

Technical University of Denmark



Interaction between -lactoglobulin and structurally different heteroexopolysaccharides investigated by solution scattering and analytical ultracentrifugation study

Khan, Sanallah; Birch, Johnny; Harris, Pernille; Van Calsteren, Marie-Rose; Ipsen, Richard; Peters, Günther H.J.; Svensson, Birte; Almdal, Kristoffer

Publication date:
2017

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Khan, S., Birch, J., Harris, P., Van Calsteren, M-R., Ipsen, R., Peters, G. H. J., ... Almdal, K. (2017). Interaction between -lactoglobulin and structurally different heteroexopolysaccharides investigated by solution scattering and analytical ultracentrifugation study. Abstract from 19th European Carbohydrate Symposium, Barcelona, Spain.

DTU Library
Technical Information Center of Denmark

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.



Interaction between β -lactoglobulin and structurally different heteroexopolysaccharides investigated by solution scattering and analytical ultracentrifugation study

Sanaullah Khan^{1,2,*}, Johnny Birch¹, Pernille Harris³, Marie-Rose Van Calsteren⁴, Richard Ipsen⁵, Günther H.J. Peters³, Birte Svensson¹ and Kristoffer Almdal²,

¹Enzyme and Protein Chemistry, Department of Biotechnology and Bioengineering, DTU, Elektrovej, Building 375, DK-2800 Kgs. Lyngby, Denmark.

²Department of Micro- and Nanotechnology, DTU, Ørsteds Plads, Building 423, DK-2800 Kgs. Lyngby, Denmark.

³Department of Chemistry, DTU, Kemitovet, Building 207, DK-2800 Kgs. Lyngby, Denmark.

⁴Saint-Hyacinthe Research and Development Centre, Agriculture and Agri-Food Canada, 3600 Casavant Boulevard West, Saint-Hyacinthe, Quebec J2S 8E3, Canada.

⁵Department of Food Science, University of Copenhagen, Rolighedsvej 26, DK-1958 Frederiksberg, Denmark.

*e-mail: sank@dtu.dk

Knowledge on molecular structure of exopolysaccharides (EPSs) and their roles in the associative interactions with proteins is essential to understand the relationship between their structure, physical and rheological properties. Despite their importance, no detailed molecular characterization of bacterial EPSs and their associative interactions with proteins have been reported up to now. By combining X-ray solution scattering (SAXS), dynamic light scattering (DLS) and analytical ultracentrifugation (AUC) in conjunction with scattering modeling, we have characterized four different heteroexopolysaccharides (HePS-1–HePS-4) from lactic acid bacteria (LAB) and their interactions with β -lactoglobulin. We have previously shown that these HePSs exhibited a compact conformation in solution [1]. Here, SAXS data for HePSs (HePS-1–HePS-4) complexes with β -lactoglobulin showed that β -lactoglobulin aggregated strongly with these HePSs. β -lactoglobulin exists as a dimer at pH 4 in the absence of HePSs. When mixed with HePSs, SAXS analysis showed that β -lactoglobulin formed large aggregates. DLS also showed formation of large aggregates of β -lactoglobulin with HePSs, thus validating SAXS data. Turbidity and AUC data indicated that both soluble and insoluble BLG–HePSs complexes were formed. This study provides new insights into the role of molecular structures in associative interactions between HePSs and BLG which has relevance for various industrial applications.

The Danish Council for Independent Research | Technical and Production Sciences is acknowledged for financial support of the project.

References

[1] Khan, S.; Birch, J.; Harris, P.; Van Calsteren, M-R.; Ipsen, R.; Peters, G. H. J.; Svensson, B.; Almdal, K. Revealing the compact structure of lactic acid bacterial heteroexopolysaccharides by SAXS and DLS. *Biomacromolecules* **2017**, *18*, 747–756.