



Functionalization of hyaluronic acid with short peptides for regenerative medicine

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OUTLINE

- 1. Problem definition**
- 2. Methodology**
- 3. Results and analysis**
- 4. Conclusions**
- 5. Future Work**

PROBLEM DEFINITION

Vascular diseases – narrowing of blood vessel

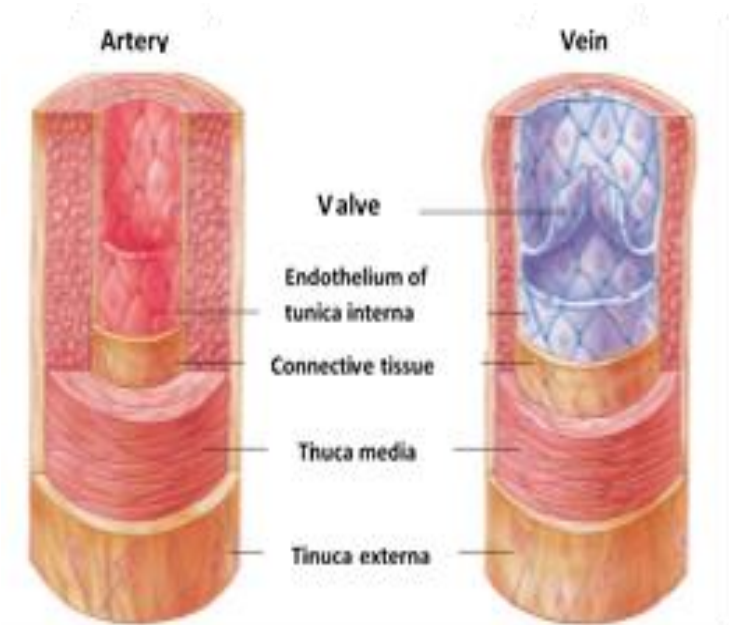
- 17.3 million people per year,
- 31% of all global deaths,
- due to plaque deposition in the vascular luminal surface¹.

Existing solution: Autologous healthy blood vessels.

Drawbacks: Transplants from patient (with other diseases).

Alternative solutions: Artificial vascular grafts

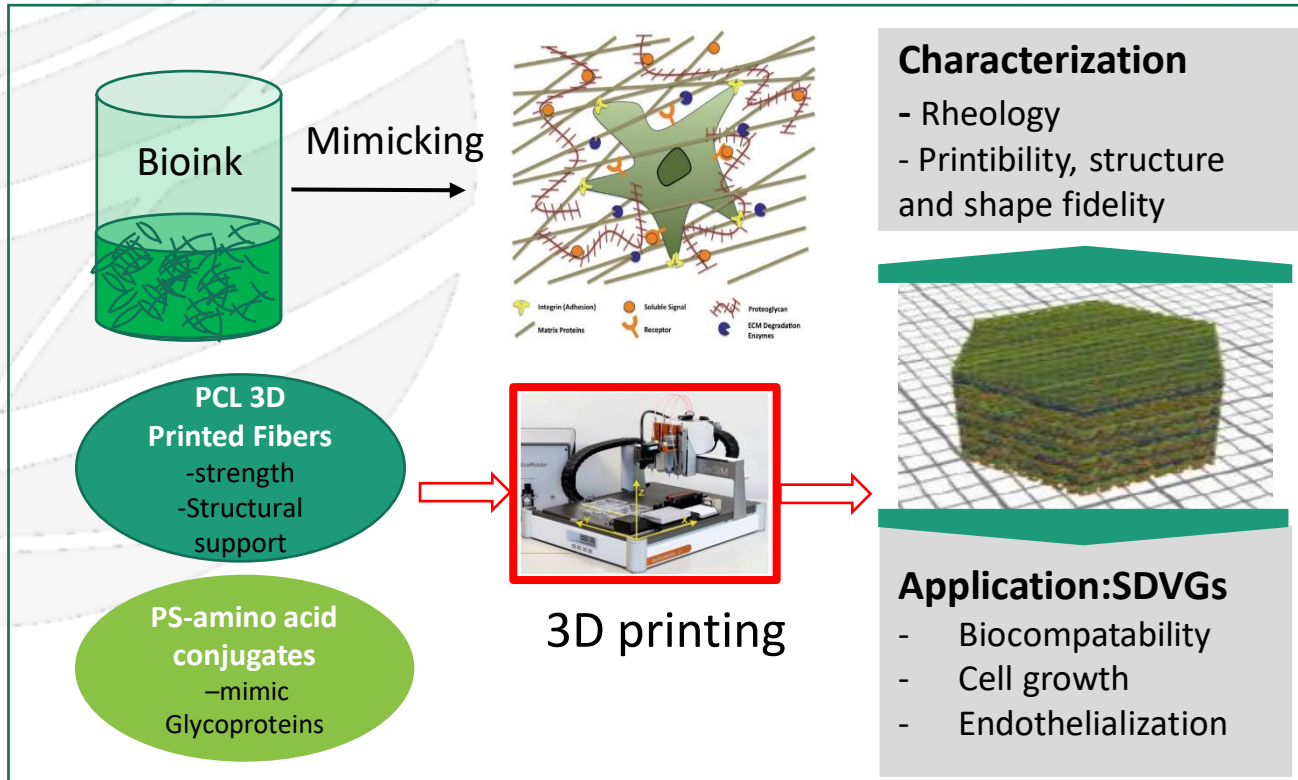
- Synthetic polyesters (Ex: Polyethylene terephthalate(PET), Polycaprolactone (PCL) etc.)
- Not available for clinical use in small diameter (< 6 mm) (**Small diameter vascular grafts (SDVGs)**).



