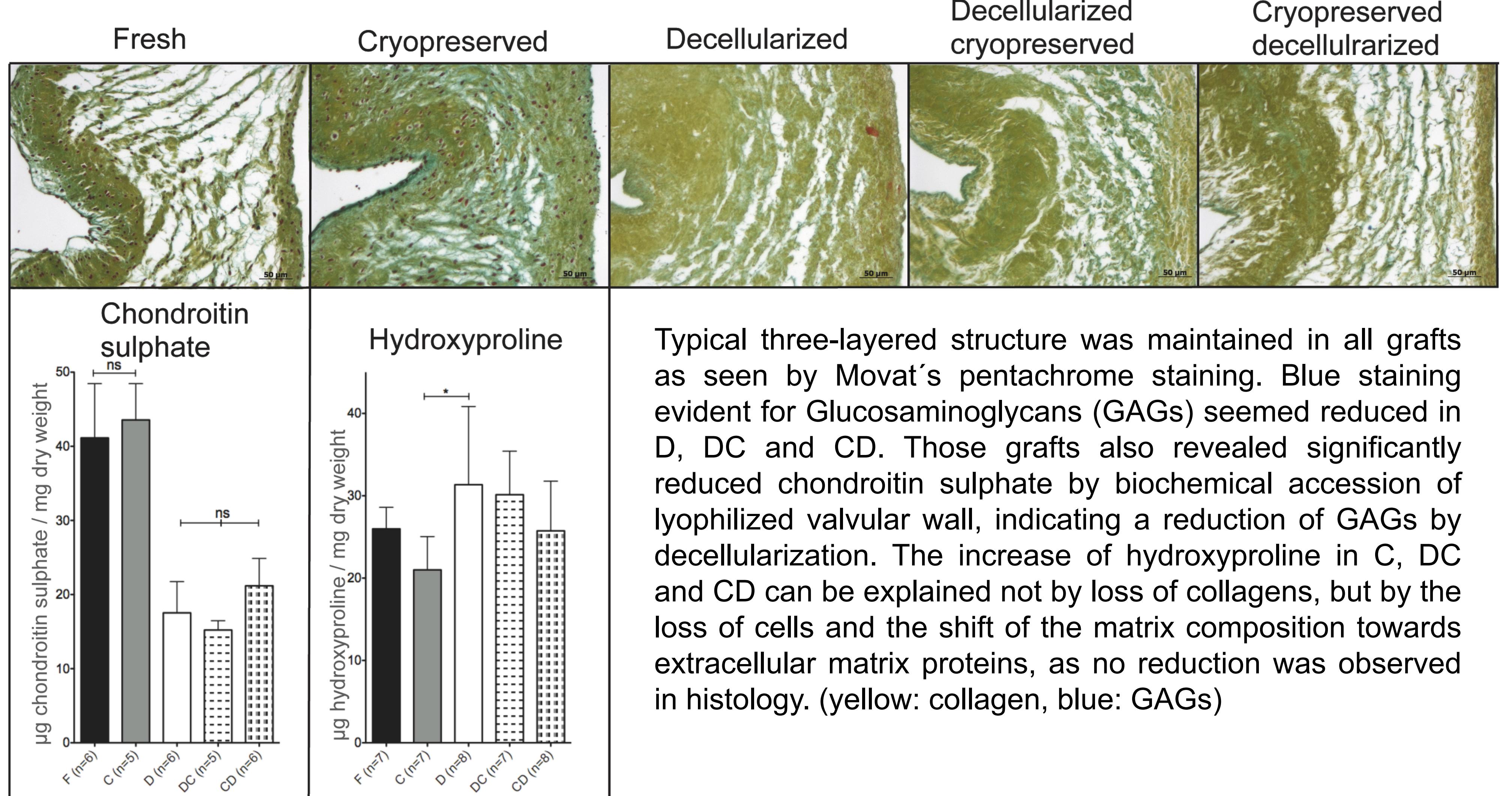
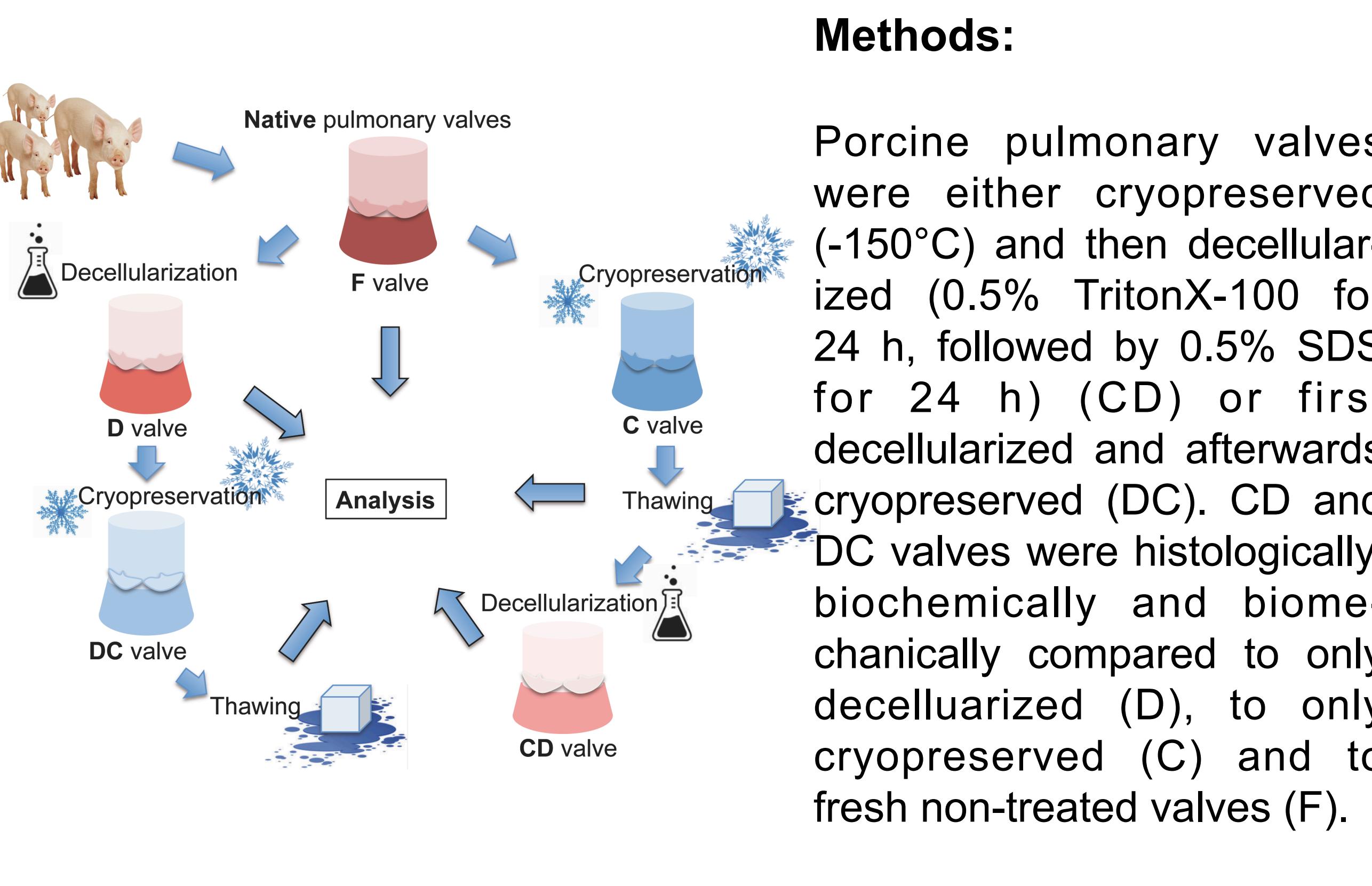


