and non-governmental grants, especially large center and program grants, **3)** Potential to become a nationally recognized leader in prebiotic research, leveraging the Baylor CPRIT Synthesis and Drug-Lead Discovery Laboratory to synergize these efforts to have major impact on drug design/delivery, **4)** Increased drug to market potential through Baylor's new Technology Transfer and Industry Engagement Program.

Project deliverables:

- Establishment of the first microbial bioreactor system (MBRA) at Baylor University
- MBRA system capable of stable culture of up to 28 independent fecal communities
- Microbial simulation model of response to dietary prebiotic fibers and pathogen resistance
- Preliminary data for larger R01-level grant and scientific leads for future hypothesis testing or intervention/clinical trials
- Graduate and undergraduate students trained in using fecal bioreactor systems, metabolic modeling, data science, and drug discovery (**see Appendix – Training Plan**)

II. Proposed timeframe within which to report back to the ISC

6 Month Report – November 1, 2019; 1 Year Report – June 1, 2020; 2 Year Report – June 1, 2021; 3 Year Report – June 1, 2022

III. Research impact on pillar of pursuing transformational education

Impact on Spiritual Growth – As part of the unambiguously Christian mission of Baylor University, this study will provide the students with the ability to practice science with Christian mentors, and experience the faith journey faced in conducting challenging scientific pursuits. Walking through these challenges with Christian mentors will encourage a deeper reflection on the impact their research has on others.

Impact on Critical Thinking – The complexity of this type of research will provide the students an opportunity to think critically through challenging scientific problems and test their ability to solve complex issues. This experience will build a solid foundation in which to apply these skills in future careers and become transformational leaders themselves.

Impact on Cutting-Edge Skills Development – The ability to combine multiple skill sets from bench to bedside or market is what makes for an exceptional scientist or industry leader. Students involved with this study will have the opportunity to learn from top scientists performing cutting-edge research, and be involved in developing clinical tools or discover novel drugs for use in preventing infections. Ultimately, this will provide greater advantages to our students in the job market, and open doors for multiple STEM career choices.

Impact on Baylor Faculty – Baylor faculty will benefit tremendously from having the MBRA system as a scientific resource (Adair, Bruce, Kearny, Lavado, Sayes, Greathouse), which will expand the scope and capability of their research. Students will also benefit from this collaborative effort through the skills learned by faculty participating in this collaborative study, as well as, exposure to guest lectures from faculty involved in studies from other participating organizations. **This resource will also make students and faculty more competitive for funding and enhance publication opportunities in high-impact journals.**