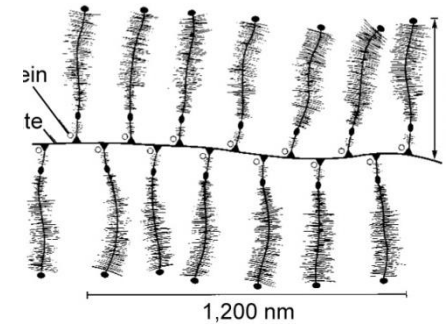
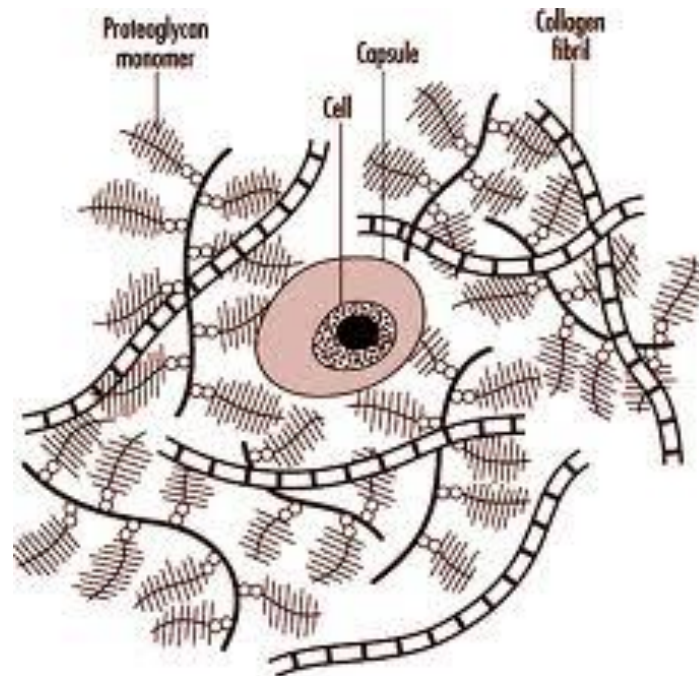
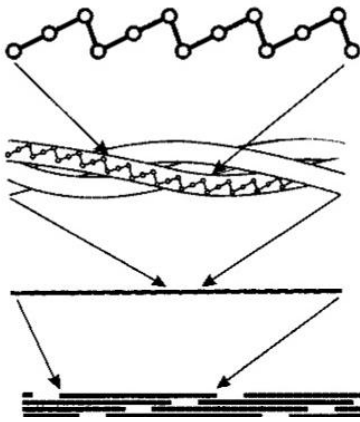
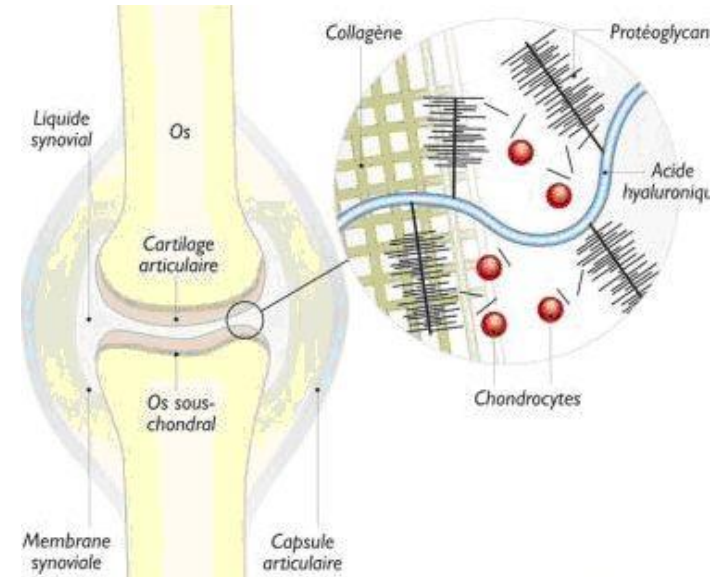


