

INTERNATIONAL CENTER OF EXCELLENCE IN MUCOSAL
IMMUNOLOGY AND INNOVATIVE ALLERGY THERAPEUTICS

FIGHTING PATHOGENS AT THEIR POINT OF ENTRY

Vaccines that induce immune responses at mucosal membranes of the intestines, lungs and other organs could help prevent deadly infections

The mucous membranes that line many of the tracts and structures in the body are the first lines of defense against foreign invaders. Equipped with a powerful and highly specialized immune system, these mucosal sentinels protect the surfaces and, by extension, the body interior, against the threat of gastrointestinal, respiratory and sexually transmitted infections, as well as cancer, allergies and more.

If these immune cells let their guard down, pathogens such as bacteria and viruses can invade. On the other hand, if they are overly vigilant, hyper-reactive conditions like asthma or autoimmune inflammatory bowel disease can take hold.

Getting the balance right is the goal of the International Center of Excellence in Mucosal Immunology and Innovative Allergy Therapeutics.

Launched as a joint initiative between Chiba University and the University of California, San Diego, in 2016, the center aims to harness the power of the mucosal immune system to develop the next generation of preventive vaccines against infectious, allergic and inflammatory diseases.

Most vaccines in use today are administered by injection. But since most infectious agents enter the body at mucosal surfaces, vaccinating through the nose, mouth, or some other mucosal route could provide more protection. Since transmission often occurs at these sites, boosting the body's ability to block that transmission could stop an infection or autoimmune reaction at its source.

"While existing injectable vaccines are able to prevent serious conditions from developing, they are not effective enough to defend against infection," notes program director, Toshinori Nakayama.

FROM BASIC RESEARCH TO CLINICAL APPLICATIONS

Before new treatments can be developed, however, much more needs to be learned about the molecular architecture of the mucosal immune system. That is why the International Center of Excellence is focusing on basic research while simultaneously advancing clinical applications. It is also strengthening ties between researchers and industry in the hope of translating its discoveries into therapies for patients.

To this end, Nakayama is building a robust pipeline of talented scientists who can move research findings seamlessly from the lab bench to the hospital bedside.

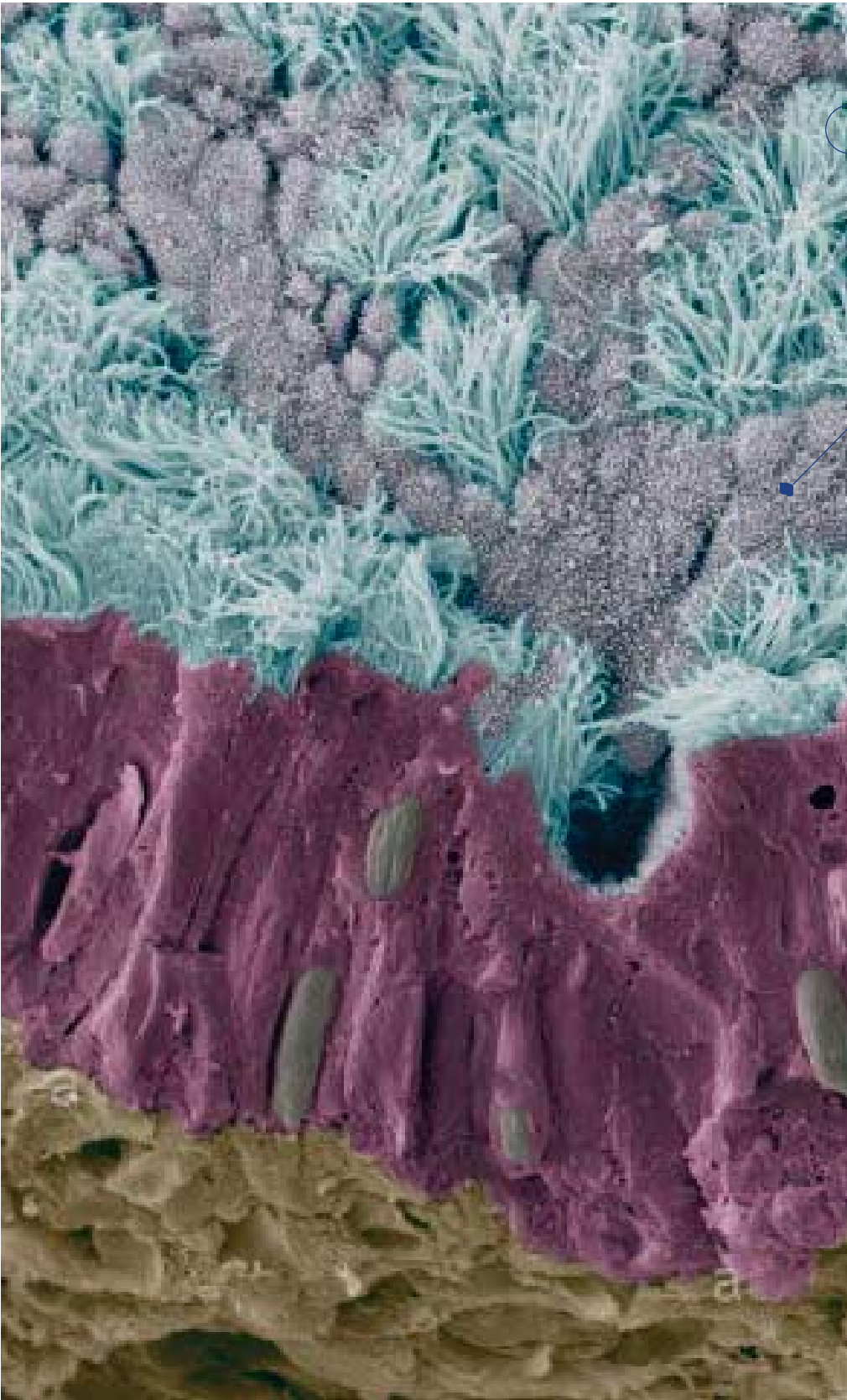
"The research system we are creating is unprecedented," says Nakayama, who is also vice president of Chiba University and dean of the Graduate School of Medicine and the Faculty of Medicine.

