DEVELOPMENT OF MULTIFUNCTIONAL COSMETIC INGREDIENTS USING BIOTECHNOLOGICAL APPROACH

MADHURI SHAMANNA[1,2], GOPAL LAKKIREDDY[2], TAJALLI KESHAVARZ[2], DANKA TAMBURIC[1]
LONDON COLLEGE OF FASHION[1], UNIVERSITY OF WESTMINSTER[2]

Introduction: Carbohydrates have a major role in the cosmetic industry due to their thickening properties and water holding capacity. Various carbohydrates like dextran, xanthan gum, carrageen and levan are presently being used in the preparation of cosmetics. Among these, levan also proved to have some immuno-beneficiary properties. Carbohydrates with multi-functionality would help create 'healthy' cosmetics. Polysaccharides from higher *basidiomycetes* are attracting the attention of researchers due to their immunomodulatory properties. This project aims to develop multifunctional polysaccharides from *Grifola frondosa* for use in cosmetic formulations.

Methodology:

- *Grifola frondosa* was grown using a defined submerged liquid fermentation media.
- Extra cellular polysaccharides (ECP) were precipitated from the fermentation broth and intra-cellular polysaccharides (ICP) were isolated from the dried mycelial biomass.
- GC-MS was done for composition and linkage analysis of the polysaccharide.
- Reactive Oxygen Species (ROS) production by the White blood cells was used as a marker for immunomodulatory properties of the polysaccharides.

Ion Exchange chromatography was carried out to separate the crude sample based on the charge.

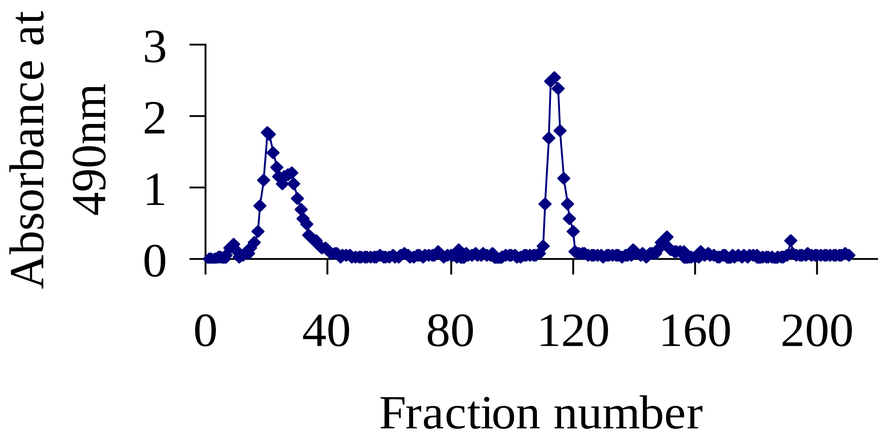

Figure 1. Ion Exchange Chromatography. ECP contains charged material. Quantitatively charged fractions are larger than the neutral fraction. Fractions of 0.5ml were collected every 2 minutes.

Gel Permeation Chromatography was carried out to determine the molecular weight of the fractions.