PROBLEM DEFINITION

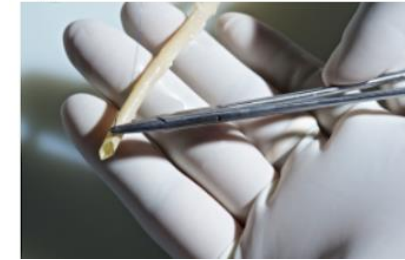
Tissue Engineered Artificial Vascular Grafts

Artegraft®: Bovine Carotid Artery Graft (North Brunswick, NJ)



ProCol® Vascular Bioprosthesis

*Approved for sale in the United States only

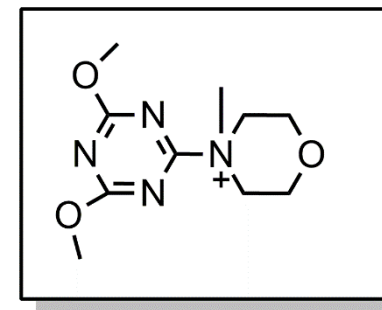
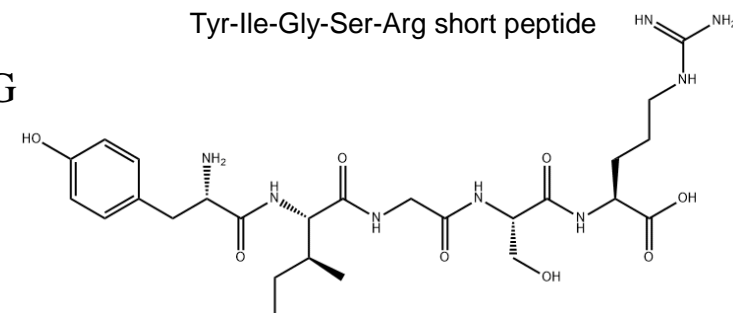
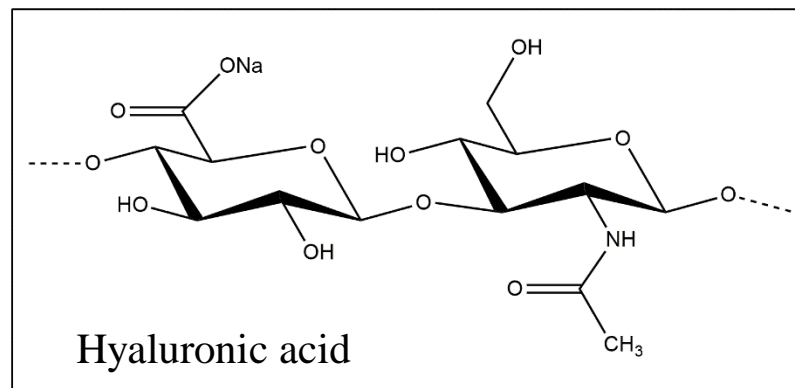
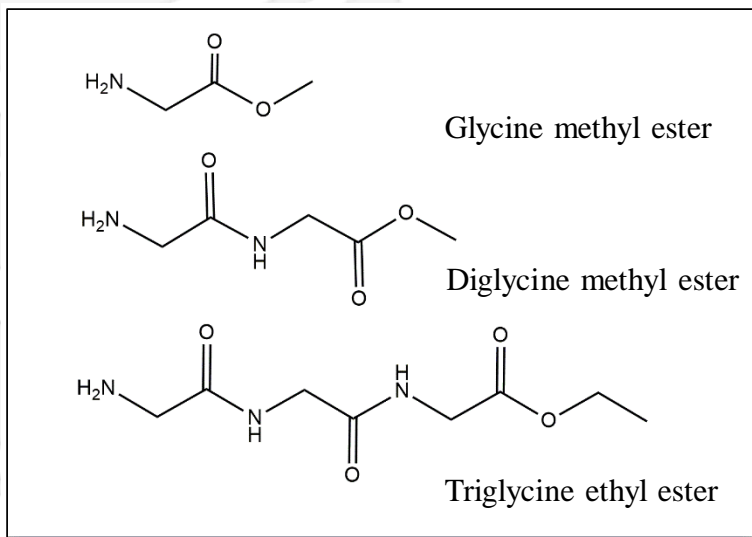


