**INSIGHTS INTO THE AORTIC WALL**

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Background: Four specific questions regarding the aortic wall are addressed with new data.

Methods: Questions addressed are:

1) Can the aortic wall communicate with us?

2) What happens anatomically when the aortic wall thins?

3) Do the mechanics of the aortic wall correlate with its clinical behavior?

4) How can we monitor the pathophysiology of the aortic wall?

#1 is addressed by careful analysis of aortic findings in the operating room;

#2 by light microscopy;

#3 by novel bi-axial engineering studies;

#4 by large throughput RNA analysis.

Results:

1) The aortic wall does communicate with us: Patients with pain undergoing surgery often have positive physical findings in and around the aorta: adhesions, injection, extreme thinning, irregular contour.

2) Aortic wall thinning is accompanied histologically by loss of bulk and number of medial lamellae.

3) In novel bi-axial stretch experiments, mathematical modeling predicts rupture at precisely the same 5.5 to 6 cm diameter that this occurs clinically.

4) A novel blood RNA Signature test, gleaned by isolating the 41 most up- or down-regulated of 33,000 RNAs studied allows us to diagnose aneurysm disease non-invasively and promises to give glimpses into real-time aortic wall pathophysiology.

Conclusions:

1) It is imperative to respect pain symptoms in aneurysm patients.

2) A very thin aorta wall or a localized aortic “bubble” has lost its vital medial layers and consists largely of intima and adventitia.

3) Mathematical modeling thoroughly endorses current clinical size criteria for aortic resection.

4) We may soon be able to “biopsy” pathophysiological conditions in the aortic wall by a simple RNA blood test.