

CLAIMS

1. An in vitro method for detecting the presence of neutralizing antibodies to PTH or PTHrP in a sample, the method comprising:
 - obtaining the sample from a subject;
 - contacting the sample with a population of cells or a cell, wherein the cell or cells comprise a receptor for PTH or PTHrP;
 - measuring cyclic adenosine monophosphate (cAMP) levels; and
 - detecting the presence of neutralizing antibodies when cAMP levels are reduced relative to a negative control sample without neutralizing antibodies.
2. The method of claim 1, wherein the measuring cAMP levels is performed by a competitive immunoassay.
3. The method of claim 2, wherein the competitive immunoassay is an electrochemiluminescent detection method.
4. The method of any one of claims 1 to 3, wherein the contacting step comprises incubating the cell or cells with the serum sample.
5. The method of any one of claims 1 to 4, wherein the method further comprises preincubation of the serum sample with a predetermined amount of PTH or PTHrP analog prior to the contacting step.
6. The method of claim 5, wherein the preincubation is for a period of at least 30 minutes.
7. The method of any one of claims 1 to 6, wherein the cell or cells are lysed prior to the measuring step.
8. The method of any one of claims 1 to 7, further comprising incubation of the cell or cells with a cell permeable cAMP-specific phosphodiesterase inhibitor prior to the contacting step.
9. The method of claims 8, wherein the cAMP-specific phosphodiesterase inhibitor is 4-(3-Butoxy-4-methoxybenzyl)-2-imidazolidinone.

10. The method of any one of claims 1-9, wherein the measuring cAMP levels is performed using the Mesoscale Discovery Multi-Array 96-well cAMP Plate.
11. The method of claim 1, wherein the predetermined amount of PTH or PTHrP analog is at least 100, 200, 300, 400, or 500 pg/mL.
12. The method of claim 1, wherein the predetermined amount of PTH is about 500 pg/mL.
13. The method of claim 1, wherein the predetermined amount of PTHrP analog is about 600 pg/mL.
14. The method of claim 1, wherein the cell or cells are rat epithelial cell line UMR-106.
15. The method of claim 14, further comprising serum-starving the UMR-106 cell or cells for a period of time prior to the contacting step.
16. The method of claim 15, wherein the period of time ranges from about 4 hours to about 48 hours, about 4 hours to about 24 hours, about 4 hours to about 16 hours, about 4 hours to about 12 hours, or about 6 hours to about 12 hours.
17. The method of any one of claims 1-16, wherein the sample is a human sample.
18. The method of claim 17, wherein the human sample is a human serum sample.
19. The method of claim 18, wherein the sample is from the subject treated with a PTHrP analog.
20. The method of claim 19, wherein the PTHrP analog is Abaloparatide.
21. The method of claim 19, wherein the PTHrP analog is Teriparatide.
22. A method of detecting the presence of neutralizing antibodies after Abaloparatide treatment, the method comprising:

obtaining a serum sample from a subject treated with Abaloparatide;
contacting the serum sample with a cell or population of cells, wherein the cell or cells comprise a receptor for PTH or PTHrP;
measuring cyclic adenosine monophosphate (cAMP) levels; and
detecting the presence of neutralizing antibodies when cAMP levels are reduced relative to a negative control sample without neutralizing antibodies.

23. The method of claim 22, further comprising discontinuing treatment when neutralizing antibodies are detected in the serum sample.

24. A kit for carrying out the method of any one of claims 1 or 22 comprising components required to carry out the obtaining, contacting, measuring and detecting steps and instructions for use.