CLAIMS:

1. A sutureless method of repairing soft tissue defect comprising:

(i) providing a collagen-containing patch adapted to enclose at least a portion of said soft tissue defect;

(ii) contacting said soft tissue defect and/or collagen-containing patch with a sensitizer;

(iii) enclosing said soft tissue defect in said collagen-containing patch to produce a bioactive chamber; and

(iv) adhering said collagen-containing patch to said soft tissue defect without sutures.

2. A sutureless method of repairing ligament defect comprising

(i) providing a collagen-containing patch adapted to enclose at least a portion of said ligament defect, wherein said patch is between 25 μm and 200 μm thick;

(ii) contacting said ligament defect and/or collagen-containing patch with rose bengal;

(iii) enclosing said ligament defect in said collagen-containing patch to produce a bioactive chamber; and

(iv) exposing said collagen-containing patch to light from a laser or light source to adhere same to the ligament defect.

3. A sutureless method according to claim 1 or 2, where the collagen-containing patch is produced by a process comprising:

(i) isolating a collagen-containing tissue and incubating same in an ethanol solution;

(ii) incubating the collagen-containing tissue from step (i) in a first solution comprising an inorganic salt and an anionic surfactant in order to denature non-collagenous proteins contained therein;

(iii) incubating the collagen-containing tissue produced in step (ii) in a second solution comprising an inorganic acid until the collagen in said material is denatured; and

(iv) incubating the collagen-containing tissue produced in step (iii) in a third solution comprising an inorganic acid with simultaneous mechanical stimulation for sufficient time to enable the collagen bundles in said collagen-containing tissue to align;

wherein the mechanical stimulation comprises applying tension cyclically to the collagen-containing tissue.

4. A method according to claim 1, wherein the soft tissue defect is in a soft tissue selected from the group consisting of ligament tissue, tendon tissue, venous tissue, arterial tissue and nerve tunnel tissue.

5. A method according to any one of claims 2 to 4, wherein the ligament defect is in the anterior cruciate ligament (ACL).

6. A method according to claim 1, wherein the sensitizers is selected from the group consisting of acetophenones, benzophenones, naphthalenes, biacetyl, eosine, rose bengal, pyrenes, anthracenes and phenothiazines.

7. A method according to any one of claims 1, 3 to 6, wherein the sensitizer is rose bengal.

8. A method according to any one of claims 1 to 7, wherein the collagen-containing patch comprises greater than 80% type I collagen.

9. A method according to any one of claims 1 to 8, wherein the collagen-containing patch comprises greater than 90% type I collagen.

10. A method according to any one of claims 1 to 9, wherein the collagen-containing patch has maximum tensile load strength greater than 25N.

11. A method according to any one of claims 1 to 10, wherein the collagen-containing patch has a modulus of greater than 100 MPa.

12. A method according to any one of claims 1 to 11, wherein the collagen-containing patch has extension at maximum load of less than 85% of the original length.

13. A method according to any one of claims 1 to 12, wherein the collagen-containing patch is between 25 μm and 200 μm thick.

14. A method according to any one of claims 1 to 12, wherein the collagen-containing patch is about 50 μm thick.

15. A collagen-containing patch for use in the sutureless repair of a soft tissue defect, wherein said patch is between 25 μm and 200 μm thick, comprises greater than 90% type I

collagen, has maximum tensile load strength of greater than 100N, has a modulus of greater than 200 MPa and is capable of enclosing said soft tissue to produce a bioactive chamber.

16. A collagen-containing patch according to claim 15, wherein said patch is produced by:

(i) isolating a collagen-containing tissue and incubating same in an ethanol solution;

(ii) incubating the collagen-containing tissue from step (i) in a first solution comprising an inorganic salt and an anionic surfactant in order to denature non-collagenous proteins contained therein;

(iii) incubating the collagen-containing tissue produced in step (ii) in a second solution comprising an inorganic acid until the collagen in said material is denatured; and

(iv) incubating the collagen-containing tissue produced in step (iii) in a third solution comprising an inorganic acid with simultaneous mechanical stimulation for sufficient time to enable the collagen bundles in said collagen-containing tissue to align;

wherein the mechanical stimulation comprises applying tension cyclically to the collagen-containing tissue.

17. A method of repairing anterior cruciate ligament (ACL) tears, partial or complete, comprising:

(i) providing a collagen-containing patch adapted to enclose at least a portion of said ACL;

(ii) contacting said ACL and/or collagen-containing patch with a sensitizer;

(iii) enclosing said ACL in said collagen-containing patch to produce a bioactive chamber; and

(iv) adhering said collagen-containing patch to said ACL without sutures.

