(a) an erythropoietin peptide portion having a cysteine residue proximate to a C terminal thereof, wherein said peptide portion has erythropoietic activity; and

(b) a Fc fragment comprising a hinge region, wherein an N terminal of said Fc fragment is directly linked to said C terminal of said erythropoietin peptide portion and wherein said hinge region has a mutation whereby a cysteine residue located proximate said N terminal is replaced with a non-cysteine residue, wherein said protein comprises the amino acid sequence present in SEQ ID NO: 2 or a sequence having at least 90% sequence identity thereto and wherein said protein has an *in vivo* half-life and erythropoietic potency at least equal to native human erythropoietin.

37. An isolated fusion protein having a prolonged half-life *in vivo* in comparison to native human erythropoietin and an erythropoietic potency at least equal to said native human erythropoietin comprising:

(a) an erythropoietin peptide portion having a cysteine residue proximate to a C terminal thereof, wherein said peptide portion has erythropoietic activity ; and

(b) a Fc fragment comprising a hinge region, wherein an N terminal of said Fc fragment is directly linked to said C terminal of said erythropoietin peptide portion and wherein said hinge region has a mutation whereby a cysteine residue located proximate said N terminal is replaced with a non-cysteine residue, whereby the first cysteine residue of said hinge region located nearest said N terminal is spaced at least 12 amino acids apart from said cysteine residue of said erythropoietin peptide portion, wherein said protein comprises the amino acid sequence present in SEQ ID NO: 2 or a sequence having at least 98% sequence identity thereto.

38. A fusion protein having an *in vivo* half-life and erythropoietic potency at least equal to native human erythropoietin comprising:

(a) an erythropoietin peptide portion having erythropoietic activity; and

(b) an immunoglobulin peptide portion linked to said erythropoietin peptide portion and comprising a hinge region having a non-naturally occurring amino acid sequence, wherein said hinge region comprises a mutation whereby a cysteine residue located nearest to the N-terminal of hinge region is replaced by a non-cysteine residue.

39. The fusion protein as defined in claim 38, wherein said mutation is at a location corresponding to amino acid residue 172 of SEQ ID NO: 2.

40. The fusion protein of claim 39, wherein said protein has an amino acid sequence at least 98% identical to SEQ ID NO:2 and includes said mutation.

41. The fusion protein as defined in claim 39, wherein said protein comprises the sequence set forth in SEQ ID NO: 2.

42. A pharmaceutical composition comprising a protein as defined in claim 28 together with a pharmaceutically acceptable carrier, adjuvant or diluent.

43. A pharmaceutical composition comprising a protein as defined in claim 38 together with a pharmaceutically acceptable carrier, adjuvant or diluent.

44. A fusion protein having a prolonged half-life *in vivo* in comparison to naturally occurring or recombinant native human erythropoietin comprising:

(a) a naturally occurring human erythropoietin molecule; and

(b) a human IgG Fc fragment comprising a hinge region, wherein an N terminal of said Fc fragment is coupled to said C terminal of said erythropoietin molecule

without the interposition of a peptide linker and wherein said hinge region comprises a mutation whereby a cysteine residue of said hinge region located nearest said N terminal is replaced with a non-cysteine residue.

45. The fusion protein as defined in claim 44, wherein said protein has the amino acid sequence present in SEQ ID NO. 2 or a sequence having 98% sequence identity thereto and including said mutation.

46. A pharmaceutical composition comprising a protein as defined in claim 44 together with a pharmaceutically acceptable carrier, adjuvant or diluent.

47. A fusion protein having a prolonged half-life *in vivo* in comparison to naturally occurring or recombinant native human erythropoietin comprising:

(a) a erythropoietin peptide portion; and

(b) a fragment of a human immunoglobulin molecule whose N terminal is linked to a C terminal of said erythropoietin peptide portion, said fragment comprising a hinge region having a mutation whereby a cysteine amino acid of said hinge region nearest to said N terminal is replaced by a non-cysteine amino acid, wherein said mutation is located at a position corresponding to residue 172 of SEQ ID NO:2.

48. The fusion protein as defined in claim 47, wherein said erythropoietin peptide portion is a naturally occurring human erythropoietin molecule.

49. The fusion protein as defined in claim 47, wherein said fragment of a human immunoglobulin molecule comprises the amino acid sequence set forth in residues 167-399 of SEQ ID NO:2

50. An isolated fusion protein comprising:

(a) an erythropoietin peptide portion having a cysteine residue proximate to a C terminal thereof; and

(b) a Fc fragment comprising a hinge region, wherein an N terminal of said Fc fragment is joined to said C terminal of said erythropoietin peptide portion without the interposition of a peptide linker and wherein said hinge region has a mutation whereby a cysteine residue located proximate said N terminal is replaced with a non-cysteine residue, wherein said protein comprises the amino acid sequence present in SEQ ID NO:2 or a sequence having at least 90% sequence identity thereto and having said mutation, wherein said protein has an *in vivo* half-life and erythropoietic potency at least equal to native human erythropoietin.

51. An isolated fusion protein comprising:

(a) an erythropoietin peptide portion having a cysteine residue proximate to a C terminal thereof; and

(b) a Fc fragment comprising a hinge region, wherein an N terminal of said Fc fragment is joined to said C terminal of said erythropoietin peptide portion without the interposition of a peptide linker and wherein said hinge region has a mutation whereby a cysteine residue located proximate said N terminal is replaced with a non-cysteine residue, whereby the first cysteine residue of said hinge region located nearest said N terminal is spaced at least 12 amino acids apart from said cysteine residue of said erythropoietin peptide portion, wherein said protein comprises the amino acid sequence present in SEQ ID NO:2 or a sequence having at least 90% sequence identity thereto and having said mutation wherein said protein has an *in vivo* half-life and erythropoietic potency at least equal to native human erythropoietin.

52. A fusion protein having a prolonged half-life *in vivo* in comparison to naturally occurring or recombinant native human erythropoietin comprising:

(a) a naturally occurring human erythropoietin molecule having a cysteine residue proximate to a C terminal thereof; and

(b) a human IgG1 Fc fragment comprising a hinge region, and CH2 and CH3 domains, wherein an N terminal of the Fc fragment is joined to said C terminal of said erythropoietin molecule without the interposition of a peptide linker and wherein said Fc fragment has a single amino acid replacement replacing the cysteine residue located nearest said erythropoietin molecule with a non-cysteine residue, whereby the first cysteine residue of said hinge region located nearest said N terminal is spaced at least 12 amino acids apart from said cysteine residue of said erythropoietin molecule.

53. A fusion protein having a prolonged half-life *in vivo* in comparison to naturally occurring or recombinant native human erythropoietin comprising:

(a) an erythropoietin peptide portion having a cysteine residue proximate the C terminal thereof, wherein said peptide portion is joined without the interposition of a peptide linker to

(b) a human IgG1 Fc fragment comprising a hinge region and CH2 and CH3 domains, wherein said hinge region has

(i) the amino acid sequence VEPKSGDKTSTCPPCP or

(ii) a sequence having at least 90% sequence identity thereto and having a non-cysteine residue at amino acid 6 measured from the N terminal of said hinge region,

whereby the cysteine residue of said hinge region located nearest said erythropoietin peptide portion is spaced at least 12 amino acids apart from said cysteine residue of said erythropoietin peptide portion.