Investigating the synergistic interactions of surface immobilized and free natural ocular lubricants for contact lens applications: A comparative study between hyaluronic acid and proteoglycan 4 (Lubricin)

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Supporting Information

Figure S1: The effect of the preconditioning step on the *in vitro* boundary lubrication at human cornea-pHEMA and pHEMA-co-TRIS hydrogel disc biointerfaces.

Figure S2: Schematic illustration of (I) rhPRG4 grafting and (II) HA-grafting on the surface of model contact lens materials.

Figure S3: Schematic *in vitro* friction test setup.

Table S1: The composition of artificial tear solution.

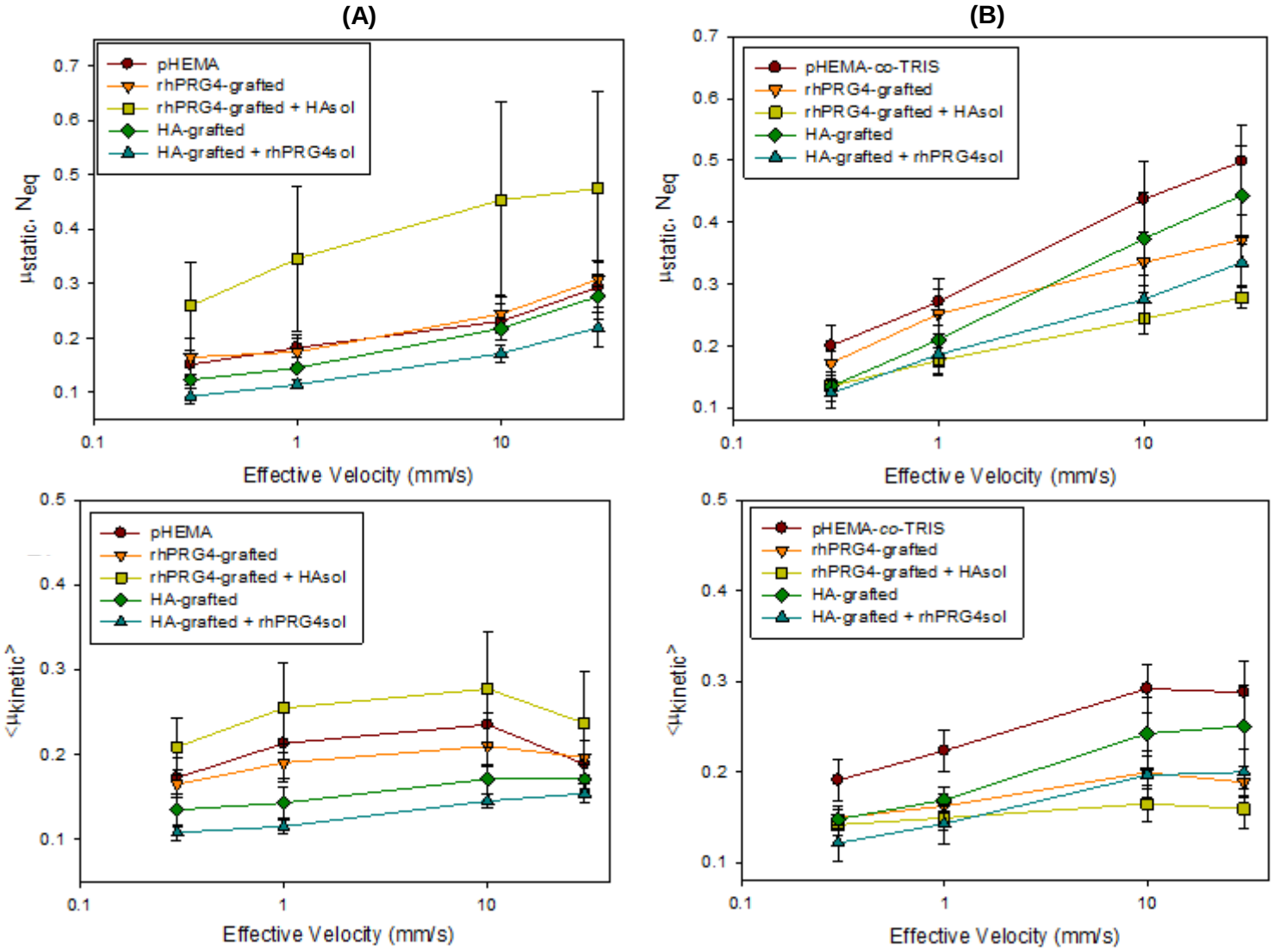

Fig. S1. The effect of the preconditioning step on the *in vitro* boundary lubrication at (A) human cornea-pHEMA hydrogel disc biointerface and (B) human cornea-pHEMA-*co*-TRIS hydrogel disc biointerface. The average normal stress was 21.4 ± 4.5 kPa and 20.1 ± 1.9 kPa, respectively. Sliding velocity values were log transformed to improve the uniformity of variance for statistical analysis. The μ_{static} frictional coefficients of the human cornea-disc biointerface were characterized by velocity dependent profiles for both pHEMA and pHEMA-*co*-TRIS hydrogels ($p \leq 0.05$), whereas no significant differences were detected between the $\langle\mu_{kinetic}\rangle$ frictional coefficients at different velocities ($p > 0.05$).

