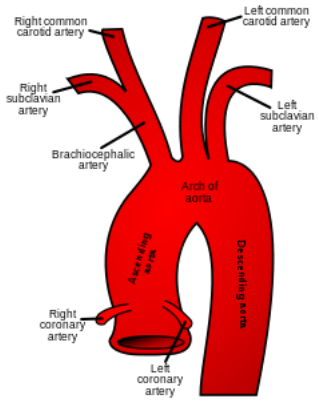
Aortic Root Dilatation

"The ascending aorta is a portion of the aorta commencing at the upper part of the base of the left ventricle on a level with the lower border of the third costal cartilage behind the left half of the sternum. It passes obliquely upward, forward, and to the right, in the direction of the heart's axis, as high as the upper border of the second right costal cartilage describing a slight curve in its course, and being situated, about 6 centimetres behind the posterior surface of the sternum. The total length is about 5 centimetres.



Source: Wikipedia.org: Ascending aorta

The aortic root is the portion of the aorta beginning at the aortic annulus and extending to the sinotubular junction. It is sometimes regarded as a part of the ascending aorta, and sometimes regarded as a separate entity from the rest of the ascending aorta."

It consists of the aortic valve and the openings for the coronary arteries (the coronary ostia). The aortic valve has three flaps (or cusps) surrounded by a fibrous ring (the annulus). "Progressive dilatation of the aortic root is caused by medial degeneration and destruction of the elastic and collagen fibers and can be also associated with high blood pressure, high stroke volume, and inflammatory diseases." (2)

There is a natural increase in size of the root as we age which provides itself a clue to underlying causes. Abnormal increase is commonly seen in Marfan's and Ehlers-Danlos Syndrome where there is a defect in their collagen synthesis. The aorta in Marfan syndrome exhibits the typical features of cystic medial degeneration with disruption of elastic fibres and fibrosis of media. Up to 85% of patients with Marfan's syndrome have aortic root dilatation with or without associated aortic regurgitation.

"Medial degeneration is a fated trend caused by the primary syndrome such as Marfan syndrome, Ehlers–Danlos syndrome, or Loeys–Dietz syndrome. In the majority of patients with these syndromes, the primary dilatation develops at the aortic root, especially at the aortic sinus. A new biomechanical viewpoint could assess specific mechanical properties on stresses in the aortic root, which are better predictors for aneurysmal enlargement than the currently-used Laplace's law. The mechanical and histologic adaptation of each sinus to the intraluminal stress results in the asymmetric enlargement of the aortic root." (2)

Thickening and calcification or sclerosis occurs, and in > 25% stenosis is present over 65 and when this is present it is associated with 50% increase in CV events. Stenosis occurs in 2-5% of elderly this carries an 80% 5 year progression to failure, valve replacement or death.

Previously thought to be unmodifiable, dilatation and sclerosis is now known as an active process with inflammation, lipoprotein deposition, active calcification and renin-angiotensin activation. The gene mutation APO E4 increases frequency of this condition. The increasing evidence of ARB mode of action makes these products ones that may well control the increasing damage as we age.

References:

- Wikipedia: Ascending Aorta. https://en.wikipedia.org/wiki/Ascending_aorta
- Kaan Kırali, Gökhan Kahveci, in New Approaches to Aortic Diseases from Valve to Abdominal Bifurcation, 2018. Aneurysm