What is Claimed:

1. A method of chemical conjugation comprising:
    a. contacting a lysosomal enzyme with a first crosslinking agent to introduce aldehyde groups;

    b. contacting a lysosomal targeting peptide with a second crosslinking agent to introduce a hydrazide group at the N-terminal residue;

    c. contacting the lysosomal enzyme with aldehyde groups of step a. with the lysosomal targeting peptide with a hydrazide group at the N-terminal residue of step b; and

    d. forming a lysosomal enzyme-lysosomal targeting peptide conjugate.

2. The method of claim 1 wherein the lysosomal targeting peptide comprises variant insulin-like growth factor 2 (vIGF2).

3. The method of any of the preceding claims wherein the first crosslinking agent comprises N-succinimidyl-4-formylbenzamide (S-4FB).

4. The method of any of the preceding claims wherein the second crosslinking agent comprises N-tert-butoxycarbonyl (tBoc)-protected hydrazide crosslinker (NHS-PEG4-tBoc-hydrazide).

5. The method of any claims 1-3 wherein the second crosslinking agent comprises acetone-, dimethoxybenzyloxycarbonyl-, trimethoxybenzyloxycarbonyl- protected hydrazide groups, or any combination thereof.

6. The method of any of claims 1-3 or 5 wherein the second crosslinking agent comprises Acetone-protected NHS-PEG_4-hydrazide, Dimethylbenzylcarbonyl-protected NHS-

PEG_4-hydrazide, Trimethoxybenzyloxycarbonyl-protected NHS-PEG_4-hydrazide, or any combination thereof.

7. The method of any of the preceding claims wherein the lysosomal enzyme comprises acid α-glucosidase (rhGAA), acid α-galactosidase A (GLA), acid β-glucuronidase (GUS), acid α-iduronidase A (IduA), acid iduronidate 2-sulfatase (I2S), β-hexosaminidase A (HexA), β-hexosaminidase B (HexB), acid α-mannosidase A, β-glucocerebrosidase (GlcCerase), acid lipase (LPA), or any combination thereof.

8. The method of any of the preceding claims wherein the lysosomal enzyme is human.

9. The method of any of the preceding claims wherein the lysosomal targeting peptide with a hydrazide group at the N-terminal residue is added in step c. at about four-fold molar excess.

10. The method of any of the preceding claims wherein aniline is added in step c.

11. A bifunctional crosslinker comprising acetone-, dimethoxybenzyloxycarbonyl-, trimethoxybenzyloxycarbonyl- protected hydrazide groups, or any combination thereof.

12. The bifunctional crosslinker of claim 11 wherein the bifunctional crosslinker comprises Acetone-protected NHS-PEG_4-hydrazide, Dimethylbenzylcarbonyl-protected NHS-PEG_4-hydrazide, Trimethoxybenzyloxycarbonyl-protected NHS-PEG_4-hydrazide, or any combination thereof.

13. A modified lysosomal targeting peptide comprising a protected hydrazide group.

14. The modified lysosomal targeting peptide of claim 13 wherein the modified lysosomal targeting peptide comprises modified vIGF2 peptide.

15. The modified lysosomal targeting peptide of claims 13 or 14 wherein the hydrazide group is protected by acetone-, dimethoxybenzyloxycarbonyl-, trimethoxybenzyloxycarbonyl-groups, or any combination thereof.

16. A method of making a modified lysosomal targeting peptide, comprising: contacting a lysosomal targeting peptide with a crosslinking agent to introduce a hydrazide group at the N-terminal residue.

17. The method of claim 16 wherein the lysosomal targeting peptide is vIGF2,

18. The method of claims 16 or 17 wherein the crosslinking agent comprises N-tert-butoxycarbonyl (tBoc)-protected hydrazide crosslinker (NHS-PEG4-tBoc-hydrazide).

19. The method of claims 16 or 17 wherein the crosslinking agent comprises acetone-, dimethoxybenzyloxycarbonyl-, trimethoxybenzyloxycarbonyl- protected hydrazide groups, or any combination thereof.

20. The method of any of claims 16, 17 or 19 wherein the crosslinking agent comprises Acetone-protected NHS-PEG_4-hydrazide, Dimethylbenzylcarbonyl-protected NHS-PEG_4-hydrazide, Trimethoxybenzyloxycarbonyl-protected NHS-PEG_4-hydrazide, or any combination thereof.

21. The method of claims 16-20 further comprising deprotecting the protected hydrazide groups of the modified lysosomal targeting peptide.

22. A method of linking one or more lysosomal targeting peptides to a lysosomal enzyme comprising:

    a. deprotecting a hydrazide-modified lysosomal targeting peptide in solution to form a deprotected hydrazide-modified lysosomal targeting peptide;

    b. and linking at least one deprotected hydrazine modified lysosomal targeting peptide to a lysosomal enzyme.

23. The method of claim 22 wherein the lysosomal targeting peptide is vIGF2.

24. The method according to claims 22 or 23 wherein the lysosomal enzyme comprises acid α-glucosidase (rhGAA), acid α-galactosidase A (GLA), acid β-glucuronidase (GUS), acid α-iduronidase A (IduA), acid iduronidate 2-sulfatase (I2S), β-hexosaminidase A

(HexA), β-hexosaminidase B (HexB), acid α-mannosidase A, β-glucocerebrosidase (GlcCerase), acid lipase (LPA), or any combination thereof.

25. A lysosomal enzyme-lysosomal targeting peptide conjugate, comprising: a lysosomal enzyme crosslinked to one or more lysosomal targeting peptides via one or more bifunctional crosslinkers.

26. The conjugate of claim 25 wherein the bifunctional crosslinkers comprise Acetone-protected NHS-PEG_4-hydrazide, Dimethylbenzylcarbonyl-protected NHS-PEG_4-hydrazide, Trimethoxybenzyloxycarbonyl-protected NHS-PEG_4-hydrazide, N-succinimidyl-4-formylbenzamide (S-4FB), or any combination thereof.

27. The conjugate of claims 25 or 26 wherein the lysosomal enzyme comprises acid α-glucosidase (rhGAA), acid α-galactosidase A (GLA), acid β-glucuronidase (GUS), acid α-iduronidase A (IduA), acid iduronidate 2-sulfatase (I2S), β-hexosaminidase A (HexA), β-hexosaminidase B (HexB), acid α-mannosidase A, β-glucocerebrosidase (GlcCerase), acid lipase (LPA), or any combination thereof.

28. The conjugate of any of claims 25-27 wherein the lysosomal targeting peptide comprises vIGF2.