

# New study looks at improving vaccine awareness

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The best medical therapies won't do much good if the public abstains from using them. Resistance to life-saving interventions may have a variety of root causes, particularly if the biotechnology involved is new and poorly understood in the non-medical community.

In a new study, researchers at Arizona State University's Biodesign Institute and their international collaborators at the Centre for the Study of the Science and the Humanities, University of Bergen, Norway, examine public attitudes to a new breed of vaccines known as RASVs (Recombinant Attenuated Salmonella Vaccines).

The group describes methods for addressing public apprehension and better informing communities as to the risks and societal benefits of new innovations, which may involve the use of recombinant DNA and other novel biological techniques. The examples provided serve to inform other researchers and clinicians about strategies for improving public perception of new biomedical innovations.

The Biodesign researchers belong to the Center for Infectious Diseases and Vaccinology, under the direction of Roy Curtiss III, who is a co-author of the paper. The study findings recently appeared in the journal *Nanoethics*.

Curtiss highlights the importance of public acceptance and understanding of unfamiliar medical products for the success of vaccination efforts.

"It is too often that we scientists do not take the time and expend the effort to effectively communicate our scientific accomplishments to the members of the lay public," he says. "It is not easy to engage young members of our society as well as their parents in detailing the fruits and benefits of research directed at solving global problems when the scientific principles may be obscure and the impact of the applications unclear."

## Next-gen vaccine

As the authors explain, RASVs offer an innovative alternative to existing human vaccines, providing a number of critical advantages in terms of effectiveness, ease of use and cost. Single-dose, orally administered RASVs are particularly attractive vaccines for use in the developing world, where conditions often make injectable vaccines impractical as well as prohibitively expensive. This new breed of [vaccine](#) holds the potential to safeguard against virtually any infectious pathogen, if properly designed.

At the heart of the vaccine is the Salmonella bacterium, known to most as the causative agent of foodborne illness. By reengineering Salmonella and removing its virulence factors, researchers are able to produce a hybrid version of the microbe suitable as a vaccine carrier. This carrier bacterium is outfitted with proteins derived from the target disease.

The resulting oral inoculation produces robust, system-wide immunity, as the RASV stimulates all branches of immune response. As the authors note, this design makes for a more potent vaccine.

## Challenges

Cutting-edge therapies occasionally meet with fierce public resistance.

For a variety of reasons explored in the current study, vaccines have provoked particular controversy. This is of great concern for medical practitioners, as successful vaccine efforts require a large segment of a given population to be immunized to stem the tide of seasonal epidemics or unexpected disease outbreaks and to safeguard individuals – particularly children – from potentially lethal pathogens.

Vaccines represent one of humanity's great success stories, eradicating devastating killers like smallpox, and bringing a broad range of other potentially lethal illnesses under control. Despite their impressive track record, however, vaccines have often faced an uphill battle for [public acceptance](#). The current research seeks to identify and then address common sources of societal mistrust of vaccines.

As the authors note, public controversy over [vaccine safety](#) and efficacy has a long history. In recent years, well-organized campaigns of misinformation have taken root, and these can propagate rapidly, particularly in the Internet age. One such example involves an aggressive movement against use of the measles, mumps, rubella (MMR) vaccine.

Unsubstantiated rumors of a vaccine link with childhood autism have struck fear into many parents who have opted not to vaccinate their children. Such concerns can become intensified if a well-known public figure becomes associated with an anti-vaccine crusade.

Infectious diseases remain major killers, and the threat of disease pandemics due to common foes like influenza or more recently identified emergent diseases are a leading public health concern. Resistance to vaccine use presents an additional obstacle to safeguarding the public. Convincing society that these protective agents are safe, affordable and effective will be as important as the thoughtful design of the vaccines themselves.

## Fusing biology and ethics

Researchers at the Biodesign Institute sought information from their international colleagues regarding the ethical, legal and social impacts of new biotechnologies. Having reviewed an array of sources, including commentary posted to anti-vaccination websites, these scientists proposed seven specific questions, drawing on critical areas of public concern:

1. What is the need for this vaccine?
2. What are some alternative treatments?
3. What are the safety issues?
4. Who profits from the vaccine?
5. How would the vaccine affect my civil liberties?
6. Why should I trust the scientists working on these things?
7. How can I know that the public health institutions are doing their best for me and my safety?

Biodesign researchers attempted to answer each of these questions in the context of RASV vaccines. Given that RASVs are live, *Salmonella*-based vaccines, initial public resistance should not be surprising. Helping the public answer the above questions of concern will therefore be vital to the future success of RASV vaccination efforts.

Scientists from the University of Bergen met with Biodesign researchers in October, 2010 for a three-week series of dialogue sessions. Based on these discussions, a detailed set of answers to the issues of public concern was developed through consensus.

The responses offered to the questions of concern highlighted:

- the effectiveness of RASVs in stimulating a particularly robust immune response

- a lack of effective RASV alternatives (including antibiotics/antimicrobials) for a variety of diseases of public concern
- the inclusion of 10 specific mutations to the Salmonella bacteria to improve safety of the vaccine and minimize the likelihood of Salmonella reverting to a disease-causing pathogen
- benefits to local governments and communities as RASVs contribute to a healthier, more efficient workforce while reducing economic costs of disease burden
- safeguards to help ensure that those who should not, or wish not to be vaccinated do not receive the vaccine inadvertently, through diffusion of the bacterial vaccine carrier through the vaccinated population
- ongoing public dialogue as an important component to help foster understanding and address concerns
- need for transparency in both scientific institutions and government agencies involved in researching, producing and distributing medical therapies impacting the public

The authors conclude their study by strongly encouraging those engaged in front-line research in potentially controversial areas of health science to improve their public outreach and education efforts.

As Curtiss says, "I believe that we scientists need to be open in dialogue and more dedicated in engaging all members of the public in discussing science discoveries that could be key to advancing the global quality of life."

Provided by Arizona State University

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