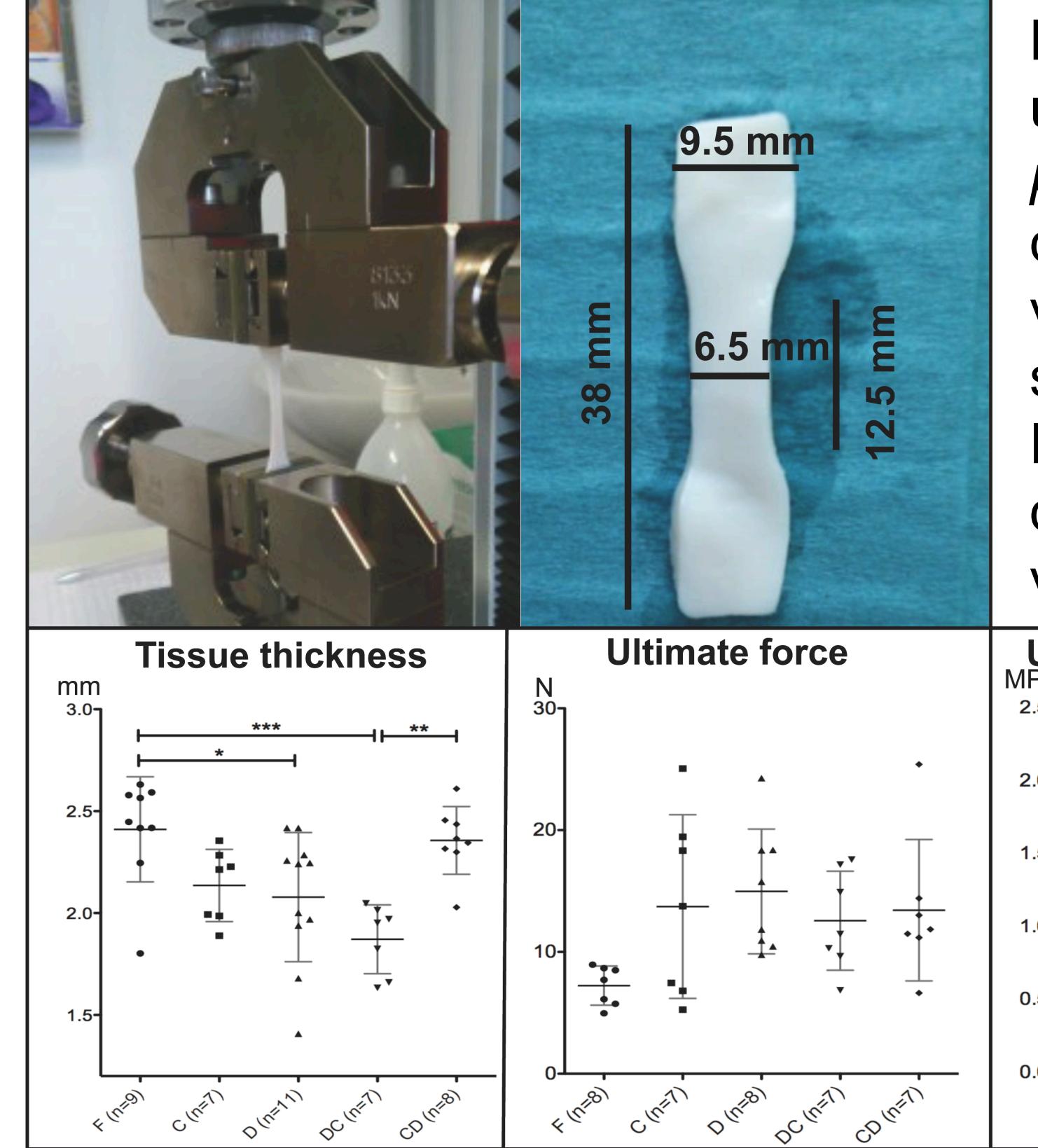
Matrix Stability and Composition of Cryopreserved and Decellularized Heart Valves

