CLAIMS

1. An isolated antibody or antigen-binding fragment thereof that binds specifically to human GFRα3, wherein the antibody comprises the three heavy chain CDRs (HCDR1, HCDR2 and HCDR3) and the three light chain CDRs (LCDR1, LCDR2 and LCDR3) contained within a HCVR/LCVR amino acid sequence pair selected from the group consisting of SEQ ID NOs : 2/10, 18/26, 34/42, 50/58, 66/74, 82/90, 98/106, 114/122, 130/138, 146/154, 162/170, 178/186, 194/202, 210/218, 226/234, 242/250, 258/266, 274/282, 290/298, 306/314, 322/330, 338/346, 354/362, 381/389 and 397/405.

2. The isolated antibody or antigen-binding fragment of claim 1, comprising a HCVR/LCVR amino acid sequence pair selected from the group consisting of SEQ ID NOs: 2/10, 18/26, 34/42, 50/58, 66/74, 82/90, 98/106, 114/122, 130/138, 146/154, 162/170, 178/186, 194/202, 210/218, 226/234, 242/250, 258/266, 274/282, 290/298, 306/314, 322/330, 338/346, 354/362, 381/389 and 397/405.

3. The isolated antibody or antigen-binding fragment of claim 2, comprising a HCVR/LCVR amino acid sequence pair selected from the group consisting of SEQ ID NO: 50/58, 146/154, 210/218 and 290/298.

4. The isolated monoclonal antibody or an antigen-binding fragment thereof of any one of the preceding claims, having one or more of the following characteristics:

(i) exhibits a K_D ranging from about 10^{-8} M to about 10^{-13} M as measured by surface plasmon resonance;

(ii) demonstrates the ability to block about 50-100% of the binding of GFRα3 to its ligand, artemin, with an IC_{50} value ranging from about 40 pM to about 15 nM;

(iii) demonstrates the ability to block about 20% to about 100% of the binding of GFRα3 to a solid support coated with a mixture of artemin and RET;

(iv) blocks or inhibits artemin-dependent activation of RET with an IC_{50} ranging from about 200 pM to about 50 nM;

(v) inhibits or reduces one or more nociceptive responses in an *in vivo* model of bone cancer pain;

(vi) inhibits or reduces artemin-sensitized thermal hyperalgesia *in vivo*;

(vii) inhibits or reduces allodynia in an *in vivo* model of osteoarthritis; or

(viii) does not cross-react with other GFR co-receptors for RET.

5. The isolated monoclonal antibody or an antigen-binding fragment thereof of any one of the preceding claims, wherein:

(a) the antibody is selected from the group consisting of a chimeric antibody and a human antibody, and/or;

(b) wherein the antibody does not cross-react with human GFRα1 or human GFRα2, and/or;

(c) wherein the antibody is a human monoclonal antibody comprising (a) a heavy chain variable region (HCVR) having an amino acid sequence selected from the group consisting of SEQ ID NO: 2, 18, 34, 50, 66, 82, 98, 114, 130, 146, 162, 178, 194, 210, 226, 242, 258, 274, 290, 306, 322, 338, 354, 381 and 397 and (b) a light chain variable region (LCVR) having an amino acid sequence selected from the group consisting of SEQ ID NOs : 10, 26, 42, 58, 74, 90, 106, 122, 138, 154, 170, 186, 202, 218, 234, 250, 266, 282, 298, 314, 330, 346, 362, 389 and 405.

6. The isolated monoclonal antibody or an antigen-binding fragment thereof of any one of the preceding claims, wherein:

(a) the antibody demonstrates the ability to block about 50-95% of the binding of human GFRα3 to its ligand, artemin, with an IC_{50} value ranging from about 40 pM to about 750 pM;

(b) the antibody or the antigen-binding fragment thereof blocks about 75-100% of the binding of human GFRα3 to its ligand, artemin, with an IC_{50} value ranging from about 400 pM to about 15 nM;

(c) the antibody or the antigen-binding fragment thereof blocks or inhibits artemin-dependent activation of human RET with an IC_{50} ranging from about 300 pM to about 5 nM; or

(d) the antibody or the antigen-binding fragment thereof blocks or inhibits artemin-dependent activation of cynomolgus RET with an IC_{50} ranging from about 0.7 nM to about 2.5 nM.

7. An isolated nucleic acid molecule encoding the antibody or antigen-binding fragment of any of claims 1-6.

8. An expression vector comprising the nucleic acid molecule of claim 7.

9. A method of producing an anti-GFRα3 antibody or antigen-binding fragment thereof comprising the steps of introducing the expression vector of claim 8 into an isolated host cell, growing the cell under conditions permitting production of the antibody or fragment thereof, and recovering the antibody so produced.

10. A pharmaceutical composition comprising the antibody or antigen-binding fragment thereof according to any one of claims 1-6 and a pharmaceutically acceptable carrier or diluent.

11. A pharmaceutical composition comprising an antibody or antigen-binding fragment thereof according to any one of claims 1-6 and a second therapeutic agent selected from the group consisting of an opioid, a COX-2 inhibitor, a local anesthetic, an NMDA modulator, a cannabinoid receptor agonist, a P2X family modulator, a VR1 antagonist, a substance P antagonist, a second GFRα3 antagonist, a cytokine or cytokine receptor antagonist, a nerve growth factor (NGF) inhibitor (a small molecular inhibitor or an anti-NGF antibody), an inhibitor of BDNF, TrkA, TrkB or p75, aspirin, a NSAID, a steroid, morphine, a selective serotonin reuptake inhibitor (SSRI), a serotonin norepinephrine reuptake inhibitor (SNRI), a tricyclic, an inhibitor of a voltage-gated sodium channel (Na_v), a calcium channel inhibitor, a potassium channel inhibitor, a tumor necrosis factor (TNF) or TNF receptor inhibitor, an inhibitor of TWEAK (TNF-related WEAK inducer of apoptosis), a RET inhibitor, an inhibitor of a GDNF family ligand, an inhibitor of GFRα1, GFRα2 or GFRα4, an inhibitor of an acid sensing ion channel (ASIC1 or ASIC3), an anti-convulsant (gabapentin or pregabalin), an inhibitor of a prekineticin receptor (PROK1 and PROK2), a caspase inhibitor, a p38 inhibitor, an IKK1/2 inhibitor, CTLA-4Ig and a corticosteroid; and a pharmaceutically acceptable carrier or diluent;

optionally wherein the second GFRα3 antagonist is a small organic molecule, a polypeptide antagonist, a second antibody specific for GFRα3, a siRNA or an antisense molecule specific for GFRα3; or wherein the cytokine or cytokine receptor antagonist is an interleukin-1 (IL-1) antagonist, an IL-6 antagonist, or an IL-18 antagonist.

12. The isolated antibody or antigen-binding fragment of claim 1, comprising an HCDR1 amino acid sequence of SEQ ID NO: 148; an HCDR2 amino acid sequence of SEQ ID NO: 150; an HCDR3 amino acid sequence of SEQ ID NO: 152; an LCDR1 amino acid sequence of SEQ ID NO: 156; an LCDR2 amino acid sequence of SEQ ID NO: 158; and an LCDR3 amino acid sequence of SEQ ID NO: 160.