Instituto Universitario de Investigación
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Universidad Zaragoza

IX JORNADA DE JÓVENES INVESTIGADORES DEL I3A

Experimental Study of the Dissection Properties of Porcine Aorta

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amb applied mechanics & bioengineering

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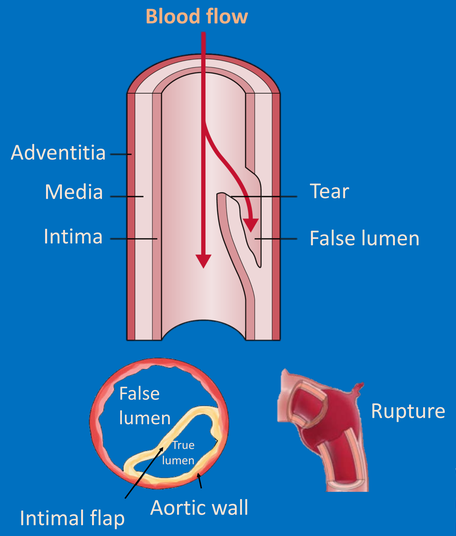
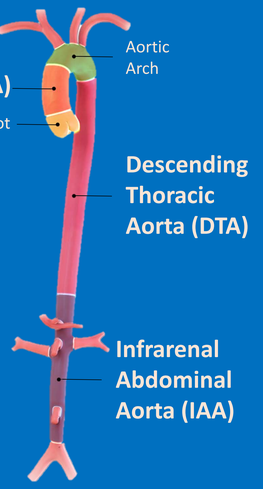
AORTIC DISSECTION

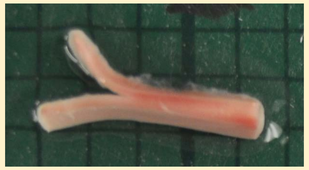




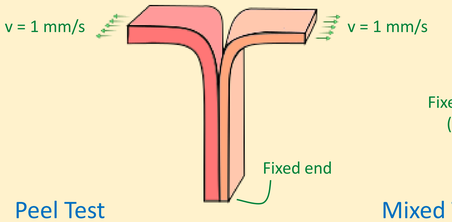
Dissection studies of vessel walls have focused on the analysis of dissection and rupture properties in one specific location of a vessel and only the separation of the medial layer.

We propose a full dissection study, including the entire aorta (ascending, descending and abdominal) and the dissection between all layers (intima-media, media-adventitia, media-media).

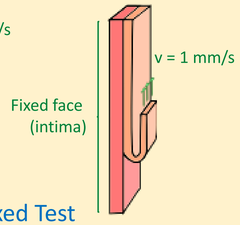
EXPERIMENTAL PROCEDURE



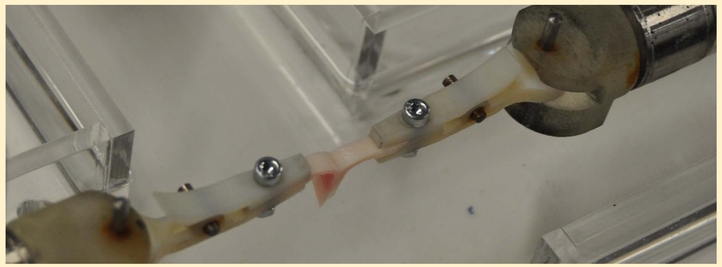
Sample preparation

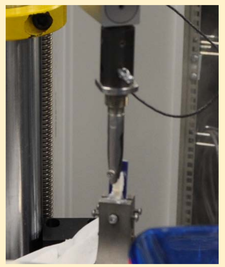


Peel Test

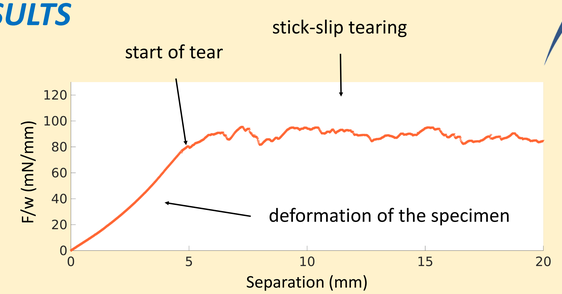


Mixed Test



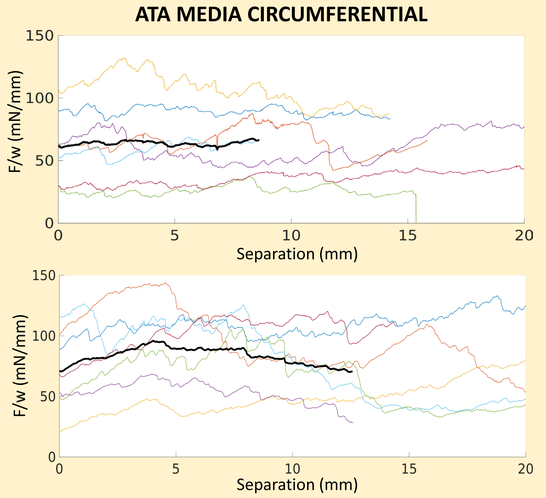


RESULTS



Peel Test (PT)

Mixed Test (MT)



PT	INTIMA - MEDIA		MEDIA - ADVENTITIA		MEDIA	
	Circumferential	*Longitudinal*	*Circumferential*	*Longitudinal*	*Circumferential*	*Longitudinal*
ATA	60,21 ± 21,18	53,74 ± 23,67	50,86 ± 25,43	59,11 ± 25,11	63,71 ± 31,69	66,14 ± 26,64
DTA	38,24 ± 19,12	30,65 ± 14,79	30,58 ± 15,28	32,72 ± 14,62	44,80 ± 25,92	40,20 ± 18,31
IAA	29,43 ± 9,38	27,19 ± 9,02	53,73 ± 12,66	43,89 ± 18,01	45,53 ± 14,06	36,39 ± 13,81

MT	INTIMA - MEDIA		MEDIA - ADVENTITIA		MEDIA	
	Circumferential	*Longitudinal*	*Circumferential*	*Longitudinal*	*Circumferential*	*Longitudinal*
ATA	74,61 ± 17,96	70,71 ± 27,09	70,74 ± 37,23	99,91 ± 44,01	83,32 ± 30,10	80,14 ± 20,76
DTA	55,73 ± 38,09	50,95 ± 26,99	60,53 ± 18,82	60,22 ± 25,09	55,42 ± 26,55	57,94 ± 26,57
IAA	31,01 ± 9,95	48,00 ± 12,12	65,81 ± 15,67	61,65 ± 33,83	49,47 ± 24,75	48,96 ± 18,98

Mean force / width ± standard deviation (mN / mm)

CONCLUSIONS

- Clear anisotropy in the dissection force throughout the aorta → need to characterise these properties according to location
- Higher forces needed to dissect the medial layer compared to the dissection of specific layers → rupture of internal lamellar layers of collagen and elastin
- Higher deviations in the dissection of the ascending aorta → isotropic layout of this location
- Higher forces obtained in the mixed test → two types of modes of fracture

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ACKNOWLEDGEMENTS

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