Interactions between Proteoglycan and Collagen depends on their structure



Joël Sandé

- Background :
Main proteins of cartilage

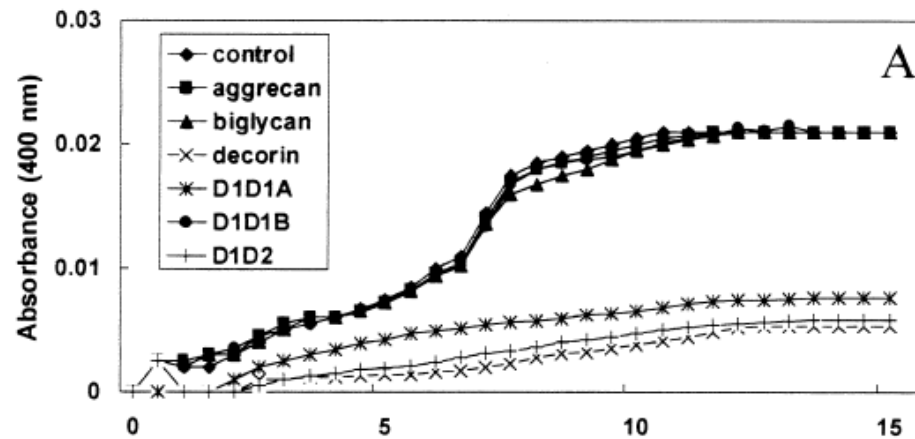


- Purpose : Study interactions + to detect the parts of their structures involved in such interactions
- Method :
 - ✓ aggrecan, decorin and biglycan as proteoglycan
 - ✓ collagen type I and II

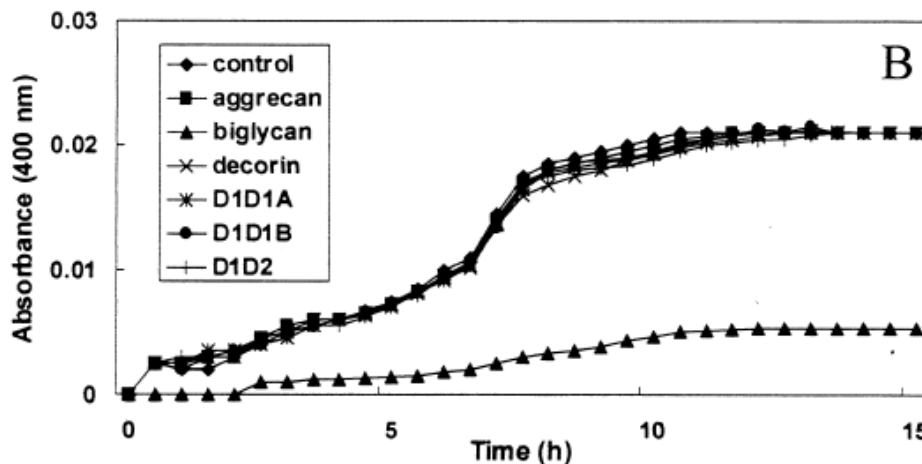
Tests & Results

- Effect of proteoglycan on the formation of collagen fibrils in vitro by solid phase assay.

Formation of
fibrils at 37 °C
for about 12 h



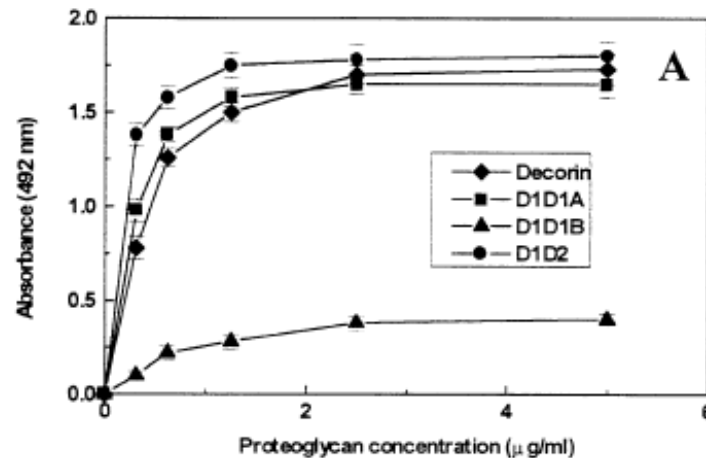
Collagen type I
inhibited by
Decorin
D1D1A
D1D2



