CLAIMS

1. A method of producing cell-free animal collagen comprising the steps of:

   a) growing a plurality of collagen producing animal cells in a cell culture comprising culture medium under conditions inducing collagen synthesis, wherein the conditions inducing collagen synthesis comprise growing the cells in a culture medium comprising at least one agent inducing collagen synthesis, wherein the at least one agent inducing collagen synthesis is selected from the group consisting of iron, insulin, ascorbic acid or a salt thereof, and any combination thereof, and wherein soluble collagen comprising procollagen is secreted to the culture medium;

   b) inhibiting or reducing of the cleavage of at least one propeptide from the procollagen N- terminus, the procollagen C- terminus or from a combination thereof, thereby obtaining a soluble collagen-enriched medium; and

   c) collecting the soluble collagen enriched medium while maintaining the cell culture.

2. The method of claim 1, wherein inhibiting or reducing the cleavage of the at least one propeptide from the procollagen N- or C- terminus comprises supplementing the medium with at least one agent selected from a small molecule, an antibody, a protein, a peptide and an siRNA.

3. The method of claim 2, wherein the at least one agent inhibits or reduces the activity of at least one procollagen peptidase.

4. The method of claim 3, wherein the at least one agent is a matrix metalloprotease (MMP) inhibitor.

5. The method of claim 4, wherein the MMP inhibitor is selected from the group consisting of GM6001, TIMP3, Batimastat (BB-94), Actinonin, UK 383367 and any combination thereof.

6. The method of claim 1, wherein collecting the soluble collagen enriched medium is performed by continuously or intermittently removing the soluble collagen enriched medium.

7. The method of claim 1, wherein said method further comprising furnishing the cell

culture with a collagen-free culture medium comprising at least one agent inhibiting the cleavage of at least one propeptide from procollagen N- or C- terminus and at least one agent inducing collagen synthesis by the cells.

8. The method of claim 7, wherein the collagen-free culture medium further comprises at least one agent inhibiting crosslinking of soluble collagen secreted to the medium.

9. The method of claim 1, wherein at least one of the cells are genetically modified to:

(1) enhance collagen synthesis, and/or enhance collagen secretion, and/or inhibit collagen crosslinking; and/or

(2) inhibit or reduce the cleavage of at least one propeptide from the procollagen N- or C- terminus; and/or

(3) have reduced activity and/or expression of at least one procollagen peptidase; and/or

(4) to reduce the expression and/or activity of at least one Lysyl oxidase (LOX); and/or

(5) have enhanced expression and/or activity of at least one protein selected from the group consisting of COL1A1, COL1A2, COL3A1, and any combination thereof; and/or

(6) have increased expression and/or activity of lysyl hydroxylase (LH) and/or of Prolyl hydroxylase (PH); and/or

(7) alter the expression of at least one gene involved in the feedback inhibition of collagen synthesis.

10. The method of claim 1, wherein said method further comprises a step of genetically modifying the cells to increase collagen production, and/or increase collagen secretion, and/or reduce the cleavage of a propeptide from the procollagen N- or C- terminus and/or reduce collagen crosslinking.

11. The method of claim 1, wherein the cells are non- genetically modified cells.

12. The method of claim 1, wherein said method further comprising a step of inhibiting crosslinking of the soluble collagen within the soluble collagen-enriched culture medium.

13. The method of claim 12, wherein inhibiting crosslinking of the soluble collagen comprises at least one of depleting copper ions from the culture medium; replacing the medium with a cooper-free medium; and supplementing the medium with at least one lysyl oxidase inhibitor.

14. The method of claim 1, wherein the cell culture is maintained for a production cycle of at least 5 days.

15. The method of claim 1, wherein said method results in cell-free animal soluble collagen production of at least 100, at least 200, at least 300, at least 400, at least 500 or at least 600 $\mu g/10^6$ cells per production cycle.

16. The method of claim 1, wherein the soluble-collagen enriched medium further comprises at least one additional ECM component.

17. The method of claim 1, said method further comprises subjecting the soluble collagen in the collected soluble-collagen enriched medium or a soluble collagen obtained therefrom to (1) conditions enabling said soluble collagen assembly to collagen fibrils; or (2) conditions enabling said soluble collagen assembly to collagen fibrils and crosslinking the collagen fibrils to form collagen fibers.

18. The method of claim 17, wherein said method further comprising forming a textile from the collagen fibrils and/or collagen fibers.