[0005] It is therefore desirable to provide improved systems and methods for altering the biomechanical properties of connective tissue having advantages not heretofore taught.

SUMMARY

[0006] Systems and methods for altering the biomechanical properties of connective tissue are described herein that overcomes the limitations noted above.

[0007] In general a device for delivering medical treatments is disclosed which comprises a laser for generating a beam of laser radiation, a housing, a controller within the housing, in communication with the laser and operable to control the qualities of the beam of laser radiation in application to a target material, a lens operable to focus the beam of laser radiation onto a target material, and a power source operable to provide power to the laser and controller. In one aspect, the present disclosure refers to a system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye, comprising: a laser operable to generate a treatment beam of laser radiation for ablation of a target biological tissue; a lens operable to focus the treatment beam; a control system coupled with and operable to control the laser, comprising: a sensor; a subsurface anatomy avoidance subsystem; a controller; and a galvo-optic assembly; and a user interface coupled with the control system and the laser, wherein the ablation caused by the laser creates at least one matrix of pores in the target biological tissue in response to a user interacting with the user interface during a medical treatment, wherein the control system further comprises a real-time biofeedback control loop including the sensor and the subsurface anatomy avoidance subsystem that is operable to monitor tissue characteristics within the target biological tissue, including thickness, topography, and focus to identify biological features, and wherein the real-time biofeedback control loop further comprises an imaging system; and wherein, during a medical treatment to improve biomechanics, a user can perform an ablating procedure on a target biological tissue in a treatment, using a pattern of pores; including the golden spiral pattern, the pattern having one of clockwise direction, counterclockwise direction, or combination thereof.

[0008] Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the presently described invention.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

[0009] Illustrated in the accompanying drawing(s) is at least one of the best mode embodiments of the present invention. In such drawing(s):

CLAIMS

What is claimed is:

1. A system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye, comprising:

a laser operable to generate a treatment beam of laser radiation for ablation of a target biological tissue;

a lens operable to focus the treatment beam;

a control system coupled with and operable to control the laser, comprising:

a sensor;

a subsurface anatomy avoidance subsystem;

a controller; and

a galvo-optic assembly; and

a user interface coupled with the control system and the laser,

wherein the ablation caused by the laser creates at least one matrix of pores in the target biological tissue in response to a user interacting with the user interface during a medical treatment.

wherein the control system further comprises a real-time biofeedback control loop including the sensor and the subsurface anatomy avoidance subsystem that is operable to monitor tissue characteristics within the target biological tissue, including thickness, topography, and focus to identify biological features, and wherein the real-time biofeedback control loop further comprises an imaging system; and

wherein, during a medical treatment to improve biomechanics, a user can perform an ablating procedure on a target biological tissue in a treatment, using a pattern of pores; including the golden spiral pattern, the pattern having one of clockwise direction, counterclockwise direction, or combination thereof.

2. The system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye according to claim 1, further comprising:

a video monitor.

3. The system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye according to claim 2, wherein the user interface further comprises at least one of:

a keyboard; and

a mouse.

4. The system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye according to claim 1, wherein the user interface further comprises:

a touchscreen video monitor.

5. The system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye according to claim 1, wherein the user interface further comprises:

a hand activated switch.

6. The system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye according to claim 1, wherein the user interface further comprises:

a foot pedal.

7. The system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye according to claim 1, wherein the biofeedback control loop uses the sensor to perform positional eye tracking for off axis ablation.

8. The system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye according to claim 1, wherein the imaging system further comprises:

a CCD camera.

9. The system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye according to claim 1, wherein the imaging system further comprises:

a CMOS camera.

10. The system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye according to claim 1, wherein the imaging system further comprises:

ultrasound imaging.

11. The system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye according to claim 1, wherein the imaging system further comprises:

Optical Coherence Tomography (OCT).

12. The system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye according to claim 1, wherein the galvo-optic assembly is operable to modify a characteristic of the treatment beam.

13. The system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye according to claim 1, further comprising:

a spotting laser operable to transmit a spotting laser beam.

14. The system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye according to claim 13, wherein the galvo-optic assembly is operable to perform off-axis scanning using the spotting laser beam.

15. The system for performing ablation of biological tissue to create a pattern of pores that improves biomechanics of an eye according to claim 1, further comprising:

an integrated surgical microscope.