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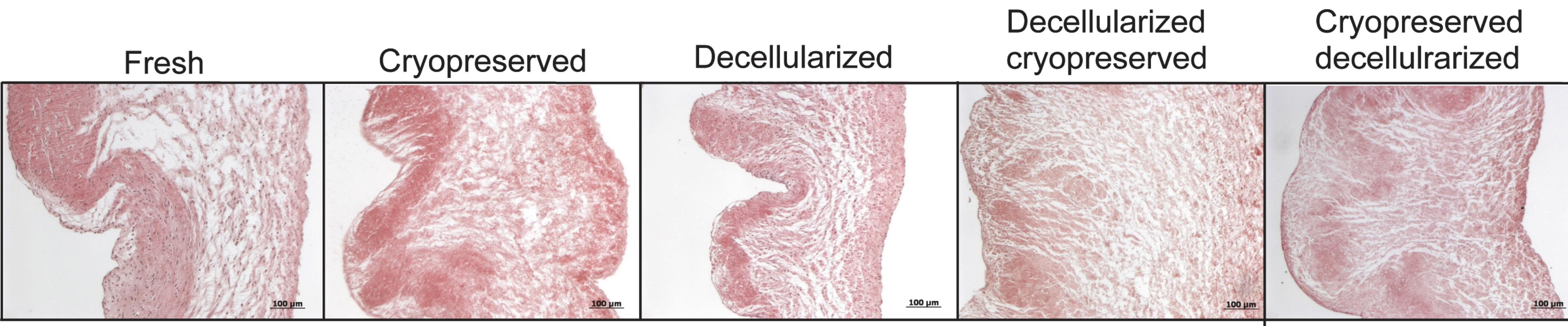
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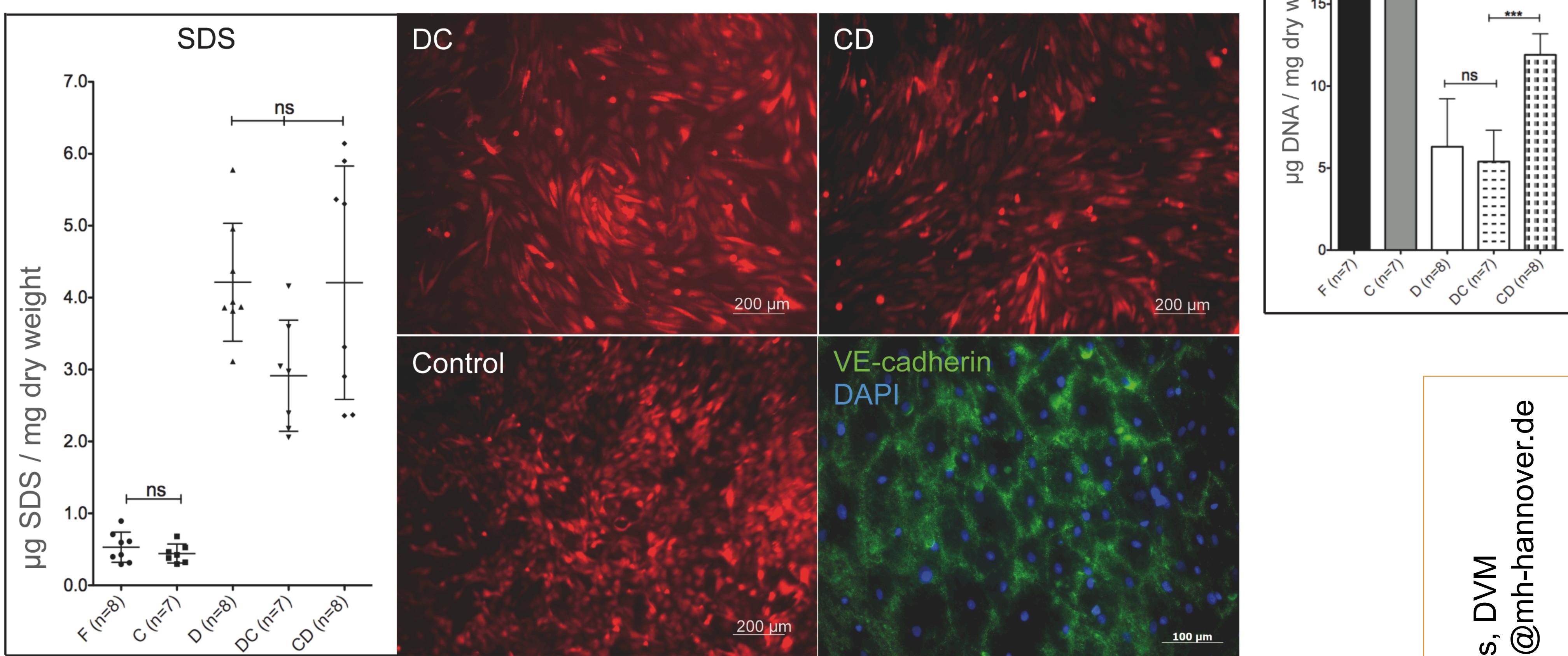
Results



