To: Maren Laughlin
From: Deborah Muoio,
MMPC External Advisor
Re: MMPC Annual Meeting (12/16,17/2015)
Date: December 21, 2015

Overview. As a member of the MMPC external advisory committee, I have had the opportunity to observe and evaluate the program for the past four years, mainly through participation in MICROMouse grant reviews as well as the MMPC group meeting held annually in the fall. In general, I have found the program to be effective and that progress towards meeting the mission has been impressive. The operation is well-organized and the activities are goal-oriented. The strengths and expertise of the various centers complement one another and the team dynamics and communication are outstanding.

Impact. The impact of the MMPCs on basic metabolic research has grown steadily during my tenure. The program serves this community through multiple mechanisms. The principal function of these centers is to provide investigators from any institution access to technically sophisticated, labor intensive and logistically challenging procedures that permit *in vivo* assessment of glucose and energy homeostasis and carbon flux. These are essential technologies necessary for advancing the study of metabolic physiology and metabolic disease. Each site also provides a number of ancillary analyses that can be performed on biologic fluids and tissue specimens, including metabolomics, lipidomics, and comprehensive profiling of hormones, cytokines and adipokines. This structure leverages various core services offered at the respective parent institutions and allows investigators to maximize animal use and to consolidate research efforts in a time and cost effective manner. Technology development continues to be a major goal of the program. Emphasis has been focused on developing, optimizing and applying state-of-the-art methods for deep phenotyping; including novel metabolic flux analyses performed in vivo and/or in perfused tissues/organs, chronic continuous blood glucose monitoring, brain imaging, microbiome analyses and new technologies for increasing the throughput of non-targeted metabolomics. The tech development aspect of the program is critical to the overarching mission of the MMPC to facilitate the advancement of metabolic research by connecting a broad network of scientists to the most current and relevant mouse phenotyping tools. This component of the program deserves strong consideration when considering the potential value and impact of new MMPC applications. In addition to the fee-for-service menu, the MMPC is increasingly recognized as the 'go-to' informational resource for standardized and validated mouse metabolic phenotyping protocols, many of which are provided on the MMPC website. Lastly, because the MMPCs are warehousing a large volume of valuable data, Rick McIndoe has been leading a herculean effort to design a database and user friendly web interface that would allow the entire research community to access and benefit from the wealth of mouse phenotyping information that has been generated by this program. The MMPC database and web tool has enormous potential if appropriate resources are committed to its development and implementation.

Future directions and opportunities. Whereas the MMPCs have made great progress toward meeting the goals of the program, a gap between current impact and potential impact remains. The communities that have benefited most from the program are the scientists that reside at the parent institutions. Although this occurs for obvious reasons and is not unexpected, efforts to increase advertisement and outreach are deserving of more attention. A list of ideas for consideration are noted below.

- Advertisement: Presence at NIH-sponsored national meetings; advertisement in high profile metabolic journals (e.g. Cell Metabolism website); quarterly webinars on MMPC protocols, establish a listserve to distribute a quarterly newsletter and/or commentary on the "MMPC publication of the month" to highlight MMPC services, accomplishments, works-in-progress and RFAs.
- Devise new strategies to offer and enhance technology transfer from MMPC sites to other academic centers with the resources and desire to establish these technologies in-house. Perhaps this could be supported through the MICROMouse program.
- Could the MMPCs develop partnerships for tech development wherein external institutions are partially funded to develop/optimize a technology that is ultimately transferred to the MMPC? For example, optimizing the application of small molecule "exomarkers" for in vivo assessment of mitochondrial H2O2 production; standardizing/optimizing exercise protocols for mouse studies; or development of novel metabolic flux analyses. This type of initiative would promote cross-pollination and ultimately expand the network of MMPC-associated centers and scientists.
- Could the MMPCs develop partnerships for database and web tool development?
- Could the MICROmouse program post a RFA that seeks applications for meta-analysis using the MMPC database.
- The business model remains vague to me. What are the targets for sustainability and potential growth? Longevity and success of the program relies a dynamic business plan that adapts to changing demands and resources. Is this a topic that should be discussed at the annual meetings?