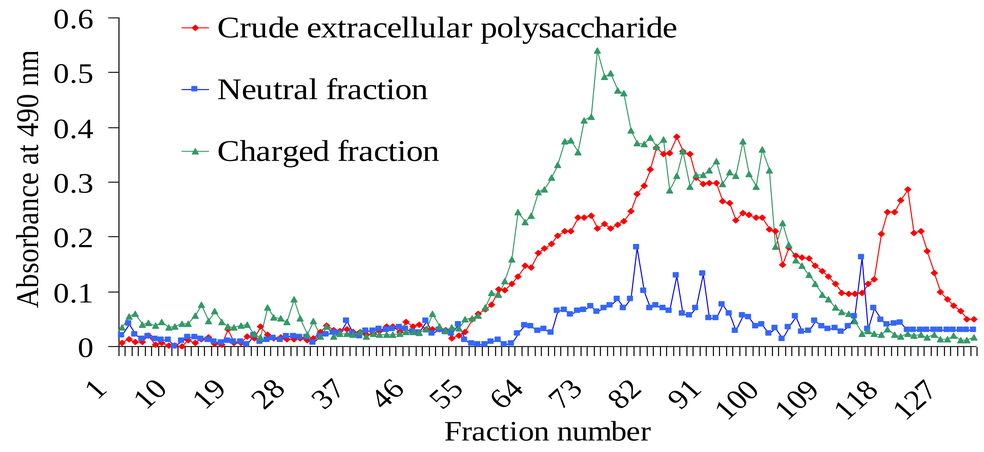

Figure 2. Gel permeation Chromatography. ECP preparation was polydispersed and neutral fraction is smaller than the charged fraction. The molecular weight of the crude, neutral and charged fractions was estimated.

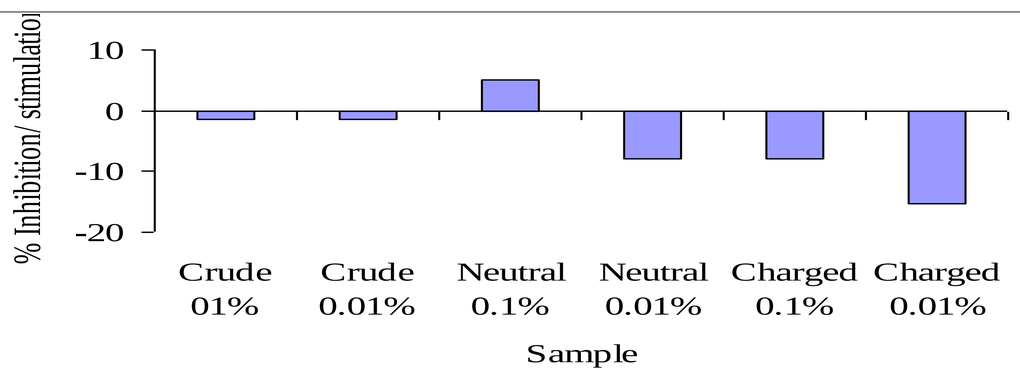

Figure 3. ROS of extra-cellular polysaccharides

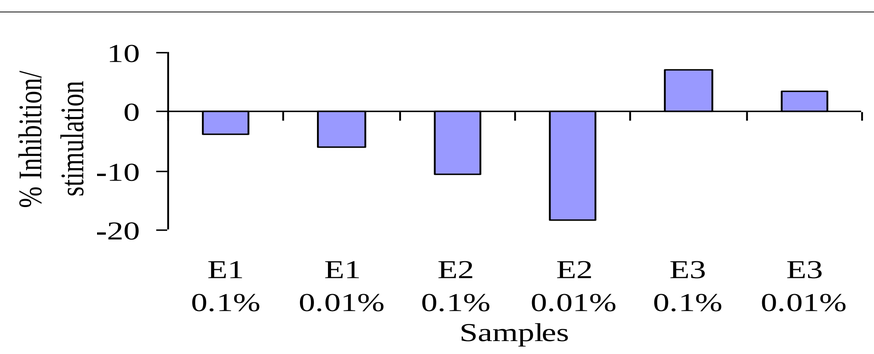

Figure 4. ROS of intra-cellular polysaccharides

ROS production by WBC was inhibited when cells were incubated with extra-cellular polysaccharide of *Grifola frondosa* except neutral fraction at 0.1% (w/v). Intra-cellular extracts except extract 3 which inhibited ROS production by WBC.

Conclusion:*Grifola frondosa* polysaccharides are very complex in structure, containinng both charged and and neutral fraction. ***In addition to β-glucans, the polysaccharides contain other units/linkages??? of ??? Type.***

Future work: Studying the effect of these polysaccharides on the immune system, with the aim to formulate cosmetics with multiple benefits.

References: Bland, E. J.; Keshavarz, T.; Bucke, C. Mol. Biotechnol. 2001, 19, 125–131: Lakkireddy, G.; Keshavarz, T.; Bucke, C. International journal of medicinal mushrooms 2006, 2, 135-148.

University of Westminster

University of the Arts London London College of Fashion