# Optimization of biotechnological processes, using membranes, to recover different fraction in order to valorise industrial waste

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The main objective of this study regards the setup of an efficient small-scale platform for the conversion of renewable waste materials, specifically whey, into added-value products, thereby reducing environmental impact and costs deriving from the disposal of these liquid waste products. Recent examples of fermentation-based valorization strategies employ lactic acid bacteria (LAB) as probiotics to improve the nutritional value of different food matrices for the formulation of functional foods. Furthermore, the facultative anaerobic metabolism of LAB can be exploited to address the environmentally sustainable production of lactic acid (LA), which is a building block of degradable bioplastics and is widely applied in many biotechnological fields (Ahmad A.et al. 2020 Env Techn Innov). In this direction, the present study focused on the optimization of a downstream process, using micro-ultra-nanofiltration membranes. From whey, different fractions will be recovered and tested as sources of bioactive compounds or as substrates for the growth of biotechnologically appealing strains. In particular, the carbohydrate rich fraction will be evaluated as a substrate for the cultivation of diverse microorganisms to develop sustainable fermentation process to obtain added value products (LA, antimicrobial peptides and probiotics). The protein-rich fraction was tested for potential uses in the cosmeceutical field, for tissue hydration/regeneration and the assays took advantage of an experimental set up for scratch assays. Finally, the development of hydrogels based/containing these proteins with potential applications in regenerative medicine will behas been investigated. Dehydration tests on HaCat cells proved R100 was the most efficient fraction in preserving cell viability from this specific stress while R10 after extensive diafiltration, showed it was able to form transparent films with improved features when glycerol was added as a plasticizer (Alfano A. et al. 2022. Ferm).