Cryovein®

METHODOLOGY

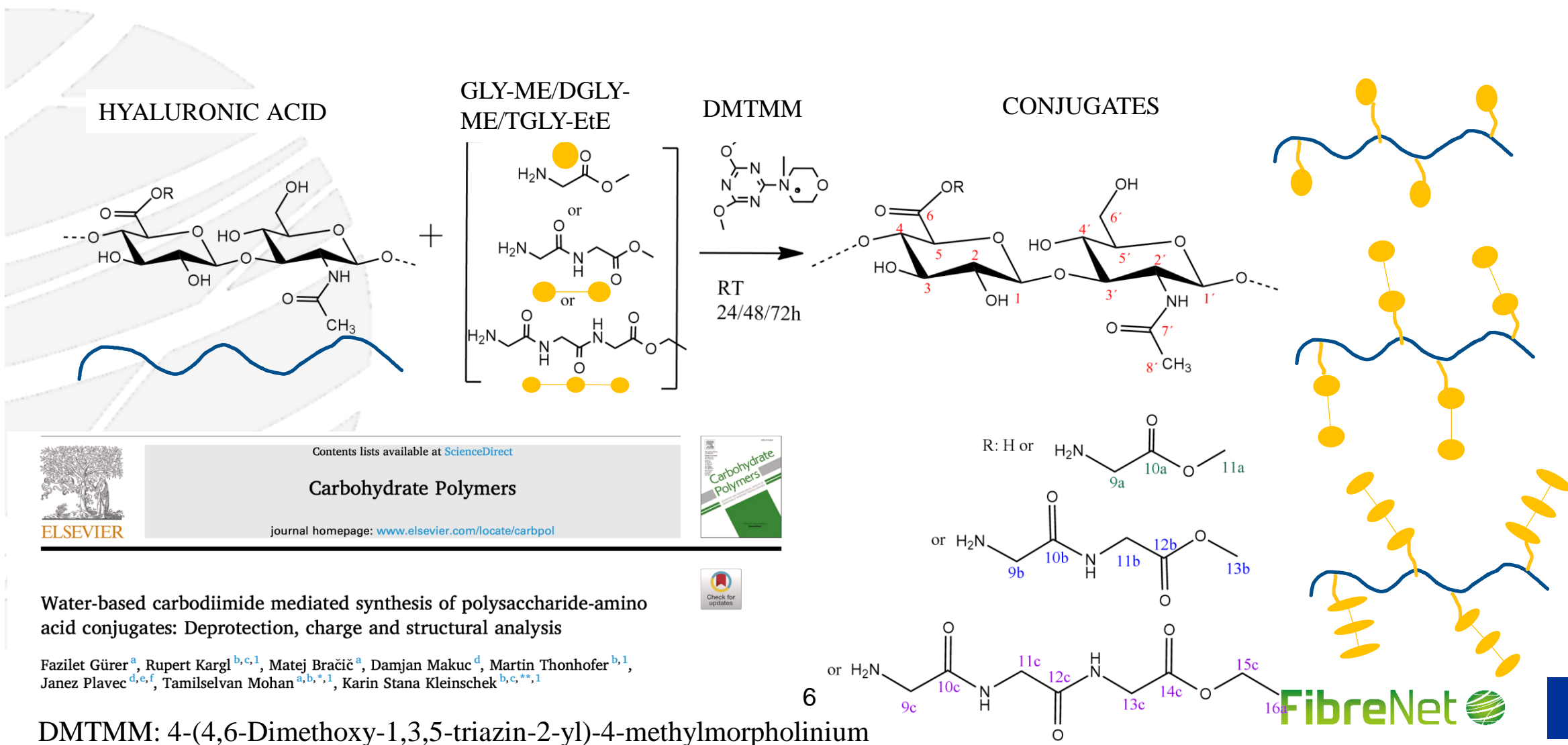
Objective: Preparing mechanically stable and bioactive scaffolds, as a model system for SDVG