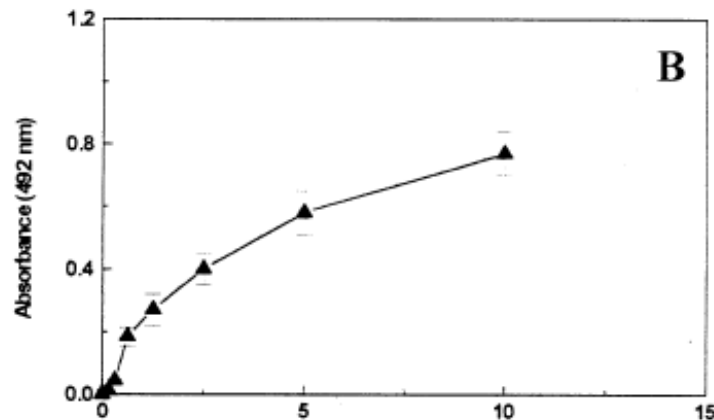
Collagen type II
inhibited by
Byglican

Tests & Results

- Submitted sample to immunochemical quantification



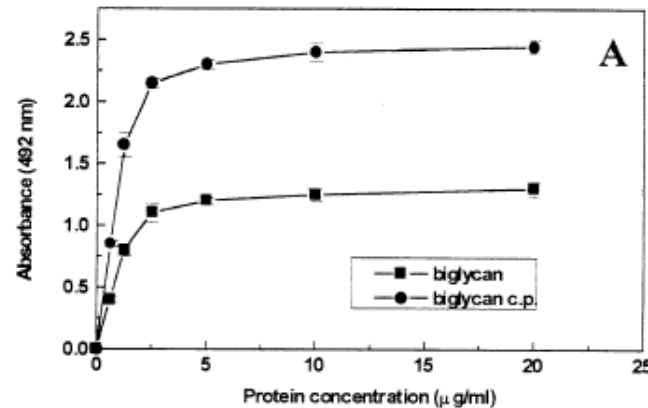
Collagen type I
interact with
decorin, D1D1A
and D1D2