Projects at the International Center of Excellence fall into three categories: Hiroshi Kiyono and Satoshi Uematsu are studying the basic mechanisms of mucosal immunology in response to microbial infections and assorted diseases; Nakayama and colleagues, including Mark Bix, Atsushi Onodera, Motoko Kimura and Osamu Ohara, are focusing on allergic reactions and novel treatments that target the mucosa; and Hiroshi Nakajima, Yoshitaka Okamoto and Naoki Shimojo belong to the clinical research team that is developing new vaccines and adjuvants for pathogens endemic to Japan and around the world.

Chiba has initially committed US\$2 million over five years to this alliance. Together with a matching contribution from UC San Diego, the project will facilitate joint research and exchanges between investigators and students on both sides of the Pacific. ■



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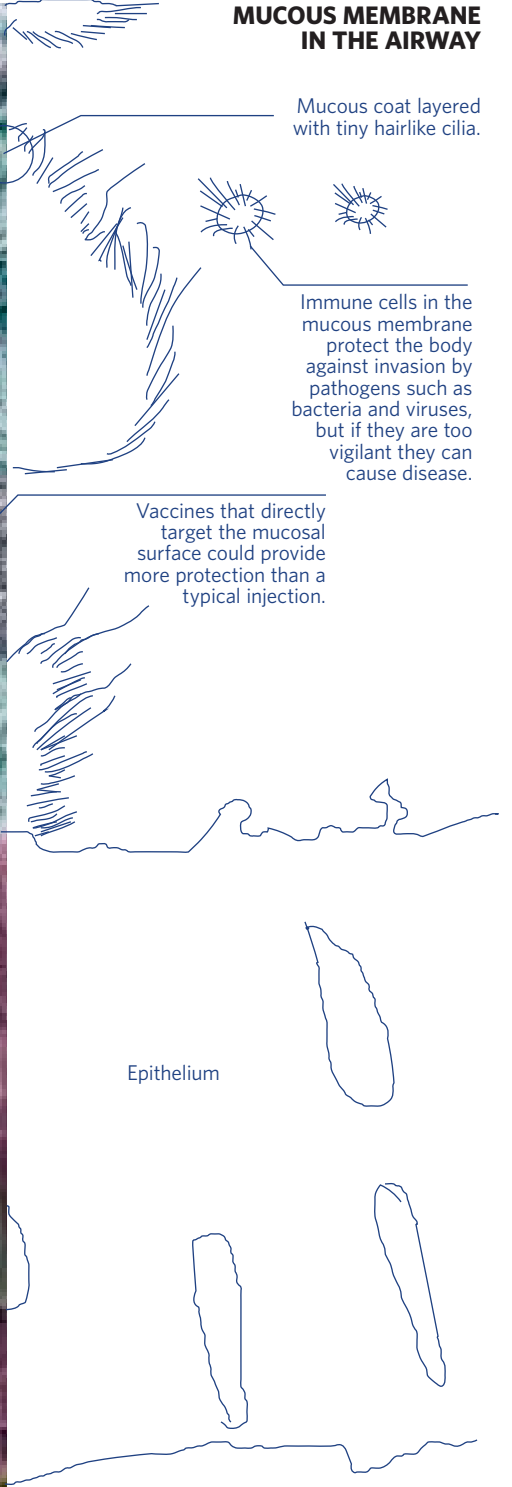


MUCOUS MEMBRANE IN THE AIRWAY

Mucous coat layered with tiny hairlike cilia.

Immune cells in the mucous membrane protect the body against invasion by pathogens such as bacteria and viruses, but if they are too vigilant they can cause disease.

Vaccines that directly target the mucosal surface could provide more protection than a typical injection.



Epithelium

Connective tissue