Synthesis of new generation of amino acid - and peptide – polysaccharide conjugates



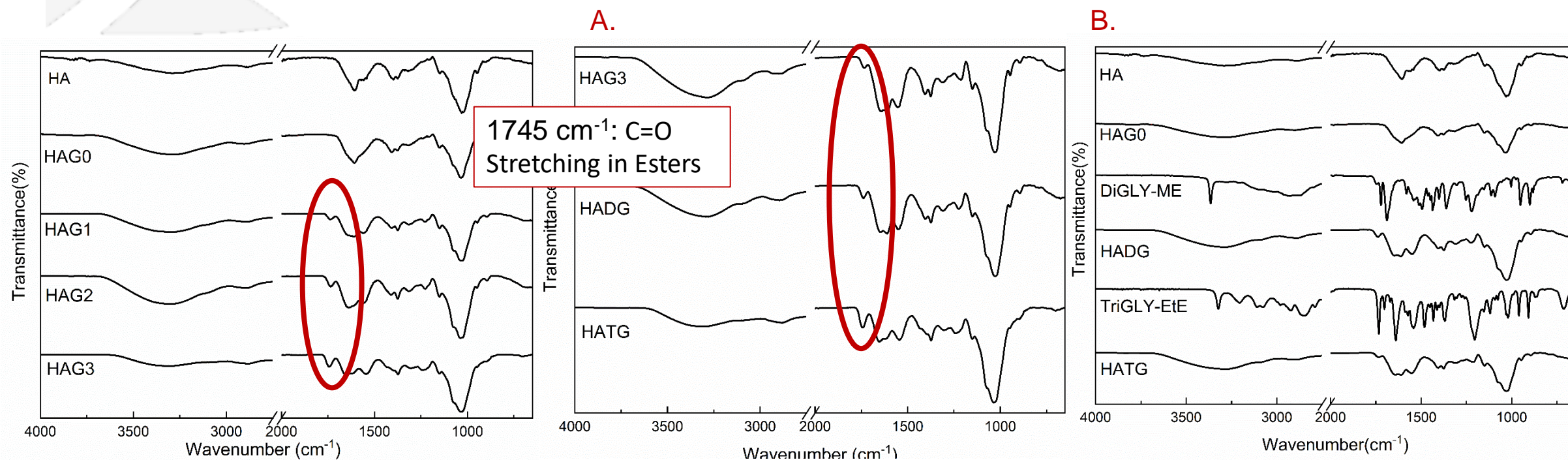
DMTMM: 4-(4,6-Dimethoxy-1,3,5-triazin-2-yl)-4-methylmorpholinium

