Azitra Demonstrates Feasibility of Engineering the Skin Microbiome to Treat Serious Skin Conditions

Commensal Skin Bacterium Engineered to Deliver Key Protein with Potential to Treat Rare Genetic Skin Disorder, Netherton Syndrome

FARMINGTON, CT (April 8, 2019): Researchers from Azitra, Inc., in collaboration with independent, nonprofit biomedical research institution The Jackson Laboratory (JAX), have demonstrated the feasibility of engineering a commensal bacterium to deliver a key therapeutic protein to the skin. Azitra will be presenting results from the joint research showing the successful genetic engineering of the common skin bacterium, *Staphylococcus epidermidis*, to produce high levels of functional LEKTI protein, a protease inhibitor involved in regulating the rate of skin loss. The company has designated the engineered LEKTI-expressing *S. epidermidis* strain as AZT-02, and the research team, including Julia Oh, Ph.D., a skin microbiome expert at JAX has also shown that engineered *S. epidermidis* efficiently colonizes skin in both wild type mice and in a mouse model of broken skin. Applied topically, AZT-02 offers the prospect for continuous and cost-effective delivery of functional LEKTI to the skin offering the potential to treat the severe genetic skin disease Netherton syndrome (NS).

The new research will be presented on April 10 by Travis Whitfill, MPH, founder and Chief Scientific Officer of Azitra as an oral presentation entitled, "Engineering the Microbiome to Treat Netherton Syndrome, a Rare Skin Disease" at the Keystone Symposia on Skin Health and Disease, held from April 8-11, 2019 in Hannover, Germany.

S. epidermidis is a normal constituent of the skin microbiome, and on its own has been shown to help maintain healthy skin by improving the water and lipid content of the skin, decreasing inflammation, promoting tissue repair, and suppressing the levels of undesirable bacteria, including *Staphylococcus aureus.* Azitra's core technology combines these characteristics of *S. epidermidis* with the added ability of delivering therapeutic proteins to the skin. This dual action aims to correct underlying skin defects and address the challenges of dysbiosis to treat complicated skin diseases.

"Azitra has developed a proprietary strain of *S. epidermidis* with an aim of using this bacterium as a platform for the treatment of skin diseases," said Mr. Whitfill. "While this organism has the potential for use on its own to help maintain skin health, we are also developing it to serve as a unique delivery system for the cost-efficient production and topical delivery of important therapeutic proteins. These proteins are targeted to treat serious skin disorders. The work presented today clearly demonstrates the feasibility of this approach for the efficient, topical delivery of LEKTI to the skin. The strain, AZT-02, has the potential to be used as a treatment for Netherton syndrome, which is a rare genetic skin disease with no available treatment options."

NS is a genetic disorder affecting 1 in 200,000 children, caused by mutations in the *SPINK5* gene that is responsible for making the LEKTI (lympho-epithelial Kazal-type related inhibitor) protein. LEKTI's

function is to inhibit protease enzymes in the skin that facilitate the shedding of skin cells. When LEKTI is absent (in severe cases) or has reduced activity (due to a more minor genetic defect), excess shedding occurs, and the skin is sensitive, open, red, and scaly. This is accompanied by a disruption of the skin's barrier function, dehydration, and potential exposure to allergens, infectious agents, toxic chemicals and other environmental hazards. Complications of NS are frequent, and newborns with the disorder are at risk of becoming dehydrated and developing skin infections or sepsis, which can be threatening. There are currently few treatment options for NS.

"We have shown with this research that our proprietary strain of *S. epidermidis* can be engineered for the delivery of therapeutic proteins and can efficiently colonize both healthy and diseased skin," said Mr. Whitfill. "Azitra is now planning further studies to evaluate the efficacy of AZT-02 for the potential treatment of NS. The company is also investigating other indications—such as atopic dermatitis—for additional therapeutic uses with this platform of delivering therapeutic proteins by a commensal skin organism."

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About Azitra

Azitra, Inc. is a clinical-stage biotechnology company combining the power of the microbiome with cutting-edge genetic engineering to treat skin disease. The company was founded in 2014 by scientists from Yale University and works with world-leading scientists in dermatology, microbiology, and genetic engineering to advance its consumer health and pharmaceutical programs to treat atopic dermatitis, dry skin, cancer therapy associated skin rashes and targeted orphan indications. For more information visit http://www.azitrainc.com.

About The Jackson Laboratory

The Jackson Laboratory (www.jax.org) is an independent, nonprofit biomedical research institution with more than 2,200 employees. With a mammalian genetics institute as its headquarters campus in Bar Harbor, Maine, it has a genomic medicine institute in Farmington, Conn. and production facilities in Sacramento, Calif., and Ellsworth, Maine. Its mission is to discover precise genomic solutions for disease and empower the global biomedical community in the shared quest to improve human health. For more information, please visit www.jax.org.

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