LENS, IMAGING SYSTEM FOR GENERATING IMAGES OF AN EYE AND METHOD OF OPERATION

Ref-No: TA-PVA1637

BACKGROUND

In ophthalmology, the conventional slit lamp microscope is a daily working device for examining almost all areas of the eye. The slit lamp is used especially for the analysis and diagnosis of pathological changes of the cornea. It allows up to a 60-fold magnification of fine corneal structures. However, a resolution of deeper, cellular relationships is not feasible with this technique.

PROBLEM

The basis of a system is the “Rostock Cornea Module” (RCM), which is an addition to the “Heidelberg Retina Tomograph” (HRT). While the RCM represents a confocal point-scanning laser ophthalmoscope for the examination of the retina of the eye, the combination of HRT and RCM represents a confocal laser scanning microscope for examining the cornea. This concept allows a representation of different levels of the cornea in vivo in subcellular resolution. Thus, the scanner captures two-dimensional images parallel to the surface of the cornea. The depth of focus can be adjusted by moving the contact cap axially. The problem here, however, is a deterioration of the image with larger focus offsets.

SOLUTION

For this application, the HRT-RCM system is extended by a piezoelectric actuator. As a result, optical elements are now shifted within the RCM, resulting in a change of the focus in the axial direction. This extension has the advantage that the cornea remains stationary and the piezoelectric actuator can operate more precisely and faster compared to a motorized actuator. The position accuracy is in the sub-nm range. The problem of additional, complex image processing for the creation of sectional images is also solved, since synchronization of a scanning direction of the HRT-RCM system with the axial direction of movement of the piezoelectric actuator results in direct sagittal, sufficiently high-resolution sectional images of the cornea.
ADVANTAGES

- In vivo diagnostics at the cellular level
- Real-time display of sectional images, for example of the cornea, in any spatial direction
- Unlike motorized actuators, piezo actuators are faster and more precise
- No degradation of the image quality

SCOPE OF APPLICATION

Diagnostics
Medical
Ophthalmology

SERVICE

Disposition
Concession Agreement
Development cooperation