METHODOLOGY



RESULTS AND DISCUSSIONS

IR Analysis



1: Hyaluronic acid coupling with glycine methyl ester with different reaction time

2: A. Hyaluronic acid coupling with diglycine methyl ester(DGLYME) and triglycine ethyl ester(TGLYEtE) and **B.** comparison of IR with pure peptides

HAG0	HA:DMTMM:GLYME	1:1:0	24h
HAG1	HA:DMTMM:GLYME	1:1:5	24h
HAG2	HA:DMTMM:GLYME	1:1:5	48h
HAG3	HA:DMTMM:GLYME	1:1:5	72h

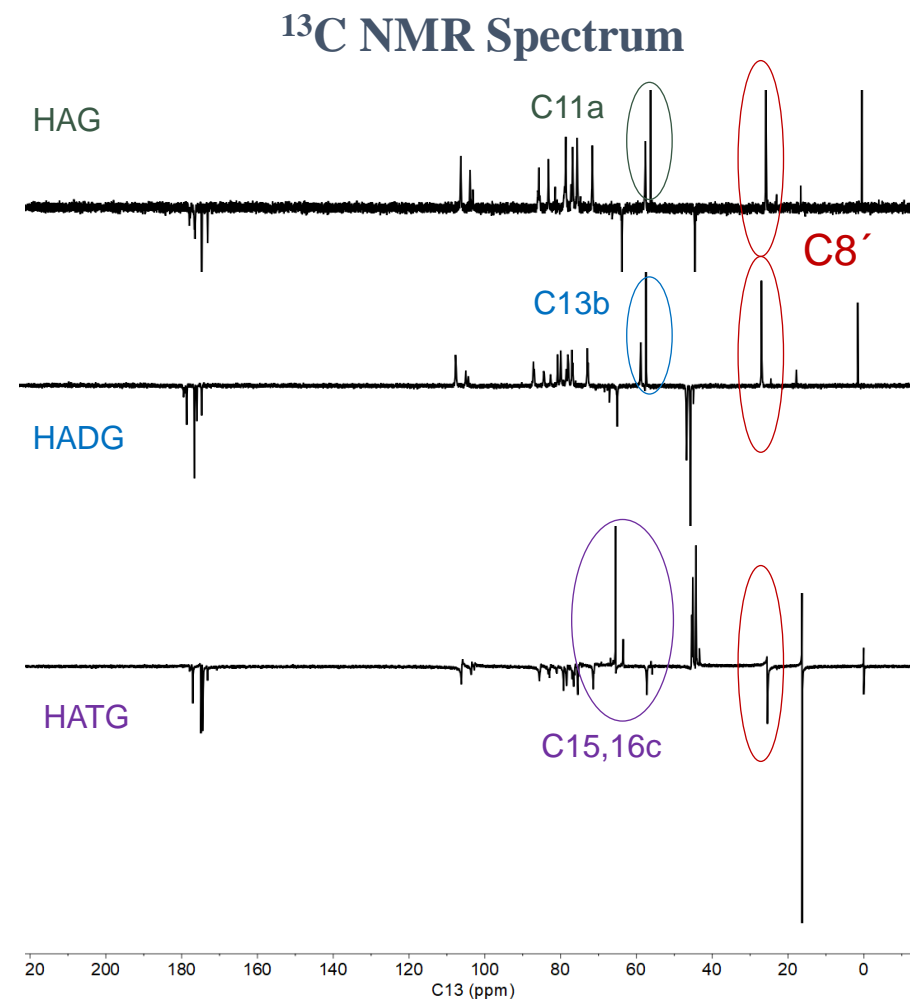
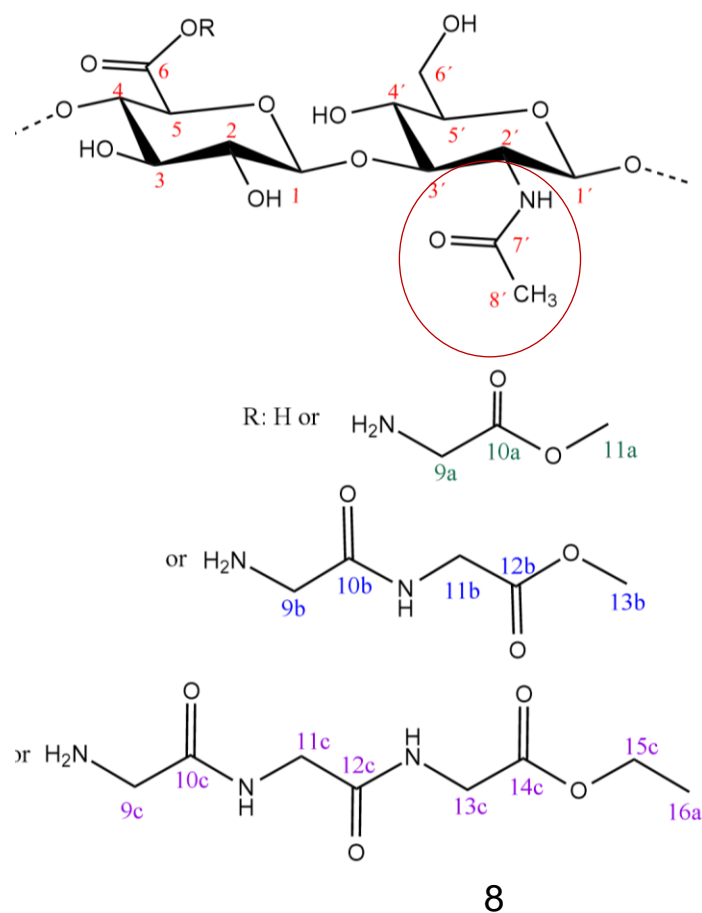
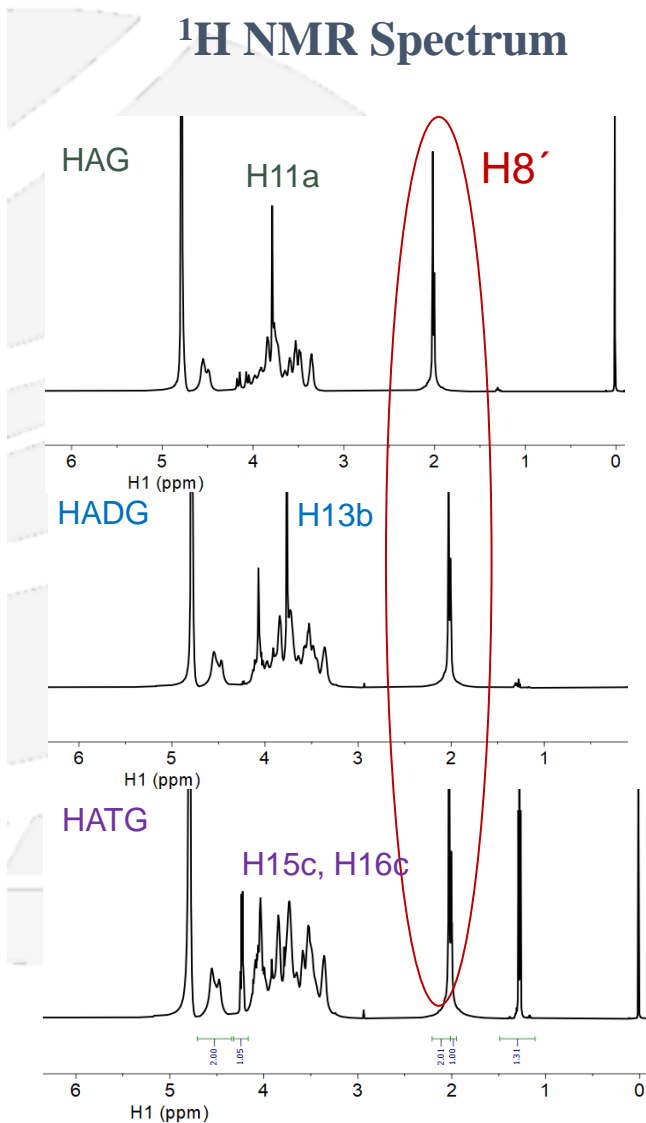
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HAG4	HA:DMTMM:GLYME	1:1:5	72h
HADG	HA:DMTMM:DGLYME	1:1:5	72h
HATG	HA:DMTMM:TGLYEtE	1:1:5	72h

