The deterioration of the mechanical properties of the vessel wall in aortic diseases

The histological structure of the aorta is the basis for its' mechanical properties. In general arterial vessel walls are composed of three layers: intima, media and adventitia, each of them having further substructures. Media is the layer responsible for the majority of the mechanical properties of the arteries. It consists of three major components: elastin, collagen and smooth muscle cells.
The components of arterial media are organised in distinctive histological structure described as lamellar media unit. The lamellar media units constitute the building blocks of the higher structure of the arterial media layer. Every single component of the lamellar media unit (elastin, collagen and smooth muscle cells) may suffer its own disease or deterioration. For the arterial wall to loose its' mechanical properties it is required few harmful factors to act together. The destruction of media lamellar unit leads to the loss of the higher order structure of the arterial wall, and thus to mechanical instability of the arterial wall. Altered mechanical properties of arterial wall occur in clinic as aortic aneurysm or aortic dissection. Both life threatening conditions start as microscopic lesions on cellular level and propagate through the vicious circle mechanism to full symptomatic disease requiring surgical intervention. During my talk I shall try to give you the overview of this process.