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**Evaluation of foreign internship and research activity of Zhussipbek Mukhatayev,
Ph.D. student in Biology at Al-Farabi Kazakh National University**

To whom it may concern.

Zhussipbek Mukhatayev visited my laboratory to work on part of his Ph.D research as a Predoctoral Research Fellow in the Department of Dermatology, Feinberg School of Medicine at Northwestern University. The title of his Ph.D work was “Development of approaches to stimulate T-regulatory cell vitiligo immunotherapy”, and here in my laboratory, he focused on generating antigen-specific Tregs as a possible therapy for vitiligo, and he was collaborating closely with me on research throughout the internship.

Vitiligo is recently gaining more awareness among public, and the importance of finding an effective cure is still under development. The use of chimeric antigen receptors (CARs) for autoimmune diseases to generate antigen-specific Tregs has been proposed, but has not yet met with much success in the field. This offers an emerging field of research to develop new treatment options.

Jussip was passionate about learning and studying the manufacture and function of antigen-specific Tregs, and during the time spent at Northwestern, he optimized the protocol for generating efficiently transduced CAR Tregs to test *them in vitro*, and *in vivo* in a vitiligo-prone mouse model. He received a travel award for his outstanding abstract on antigen-specific CAR Tregs submitted to The Joint Montagna Symposium on the Biology of Skin/Pan American Society for Pigment Cell Research Annual Meeting “Melanoma to Vitiligo: The Melanocyte in Biology and Medicine” held in Oregon in October, 2019. He also contributed to a recently published research article in the Journal of Investigative Dermatology, “Antibiotics drive microbial imbalance and vitiligo development in mice”, by providing data to evaluate Treg infiltration in the skin after antibiotic treatment. Jussip is listed as the third author for this paper.

Zhussipbek also learned a new aspects of immunology through using variety of methods including T cell culture techniques, florescent microscopy and imaging, flow cytometry, and Treg transduction and maintenance techniques which were key to generate antigen-specific Tregs for vitiligo therapy.

The research on antigen-specific Tregs, and testing them *in vitro* and *in vivo* with promising results contributes to fulfill your objectives for a Ph.D thesis, and thus, I consider this work sufficient to support his candidacy for gaining a Ph.D. degree.

Please do not hesitate to contact me directly with any concerns or questions about Zhussipbek Mukhatayev's research in Chicago. He has done great work, contributing his insight and his skills towards a well-executed research project.

Sincerely,



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