FibreNet

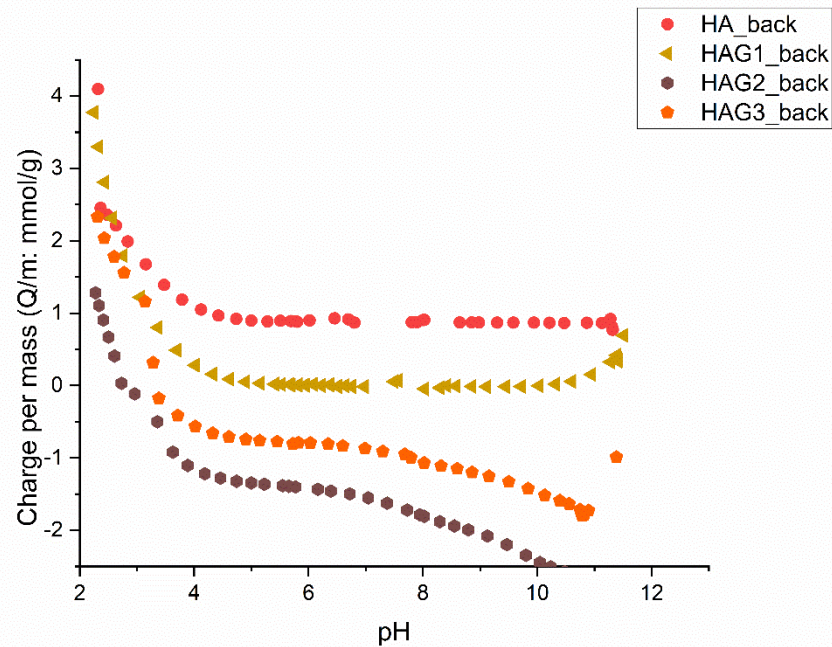


RESULTS AND DISCUSSIONS

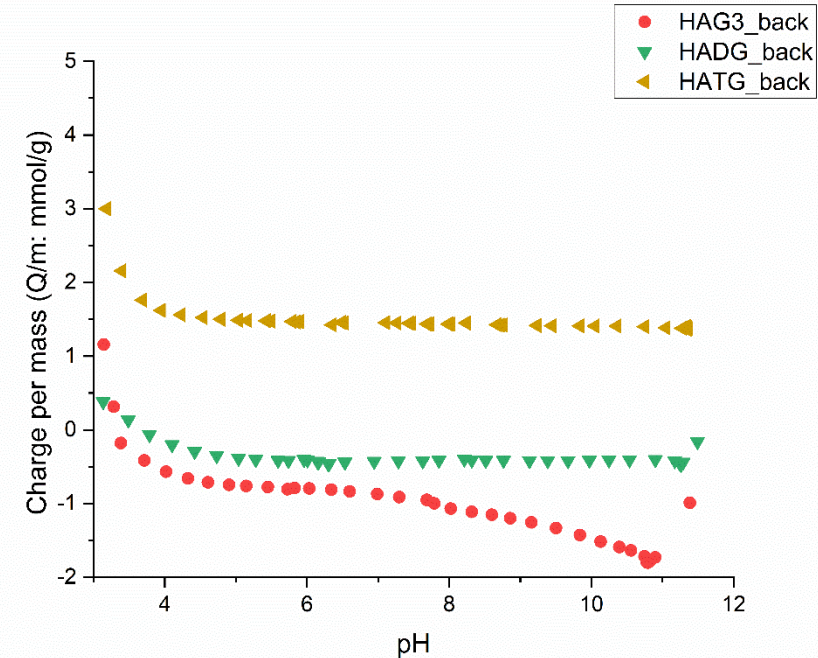


RESULTS AND DISCUSSIONS

TITRATION RESULTS



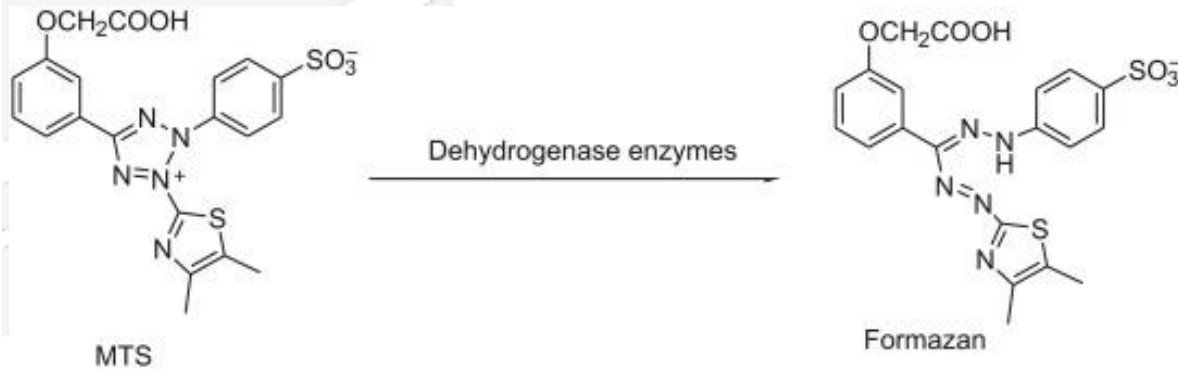
1: Potentiometric titration results for HA coupling with GLY-ME with different reaction time compared with pure HA



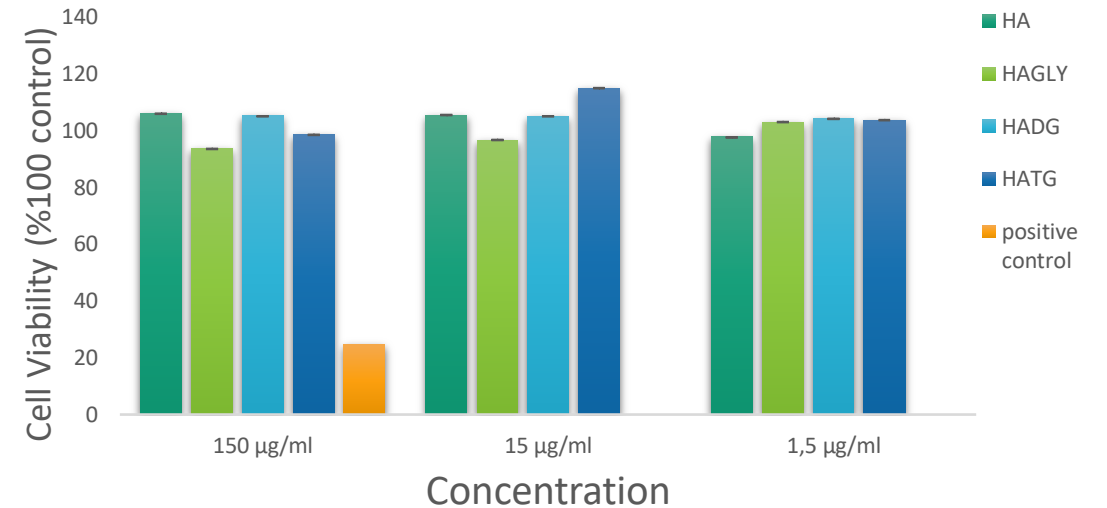
2: Potentiometric titration results for HA coupling with GLY-ME and GLY peptides

RESULTS AND DISCUSSIONS

MTS RESULTS



The MTS assay protocol is based on the reduction of the MTS tetrazolium compound by viable mammalian cells (and cells from other species) to generate a coloured formazan dye that is soluble in cell culture media.



Cell viability after HUVECs treated with HA conjugates for 24h

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Thank you for your attention!