CLAIMS:

1. A sutureless method of repairing a defect in a soft tissue selected from the group consisting of ligament tissue and tendon tissue comprising:

(i) providing a collagen-containing patch adapted to wrap around said soft tissue such that the defect is enclosed, wherein the collagen-containing patch has a modulus of greater than 100 MPa;

(ii) contacting said soft tissue and/or collagen-containing patch with a sensitizer selected from the group consisting of acetophenones, benzophenones, naphthalenes, biacetyl, eosine, rose bengal, pyrenes, anthracenes and phenothiazines;

(iii) wrapping said soft tissue with said collagen-containing patch such that the tissue is enclosed and a bioactive chamber beneath the patch and above the tissue defect is produced; and

(iv) adhering said collagen-containing patch to said soft tissue without sutures by exposing said collagen-containing patch to light from a laser or light source.

2. A sutureless method according to claim 1, where the collagen-containing patch is produced by a process comprising:

(i) isolating a collagen-containing tissue and incubating same in an ethanol solution;

(ii) incubating the collagen-containing tissue from step (i) in a first solution comprising an inorganic salt and an anionic surfactant in order to denature non-collagenous proteins contained therein;

(iii) incubating the collagen-containing tissue produced in step (ii) in a second solution comprising an inorganic acid until the collagen in said material is denatured; and

(iv) incubating the collagen-containing tissue produced in step (iii) in a third solution comprising an inorganic acid with simultaneous mechanical stimulation for sufficient time to enable the collagen bundles in said collagen-containing tissue to align;

wherein the mechanical stimulation comprises applying tension cyclically to the collagen-containing tissue.

3. A method according to claim 1 or 2, wherein the soft tissue is a ligament tissue.

4. A method according to claim 3, wherein the defect in the ligament tissue is an anterior cruciate ligament (ACL) tear or rupture.

5. A method according to any one of claims 1 to 4, wherein the sensitizer is rose bengal.

6. A method according to any one of claims 1 to 5, wherein the collagen-containing patch comprises greater than 80% type I collagen.

7. A method according to any one of claims 1 to 6, wherein the collagen-containing patch comprises greater than 90% type I collagen.

8. A method according to any one of claims 1 to 7, wherein the collagen-containing patch has maximum tensile load strength greater than 25N.

9. A method according to any one of claims 1 to 8, wherein the collagen-containing patch has extension at maximum load of less than 85% of the original length.

10. A method according to any one of claims 1 to 9, wherein the collagen-containing patch is between 25 μm and 200 μm thick.

11. A method according to any one of claims 1 to 9, wherein the collagen-containing patch is about 50 μm thick.

12. A kit for use in a method according to claim 1 comprising:

(i) a collagen-containing patch which is between 25 μm and 200 μm thick, comprises greater than 90% type I collagen, has maximum tensile load strength of greater than 100N, has a modulus of greater than 200 MPa and is adapted to wrap around said soft tissue such that the defect is enclosed and a bioactive chamber beneath the patch and above the tissue defect is produced;

(ii) a sensitizer selected from the group consisting of acetophenones, benzophenones, naphthalenes, biacetyl, eosine, rose bengal, pyrenes, anthracenes and phenothiazines; and

(iii) instructions for use.

13. A kit according to claim 12, wherein said patch is produced by:

(i) isolating a collagen-containing tissue and incubating same in an ethanol solution;

(ii) incubating the collagen-containing tissue from step (i) in a first solution comprising an inorganic salt and an anionic surfactant in order to denature non-collagenous proteins contained therein;

(iii) incubating the collagen-containing tissue produced in step (ii) in a second solution comprising an inorganic acid until the collagen in said material is denatured; and

(iv) incubating the collagen-containing tissue produced in step (iii) in a third solution comprising an inorganic acid with simultaneous mechanical stimulation for sufficient time to enable the collagen bundles in said collagen-containing tissue to align;

wherein the mechanical stimulation comprises applying tension cyclically to the collagen-containing tissue.

14. A method of repairing an anterior cruciate ligament (ACL), comprising:

(i) providing a collagen-containing patch adapted to wrap around said ACL so that the ACL or a portion of said ACL is enclosed and wherein the collagen-containing patch has a modulus of greater than 100 MPa;

(ii) contacting said ACL and/or collagen-containing patch with a sensitizer selected from the group consisting of acetophenones, benzophenones, naphthalenes, biacetyl, eosine, rose bengal, pyrenes, anthracenes and phenothiazines;

(iii) wrapping said ACL with said collagen-containing patch such that the ACL or a portion thereof is enclosed and a bioactive chamber beneath the patch and above the ACL is produced; and

(iv) adhering said collagen-containing patch to said ACL without sutures by exposing said collagen-containing patch to light from a laser or light source.

15. A method according to any one of claims 1 to 11 or 14, wherein the collagen-containing patch is exposed to green light at 532 nm at an irradiance of ~0.5 W/cm^2 for 5 minutes to adhere the patch.