



## TECHNOLOGY REVIEW

The UR Ventures Technology Review is your monthly look at innovation and technology commercialization at the University of Rochester. In this issue, you will learn about the first live-attenuated vaccine against the dog flu, the 100 most innovative universities, and a Rochester-based discovery currently under clinical trial. Meliora!

### Rochester Researchers Develop Dog Flu Vaccine

[Canine influenza virus \(CIV\)](#) is a recently emerged virus that causes acute respiratory disease in dogs. Most dogs have no immunity to CIV, and infection may therefore spread quickly in locations with concentrated dog populations such as boarding kennels, doggy day cares, and animal shelters. Currently, there is only one approved vaccine that reduces the severity and incidence of canine influenza, and that vaccine is based on an inactivated virus.

Live-attenuated influenza vaccine (LAIV) is known to provide better protection against disease through the induction of better innate and adaptive immune responses. To date, no such vaccine for CIV infections has been developed. Researchers at the University of Rochester and Cornell University have developed a CIV LAIV based on mutations in the viral polymerase that confer the virus temperature sensitivity, like that of the human LAIV.

Dr. Luis Martinez-Sobrido and his colleagues have shown that introduction of mutations in the viral polymerase make the CIV temperature sensitive (e.g. able to replicate at low, but not high, tempera-

tures). In addition, using an animal model of influenza virus infection, they have obtained preliminary data demonstrating that the CIV LAIV does not replicate in the lungs of infected animals. Moreover, immunogenicity data from these experiments demonstrate that the induction of both total and neutralizing antibody responses against CIV is better than that observed with the currently available inactivated vaccine. Significantly, the data show that a single intranasal immunization confers complete protection against challenge with wild-type CIV and that this protection is better than that observed with the CIV inactivated vaccine.

Hence, this intranasal competitive LAIV could be used to provide a better protection against CIV in dogs than that currently obtained with the inactivated CIV vaccine. More-

over, this novel vaccine confers protection against the new H3N2 CIV that has been recently introduced in the USA and is [spreading widely](#) in the mid-Western states.

Proof of Concept has been validated in vivo. UR Ventures is seeking an industry partner to develop and commercialize this technology and has already received interest from two of the biggest industry players.

Contact [Matan Rapoport, Ph.D.](#), MBA for more information.



## Rochester Ranked Among the Most Innovative Universities in the World

“Innovation” is defined as [the introduction of something new](#). It often goes hand-in-hand with “creativity” and “invention” in an attempt to capture something different and exciting. As such, innovation is difficult to quantify.

Recently, Reuters set out to [do just that](#). They developed a comprehensive [10-point strategy](#) to assign an innovation quotient to universities around the world, and they have released their list of the 100 most innovative universities.

The method they employed for their ranking focused on patenting activities (the number of patent applications filed; the location of those applications -- with more international applications signaling a more serious commitment to protecting and commercializing intellectual property; and the rate of successful outcomes of those applications); publications (the number of articles arising from both faculty and

faculty-industry collaborations); and scientific impact (how many patent applications are cited in other patent applications; how many articles are cited in other articles; and the overall impact of those citations).

It is no surprise that Stanford University topped the list, with MIT and Harvard coming in at 2nd and 3rd, respectively. The University of Rochester placed 39th in the United States and 60th in the world – among and above much larger institutions with signifi-



cantly more research funding. Inclusion on this list comes as no surprise to those who know Rochester, which has long been a leader of innovation and a hub of world-class research.

[Click here](#) to access the complete list.

## Clinical Trials Testing Possible Treatment for Muscular Dystrophy 1

[Muscular Dystrophy1 \(DM1\)](#) is a genetic disease affecting approximately 1 in 7,500 people. It is caused by a defect in the DMPK gene, which is responsible for normal muscle functions. This degenerative disease is characterized by wasting of the muscles in multiple organs and tissues. Currently, there is no cure or treatment specific to DM1; physicians are only able to provide treatment plans to manage complications related to the disease.

Charles Thornton, M.D., Professor of Neurology at the University of Rochester, has been working to find a cure for this debilitating muscle wasting disease. He developed the first generation of an antisense oligonucleotide (ASO) technology designed to enable the production of functional DMPK proteins and allow patients' bodies to build muscle tissue – effectively curing DM1.

Thornton's approach, and his position as a

leader in the field attracted the attention of [Isis Pharmaceuticals](#), which is also interested in ending DM1. Working collaboratively, Thornton and Isis developed ISIS-DMPKRx, the second generation of an ASO therapy designed to treat DM1. Initial results have been promising, and Isis has undertaken a multi-center Phase I/IIa clinical trial to test the safety and tolerability of ISIS-DMPKRx. The University of Rochester, under the guidance of Richard Moxley III, M.D. and Charles Thornton, is one of the sites currently conducting the trials through the end of 2016. Successful outcome of the current trials will warrant ISIS-DMPKRx to advance to Phase III trials for efficacy.

The ongoing trials have been applying the [Myotonic Dystrophy Health Index \(MDHI\)](#) instruments to monitor patients' overall outcome. MDHI, an FDA

recommended patient relevant outcome measures instrument was developed at the University of Rochester by Chad Heatwole, M.D., Associate Professor of Neurology. Heatwole's copyrighted methods rely on patients' self-reported quality-of-life experiences, as well as quantifiable medical indications to gauge overall outcomes in a more effective and meaning-