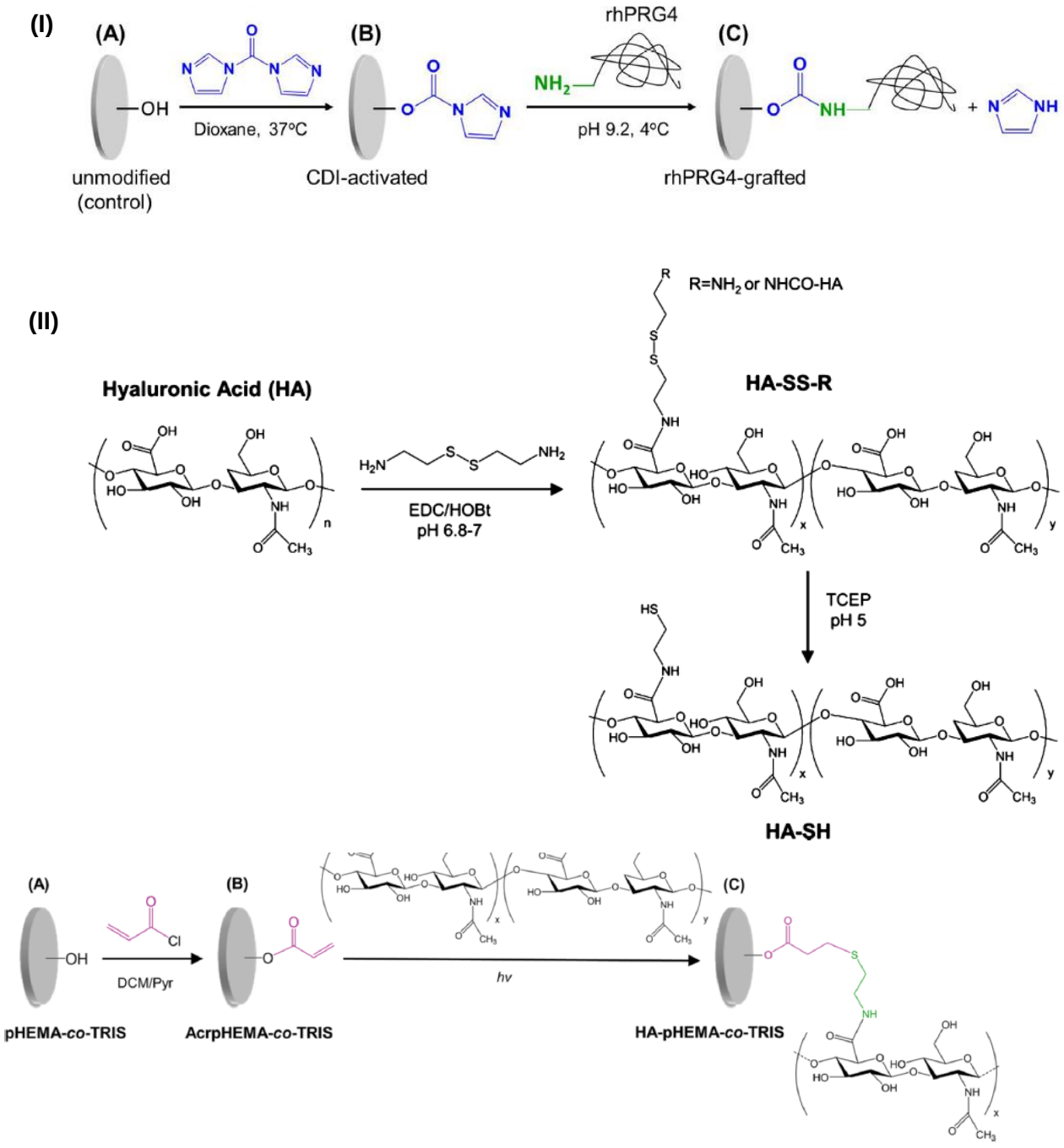

Figure S2. Schematic illustration of (I) rhPRG4 grafting and (II) HA-grafting on the surface of model contact lens materials. Reproduced with permissions from (35) and (37), respectively.

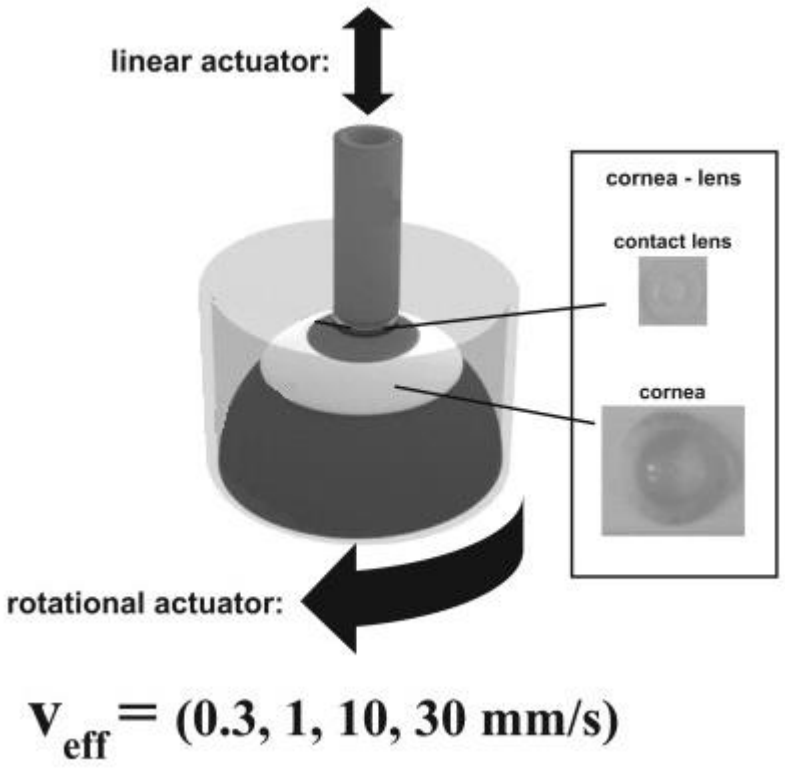

Figure S3. Schematic *in vitro* friction test setup, reproduced with permission from (39).

Table S1. The composition of the artificial tear solution**.**

Salt components	**Concentration (mg/ml)**	**Proteins**	**Concentration (mg/ml)**
Sodium chloride	5.26	Human serum albumin*	0.2
Potassium chloride	1.19	Hen egg lysozyme*	1.9
Sodium carbonate	1.27	Bovine colostrum lactoferrin	1.8
Potassium bicarbonate	0.30	Bovine β-lactoglobulin A	1.6
Calcium chloride	0.07	Human IgG	0.02
Trisodium citrate	0.44	Bovine submaxillary mucin	0.15
Sodium phosphate dibasic	3.41		
Hydrochloric acid	0.94		
Glucose	0.036		
Urea	0.072		
Proclin 300	200 µL per liter of solution		

* Only one protein at a time was radiolabeled with I^{125}. The fraction of the I^{125}-labeled protein in both cases was 5% of the desired final concentration.