

Institut d'Alembert Seminar / May 23rd, 2023 at 11:00 am
Amphi 1Z56 – North Building -



PATHOGENS LECTINS: FROM STRUCTURAL GLYCOBIOLOGY TO ANTIADHESIVE STRATEGIES

**By Anne Imberty,
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Presentation:

A large number of pathogenic microorganisms display receptors for specific recognition and adhesion to the glycoconjugates present on human tissues. In addition to membrane-bound adhesins, soluble lectins are involved in lung infections caused by the bacteria *Pseudomonas aeruginosa* and *Burkholderia cepacia* and by the fungus *Aspergillus fumigatus* that are responsible for hospital-acquired diseases. The multivalency of lectin is proposed to play a role in their strong avidity for glycosylated cell surfaces, their specific binding to targeted human tissues, and also in their ability to affect membrane dynamics by clustering glycosphingolipids, resulting in some cases in internalization of intracellular pathogens. Accumulated knowledge about the structures of the lectins and the interactions with host glycoconjugates has led to the design of powerful glyco-derived inhibitors that can serve as antimicrobial therapeutic agents, as a complement to or an alternative to antibiotic therapy. Several strategies are developed with development of glycoderivatives and/or multivalent glycostructures. The structural role of calcium present in the binding site of fucose and galactose specific lectins has been investigated through x-ray and neutron crystallography (1). Novel inhibition strategy with non-carbohydrate glycomimetics is now proposed (2).

Biography:

Anne Imberty is CNRS Research Director at the Plant Macromolecular Research Center in Grenoble. She was the director of CERMAV for the period 2016-2020. She is the coordinator of the Glyco@Alps network funded by the University of Grenoble Alpes. Previously, she was deputy director of the chemistry department of the CNRS, in charge of interdisciplinarity. She graduated in biology from the Ecole Normale Supérieure in Paris. In 1984, she joined CERMAV in Grenoble and did her doctorate on the structure of starch. She then developed the modeling of protein-sugar interactions during her post-doc in Toronto. She received the young researcher prize from the French Society of Carbohydrates in 1999, the Roy Whistler Prize from the International Carbohydrate Organization in 2004, the "Charles Dhéré" prize from the Academy of Sciences in 2011, the medal of silver from the CNRS in 2013, the Legion of Honor in 2014 and the international Catalán-Sabatier prize from the Royal Spanish Society of Chemistry in 2020. She has published more than 300 scientific articles and is assistant editor of the journal *Glycobiology*. Since 1999, she has held a research position at the CNRS-Grenoble. Her research is in the area of structural glycosciences, with a particular interest in biologically active oligosaccharides and their interaction with proteins. Her current work focuses on the lectins of pathogenic microorganisms. The characterization of their interaction with human glycoconjugates opens the way to anti-adhesive therapeutic strategies. Furthermore, these lectins can be modified by a synthetic glycobiology strategy to create new tools in biotechnology, diagnostics and therapy.

References:

1. Gajdos, L., *Nature Comm.*, **2022**, *13*, 194.
2. Kuhadomlarp, S., et al., *Angew. Chem. Int. Ed.*, **2021**, *60*, 2.