



www.cnrs.fr



PRESS RELEASE | PARIS | 19 MARCH 2018

## How allergens trigger asthma attacks

**A team of Inserm and CNRS researchers from the Institute of Pharmacology and Structural Biology—or IPBS (CNRS / Université Toulouse III—Paul Sabatier)—have identified a protein that acts like a sensor detecting various allergens in the respiratory tract responsible for asthma attacks. Their study, codirected by Corinne Cayrol and Jean-Philippe Girard, is published in *Nature Immunology* on 19 March 2018. These scientists' work offers hope for breakthroughs in the treatment of allergic diseases.**

What do mold, pollen, and cockroaches have in common? Though they correspond to three different kingdoms of life, they can all cause asthma attacks in people sensitive to them. And all of them, despite their very different compositions, contain enzymes called *proteases*.

The IPBS team has identified a human protein that reacts to many environmental allergens: interleukin-33 (IL-33). When allergens enter the human respiratory tract, they release proteases that hack IL-33 molecules into extremely reactive pieces triggering the chain reactions behind allergy symptoms.

Apparently, the same mechanism is responsible for these reactions after exposure to any of several different allergens. As a matter of fact, IL-33 was shown to detect 14 different allergens tested, which include some present in ambient air (i.e. pollen, house dust mites, and fungal spores) and others associated with occupational asthma (like subtilisin, found in detergents).

These findings are all the more important because they establish a direct link between genetics and the environment. Indeed, the gene that codes for IL-33 is among the principal ones predisposing humans to asthma.

Furthermore, clinical trials now under way are targeting IL-33. And they're on the right track, given the IPBS team's discovery of a single mechanism for detection of airborne allergens by IL-33. Inhibiting production of reactive IL-33 fragments after allergen exposure might make it possible to limit severe allergic reactions in asthmatic patients.

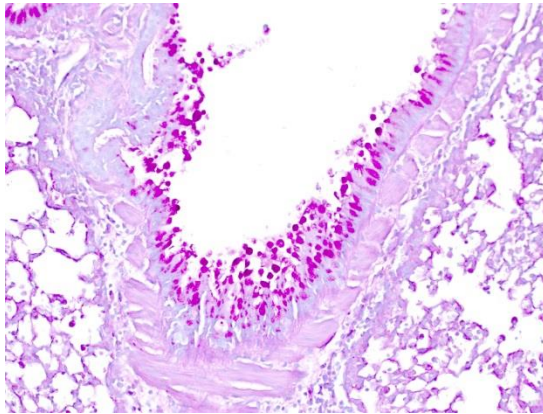
*This research was funded by the French National Research Agency (ANR).*



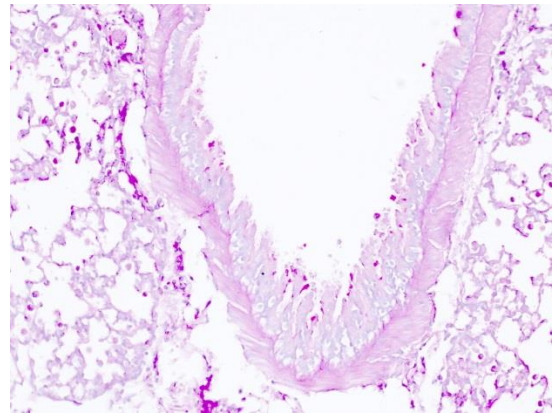
www.cnrs.fr



Functional IL-33 'sensor'



Deactivated IL-33 'sensor'



**Mucus production in lung after inhaling allergen** (lung sections; mucus shown in magenta).

Excessive mucus production is characteristic of allergic asthma. The IL-33 protein, a major factor predisposing humans to asthma, detects allergen protease activity. Activated by proteases, IL-33 sets off a cascade of reactions, including mucus production, that are associated with asthma and other allergic diseases. When IL-33 activation is inhibited (see image on right), these reactions are not triggered.

© Corinne Cayrol and Jean-Philippe Girard, IPBS, CNRS / Université Toulouse III—Paul Sabatier

## Bibliography

**Environmental allergens induce allergic inflammation through proteolytic maturation of IL-33.** Corinne Cayrol\*, Anais Duval\*, Pauline Schmitt, Stephane Roga, Mylène Camus, Alexandre Stella, Odile Bulet-Schiltz, Anne Gonzalez-de-Peredo and Jean-Philippe Girard. *Nature Immunology*, 19 March 2018. DOI: <http://dx.doi.org/10.1038/s41590-018-0067-5>

## Contacts

**CNRS scientist** | Corinne Cayrol | [corinne.cayrol@ipbs.fr](mailto:corinne.cayrol@ipbs.fr)

**Inserm scientist** | Jean-Philippe Girard | T +33 (0)5 61 17 59 18 | [jean-philippe.girard@ipbs.fr](mailto:jean-philippe.girard@ipbs.fr)

**CNRS press officer** | Véronique Etienne | T +33 (0)1 44 96 51 37 | [veronique.etienne@cnrs.fr](mailto:veronique.etienne@cnrs.fr)