

Claims

1. Method for determining geometrical parameters of a soft contact lens (CL), the method comprising the steps of
 - providing an OCT imaging device comprising an OCT light source;
 - providing a soft contact lens (CL) having a back surface (BS) and a front surface (FS);
 - arranging the soft contact lens (CL) relative to the OCT imaging device such that light coming from the OCT light source impinges on the back surface (BS) of the soft contact lens (CL);
 - irradiating the soft contact lens (CL) with light from the OCT light source and generating a three-dimensional OCT image of the soft contact lens (CL) using the OCT imaging device;
 - from the three-dimensional OCT image determining a plurality of edge points (E_i) located on the edge (E) of the soft contact lens (CL);
 - connecting adjacent ones (E_1, E_2 ; E_2, E_3) of the edge points in a circumferential direction by individual straight lines, each of the individual straight lines having a length (U_i), to form an approximated circumference of the soft contact lens (CL);
 - summing up the lengths (U_i) of all individual straight lines, the sum of the lengths of all individual straight lines representing a length U of the approximated circumference of the soft contact lens (CL);
 - from the so determined length U of the approximated circumference of the soft contact lens (CL) determining a diameter D of the soft contact lens (CL) according to the equation $D = U / \pi$.
2. Method according to claim 1, the method further comprising the step of determining a center (C) of the back surface (BS) of the soft contact lens by extracting the back surface (BS) of the soft contact lens (CL) from the three-dimensional OCT image, and by determining that point on the back surface (BS) to be the center (C) of the back surface (BS) from which a sum of all shortest distances from that point along the back surface (BS) to all edge points (E_i) is minimal.
3. Method according to claim 2, further comprising the step of determining a length L along the back surface (BS) from a first edge point (E_1) of the plurality of edge points (E_i) through the center (C) to a second edge point (E_{10}) located opposite to the first edge point (E_1) relative to the center (C), and further determining a base curve equivalent BCE

of the soft contact lens from the length L and the diameter D of the soft contact lens using the equation: $D = 2 \cdot BCE \cdot \sin(L / [2 \cdot BCE])$.

4. Method according to any one of the preceding claims, further comprising the steps of:
 - from the three-dimensional OCT image generating a plurality of two-dimensional OCT light sections of the soft contact lens (CL), each individual two-dimensional OCT light section of the plurality of two-dimensional OCT light sections of the soft contact lens (CL) comprising two edge points (E_1 , E_{10}) of the plurality of edge points (E);
 - defining a boundary curve bounding each individual two-dimensional OCT light section;
 - determining the second derivative of the boundary curve of the two-dimensional OCT light section; and
 - determining the two edge points (E_1 , E_{10}) to be located at those locations at opposite ends of the two-dimensional OCT light section where the second derivative of the boundary curve of the two-dimensional OCT light section has a maximum.
5. Method according to any one of claims 2 to 4, wherein further a center thickness (CT) of the soft contact lens (CL) is determined from the three-dimensional OCT image by calculating, at the center (C) of the back surface (BS) of the soft contact lens (CL), a plane (TP) tangential to the back surface (BS) of the soft contact lens (CL), determining an axis (CA) running perpendicular to this tangential plane (TP) through the center (C) of the back surface (BS) of the soft contact lens (CL) and through the front surface (FS) of the soft contact lens (CL), and determining the center thickness (CT) of the soft contact lens (CL) to be the distance between the center (C) of the back surface (BS) of the soft contact lens (CL) and the intersection of the axis (CA) with the front surface (FS) of the soft contact lens (CL).
6. Method according to any one of claims 3 or 5, wherein in case a central reflex occurs in the three-dimensional OCT image in a central area of the back surface (BS) of the soft contact lens (CL) caused by irradiating the soft contact lens with light from the OCT light source, a further three-dimensional OCT image is generated by irradiating the soft contact lens (CL) with light of lower intensity from the OCT light source, with the central reflex being attenuated in the further three-dimensional OCT image to allow for determining the length L along the back surface (BS) or the center thickness (CT) of the soft contact lens, and wherein in the central area of the back surface of the soft contact

lens (CL) the further three-dimensional image is used for determining the length L along the back surface (BS) or the center thickness (CT) of the soft contact lens (CL), or for determining both the length L along the back surface (BS) and the center thickness (CT).

7. Method according to any one of the preceding claims, wherein the soft contact lens (CL) is arranged in a container (10) filled with an aqueous liquid (11) such as water, including deionized water, or a buffered solution, such as a buffered saline solution, or a mixture of the water and the buffered solution, with the soft contact lens (CL) being completely immersed in the aqueous liquid (11).
8. Method according to claim 7, wherein the step of providing an OCT imaging system comprises providing an OCT imaging system having a probe head (12) comprising a planar liquid dip window (120) through which the light from the OCT light source irradiates the soft contact lens (CL) immersed in the aqueous liquid (11) in a predetermined irradiation direction, with a normal on the planar liquid dip window (120) being arranged inclined relative to the predetermined irradiation direction.