Collagen type II
interact with
Byglican

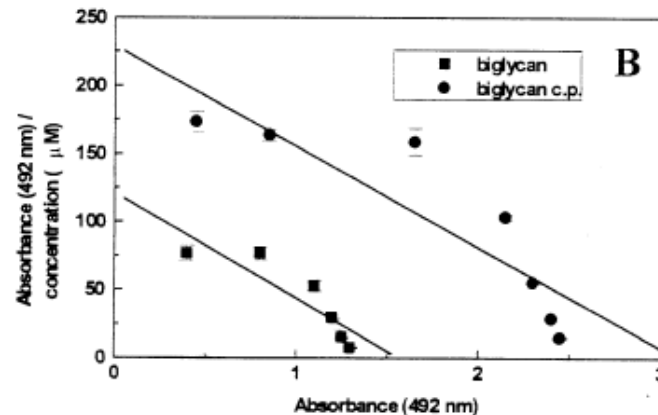
Tests & results

- Effect of proteoglycan core protein was then examined



Increasing of interaction with core protein than in simple in case of Biglycan

$$A \rightarrow B+C$$
$$K_d = BC/A$$

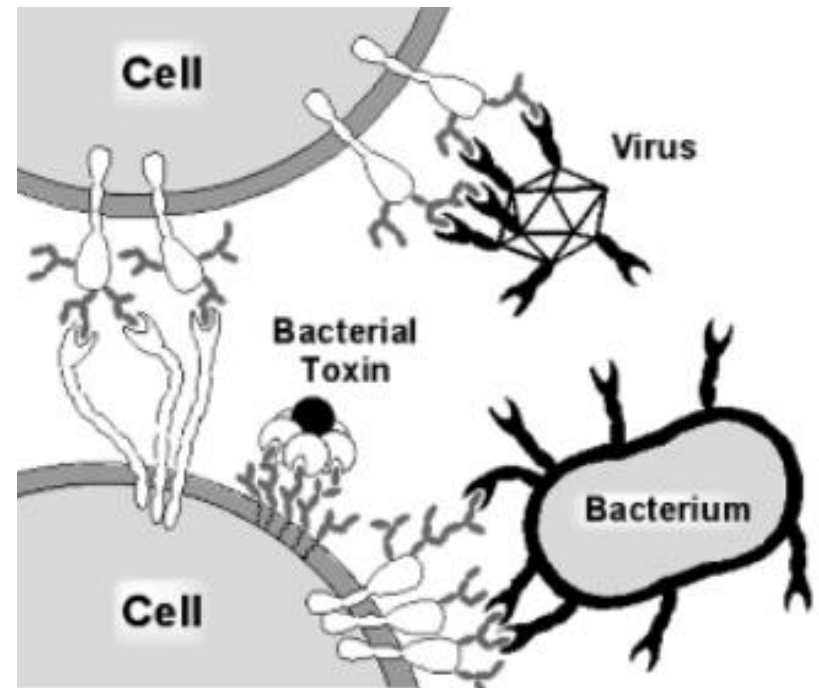


Kd is the same
Dependant on the middle

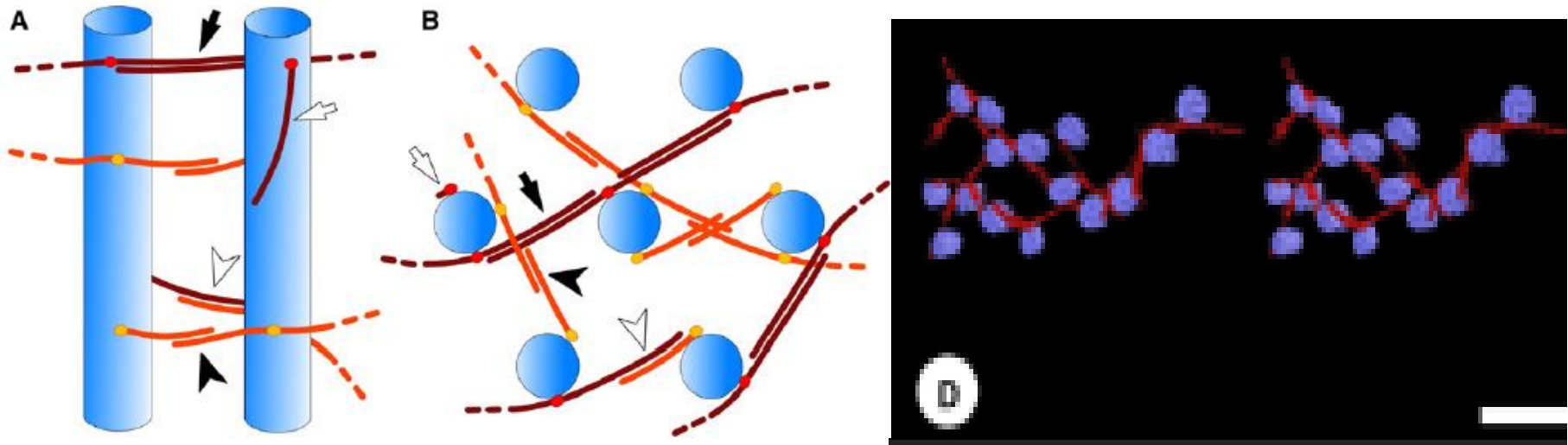
GAG doesn't plays any role here

Test & Results

- None of the squid proteoglycan (decorin, D1D1A and D1D2) core interacts with collagen -> (hypothesis) the interactions are electrostatics and mediated by the GAG chain
- The source of collagen type I or II did not affect the interactions -> amino-acid



