CLAIMS

I claim:

1. A zinc(II) polymer conjugate complex comprising:

a polymer backbone comprising polyglutamic acid, which comprises glutamic acid monomer units joined by peptide bonds;

a plurality of first receptor-targeting moieties, each covalently bonded to and pendant from a monomer unit in the polymer backbone via a first linker moiety;

a plurality of ionophores, each covalently bonded to and pendant from a monomer unit in the polymer backbone via a cleavable linker moiety; and

zinc(II) complexed to a carboxylate moiety of a glutamic acid monomer unit in the polymer backbone.

2. The zinc(II) polymer conjugate complex of claim 1, further comprising:

a plurality of second receptor-targeting moieties, each covalently bonded to and pendant from a monomer unit in the polymer backbone via a second linker moiety.

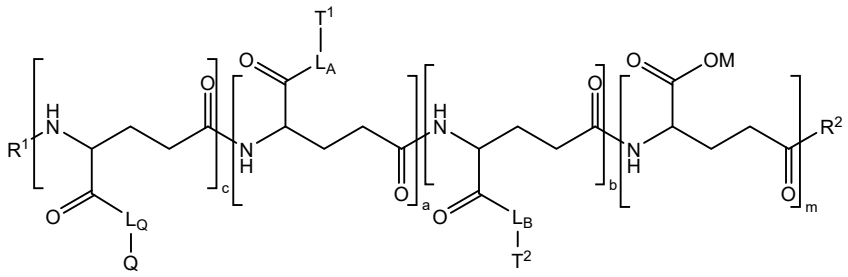
3. The zinc(II) polymer conjugate complex of claim 1 or 2, further comprising:

a plurality of labeling moieties, each covalently bonded to and pendant from a monomer unit in the polymer backbone via a label-linker moiety.

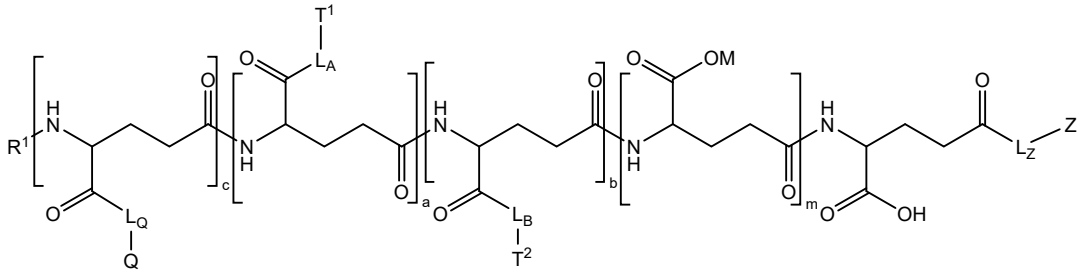
4. The zinc(II) polymer conjugate complex of claims 1, 2 or 3, wherein the weight-to-weight ratio of zinc(II) to the polymer conjugate is in the range of 1:5 to 1:20.

5. The zinc(II) polymer conjugate complex of claims 1, 2 or 3, wherein the number of zinc(II) ions per polymer conjugate on average is at least 20.

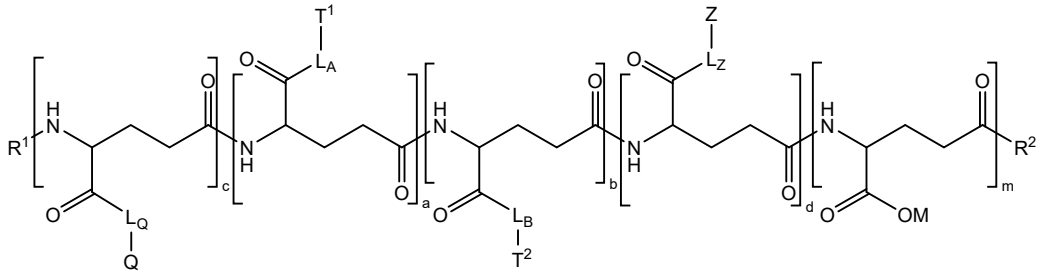
6. A zinc(II) polymer conjugate complex comprising: a polymer conjugate according to Formula IV, V, or VI:



(IV)



(V)



(VI)

wherein:

R^1 is H;

R^2 is OH or OM or L_A-T^1 or L_B-T^2 or L_Q-Q;

L_A is a bond or bifunctional linking group having a first terminal site bonded to the polymer and a second terminal site bonded to T^1,

wherein the first terminal site and the second terminal site are connected through a chain of 3 to 20 atoms;

L_B is a bond or bifunctional linking group having a first terminal site bonded to the polymer and a second terminal site bonded to T^2, wherein the first terminal site and the second terminal site are connected through a chain of 3 to 20 atoms;

L_Q is bifunctional linking group having a first terminal site bonded to the polymer and a cleavable terminal site bonded to Q, wherein the first terminal site and the cleavable terminal site are connected through a chain of 3 to 20 atoms;

L_Z, when present, is a bond or bifunctional linking group having a first terminal site bonded to the polymer and a second terminal site bonded to Z, wherein the first terminal site and the second terminal site are connected through a chain of 3 to 20 atoms;

T^1 is a first targeting moiety;

T^2 is a second targeting moiety;

Q is an ionophore moiety;

Z, when present, is fluorophore moiety;

each instance of M is independently H, a proton, an alkali ion; a pharmaceutically acceptable monovalent cation, or absent;

a and b are zero or a finite number up to about 5, but a and b are not both zero;

c is a finite number in the range from about 3 to about 50;

d is, when present, approximately 1; and

m is a finite number in the range from about 50 to about 700; and

zinc(II) complexed to a carboxylate moiety of a glutamic acid monomer unit in the polymer conjugate.

7. A pharmaceutical composition comprising a zinc(II) polymer conjugate complex according to claim 6 and a pharmaceutically-acceptable diluent, carrier, buffer, vehicle, or any combination thereof.

8. The pharmaceutical composition of claim 7, wherein the pharmaceutical composition is formulated for parenteral administration.

9. The pharmaceutical composition of claim 8, wherein the weight-to-weight ratio of zinc(II) to the polymer conjugate is in the range of 1:5 to 1:20.

10. The pharmaceutical composition of claim 8, wherein the number of zinc(II) ions per polymer conjugate on average is at least 20.

11. Use of the pharmaceutical composition according to any one of claims 7 to 10 in the manufacture of a medicament for treating a tumor in a patient; wherein a therapeutically effective amount of the pharmaceutical composition is to be administered to the patient.

12. Use of the pharmaceutical composition according to any one of claims 7 to 10 in the manufacture of a medicament for inducing parthanatos in a tumor in a patient; wherein a therapeutically effective amount of the pharmaceutical composition is to be administered to the patient.

13. The pharmaceutical composition according to any one of claims 7 to 10 for use as a medicament.