CLAIMS

What is claimed is:

1. A method for manufacturing a personalized naturally designed mitral valve prosthesis to precisely fit a specific patient for which the valve prosthesis is made for, said method comprising:

   measuring size and shape of a native mitral valve of the specific patient by using imaging methods;

   calculating geometry and dimensions of an annular ring, an anterior leaflet, a posterior leaflet and chords per the specific patient, based on validated algorithms; and

   cutting and connecting the annular ring, the anterior leaflet, the posterior leaflet and chords, thereby forming a personalized prosthesis mitral valve.
2. The method of claim 1, wherein measuring size and shape of a native mitral valve of a patient comprises measuring mitral valve related parameters comprising: annulus circumference (AC), annulus area (AA), anterior-posterior (A-P) diameter, anterolateral-posteromedial (AL-PM) diameter, commissural diameter (C-C), anterior leaflet length (AL), posterior leaflet length (PL), mitral valve shape, and length of chordae tendineae (ACL and PCL).
3. A personalized mitral valve prosthesis comprising a flexible annular ring dimensioned to match the native mitral annulus of a specific patient, a flexible anterior leaflet and a flexible posterior leaflet dimensioned to match the native mitral leaflets of the specific patient, said leaflets connected to the annular ring and chords dimensioned to match the native mitral leaflets of the specific patient, said chords to connect with papillary muscle of the heart, said personalized mitral valve prosthesis formed by:

   measuring size and shape of a native mitral valve of the specific patient by using imaging methods;

   calculating geometry and dimensions of annular ring, leaflets and chords per the specific patient based on validated algorithms; and

   cutting and connecting the annular ring, leaflets and chords, thereby forming a personalized prosthesis mitral valve.
4. The personalized mitral valve prosthesis of claim 3, wherein measuring size and shape of a mitral valve of a patient comprises measuring mitral valve related parameters comprising: annulus circumference (AC), annulus area (AA), anterior-posterior (A-P) diameter, anterolateral-posteromedial (AL-PM) diameter, commissural diameter (C-C), anterior leaflet

length (AL), posterior leaflet length (PL), mitral valve shape, and length of chordae tendineae (ACL and PCL).

5. The personalized mitral valve prosthesis of claim 4, wherein calculating comprises calculating the annular ring circumference (AC) as a combination of anterior leaflet annular ring circumference (AAC) that is a top edge of the anterior leaflet, and posterior leaflet annular ring circumference (PAC) that is a top edge of the posterior leaflet based on equation (iii), further wherein said annular ring is formed into a multi-layered reinforced structure by folding or overlapping the top edge of each of the anterior leaflet and posterior leaflet.
6. The personalized mitral valve prosthesis of claim 5, wherein connecting comprises joining the edge of the anterior leaflet with the edge of the posterior leaflet such to create a coaptation between the anterior leaflet and posterior leaflet, wherein the coaptation controls the function and performance of the personalized mitral valve prosthesis by controlling the size of valve orifice and thus affect the trans-mitral pressure gradient.
7. The personalized mitral valve prosthesis of claim 3, wherein connecting comprises joining the two leaflets together thereby forming two commissures, wherein the two commissures incline inward in cone angle ($\delta_{1.}$) to create a slight cone shape to the body of the personalized mitral valve prosthesis to properly fit in the native left ventricle per shape and contour of the specific patient wherein the cone angle ($\delta_{1.}$) is determined by an inclined angle ($\delta_{0.}$) of each commissure edge of the two leaflets based on equation (x).
8. The personalized mitral valve prosthesis of claim 3, wherein connecting comprises connecting the anterior leaflet to the posterior leaflet by connecting anterolateral side to anterolateral side and connecting posteromedial side to posteromedial side.
9. The personalized mitral valve prosthesis of claim 6, wherein the measuring comprises measuring: size and shape of a native annular ring of the specific patient, commissure height (CH) inclined angel ($\delta_{0.}$), anterior leaflet length (AL) and posterior leaflet length (PL), and coaptation height (Coapt H) for calculating length of each leaflet edge based on equation (xi); wherein calculating the anterior leaflet length (AL) and posterior leaflet length (PL) is based on: (a) an anterior-posterior diameter (A-P) that is a theoretical minimum distance for coaptation, (ib) a ratio (r) between AL to PL, (c) coaptation depth (Cd), (d) the coaptation height (Coapt H) and (e) chord length (Lc) based on equations (viii) and (ix), respectively.
10. The personalized mitral valve prosthesis of claim 4, wherein the annular ring circumference (AC) is a function of the anterior-posterior diameter (A-P) and the anterolateral posteromedial diameter (AL-PM) based on equation (iii) and wherein measuring the anterior-posterior

diameter (A-P) and the anterolateral posteromedial diameter (AL-PM) is when the mitral valve closes during left ventricular systole.

11. The personalized mitral valve prosthesis of claim 4, wherein calculating the annular ring circumference (AC) of the prosthesis is based on the annular ring width (d) of preserved native leaflets during clinical surgery.
12. The personalized mitral valve prosthesis of claim 4, wherein calculating the annular ring circumference (AC) of the prosthesis is based on a ratio (λ) in equation (iii).
13. The personalized mitral valve prosthesis of claim 3, wherein the annular ring is asymmetrical and further wherein said annular ring is formed from a combination of an anterior leaflet annulus and a posterior leaflet annulus, wherein anterior leaflet annular circumference (AAC) is smaller than posterior leaflet annular circumference (PAC), and the ratio (R) between AAC/PAC is between 49/51 and 30/70 or is between 35/65 and 42/58 or is 40/60.
14. The personalized mitral valve prosthesis of claim 3, wherein connecting comprises connecting the two leaflets together to form a body of the personalized mitral valve prosthesis.
15. The personalized mitral valve prosthesis of claim 3, wherein each of the anterior leaflet and each of the posterior leaflet comprises two sets of chords: anterolateral chords and posteromedial chords, wherein each of the anterolateral chords and posteromedial chords comprises three sub-chords, wherein the cords are uniformly distributed along at least 3/8 of each edge from each side.