Biomechanical stability was analyzed applying uniaxial tensile-testing to samples of *truncus pulmonalis* in the circumferential direction. While differences were seen in tissue thickness of all treated valves compared to F valves, only D valves showed significant differences to F valves regarding UTS and E modulus. CD and DC valves show no significant difference when compared to each other or to F valves.



HE- staining revealed no intact nuclei in DC and D valves, while small residues of nuclei were found in CD valves. DNA measurement in lyophilized valvular wall also revealed, that decellularization resulted in a strong reduction of DNA content, DC valves showed significantly less DNA than CD valves.



Conclusions

DC and CD valves resemble histologically native grafts in ECM-composition and bear similar biomechanical properties. In spite of remaining SDS in grafts' matrix, no harmful effect was evident when seeded with allogeneic cells. While cryopreservation did not alter the ECM composition of the heart valve, decellularization itself removed GAGs. Although decellularization after cryopreservation was effective, decellularization prior to cryopreservation led to a higher reduction of nuclei. Data show that DC should be preferred to CD, which is also more practical in clinical use. *In vivo* testing for long term stability needs to be conducted, especially before considering decellularizing valves already cryopreserved in cryobanks.

SDS, a detergent used in decellularization, was detected in all decellularized grafts. After *in vitro* culture of porcine aortal endothelial cells (RFP-expression) on DC and CD cusps for 3 days in endothelial growth medium (20% FCS) a monolayer formed on the surface was found in both groups equally confluent and comparable to the monolayer created on the control culture plate. Thus, remaining SDS did not prevent cell growth and the endothelial cells maintained their characteristics as demonstrated by the expression of VE-cadherin in cell-cell-contacts.