Model 1

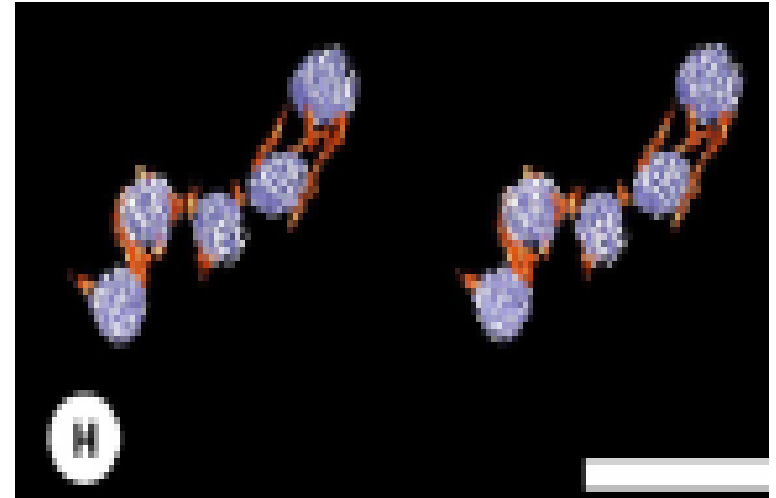
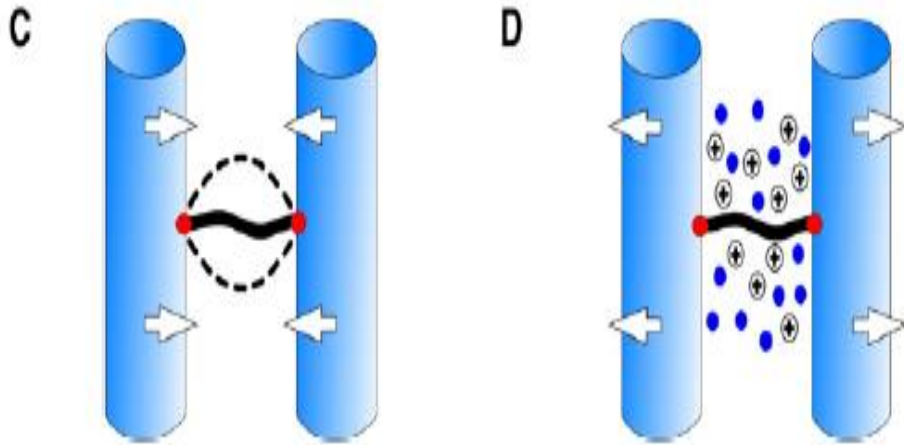


Some PGs that form bridges between fibrils bridge adjacent fibrils only tangentially, so that a PG chain often extends between more than two collagen fibrils



they can conceivably break and reform repeatedly

Model 2



Multiple direct proteoglycan bridge between collagen fibers

→ attraction exerted by the proteoglycan opposing the positive charges between the fibrils repulsing each other

Conclusion

Knowing that proteoglycan have different structures, the interactions between those macromolecules depend strongly on their structures.

Collagen might play a role, but it's mostly proteoglycan for what we know so far.

References

- Demitrios H. Vynios*, Nicoletta Papageorgakopoulou, Helen Sazakli, Constantine P. Tsiganos. **The interactions of cartilage proteoglycans with collagens are determined by their structures.** Biochimie 83 (2001) 899–906
- Philip N. Lewis, Christian Pinali, Robert D. Young, Keith M. Meek, Andrew J. Quantock, and Carlo Knupp. **Structural Interactions between Collagen and Proteoglycans Are Elucidated by Three-Dimensional Electron Tomography of Bovine Cornea.** Structure 18, 239–245, February 10, 2010

