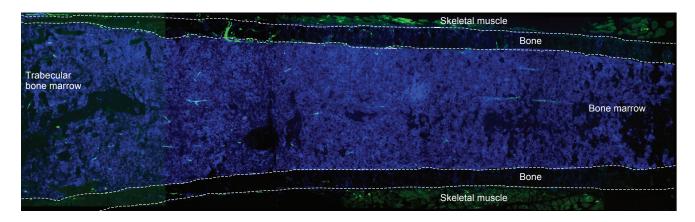
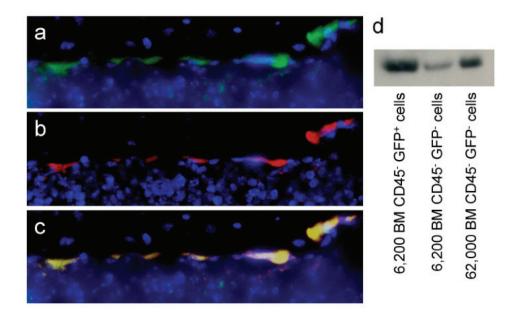
doi: 10.1038/nature09262 nature

SUPPLEMENTARY INFORMATION

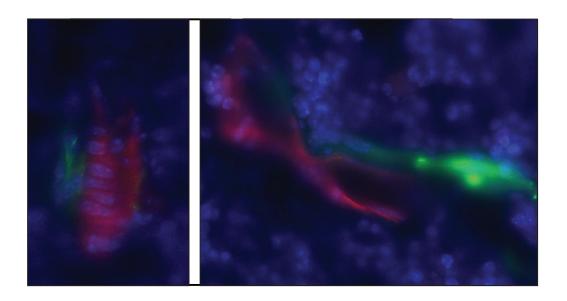


Supplementary Figure 1. **Distribution of GFP**⁺ **cells in the bone marrow of Nes-***Gfp* **transgenic mice**. Composite images at low magnification showing the distribution and low frequency of GFP cells in the bone marrow of adult *Nes-Gfp* transgenic mice. Haematopoietic lineages (blue) have been identified with anti-Ter119, -Gr-1, -CD3e, -B220, -Mac-1 and -CD48 antibodies. Bone margins are indicated with dashed lines.

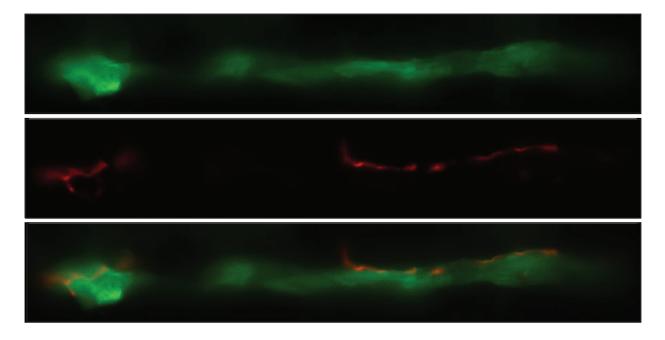


Supplementary Figure 2. Expression of GFP in Nes-Gfp transgenic mice correlates with enriched expression of endogenous nestin.

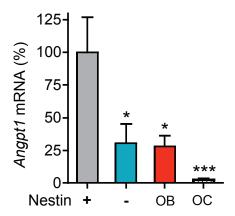
a-c, Immunohistochemistry of a femoral section from *Nes-Gfp* transgenic mice showing GFP⁺ cells (**a**, green), distributed along the endosteum, that also stained positive using a polyclonal rabbit antinestin antibody (LifeSpan Biosciences) detected using the TSA amplification system (Perkin Elmer; **b**, red). **c**, Merged image. **a-c**, Nuclei have been stained with DAPI (blue). **d**, Representative Western blot (n = 4 mice) performed in lysates from sorted CD45⁻ GFP⁺ and CD45⁻ GFP⁻ cells using a monoclonal anti-nestin antibody (clone Rat-401, Millipore). Immunoreactive proteins of molecular weight consistent with nestin are enriched in bone marrow (BM) CD45⁻ GFP⁺ cells when compared to the same or a 10-fold higher number of CD45⁻ GFP⁻ cells.



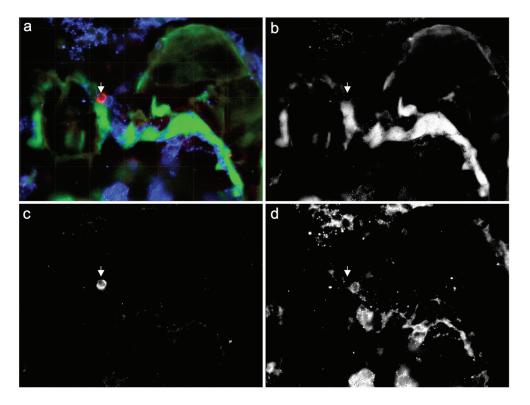
Supplementary Figure 3. Illustrative movies from Z-stacks showing the peri-vascular distribution of bone marrow Nes:GFP $^+$ cells. Movies from \sim 10 μ m Z-stacks showing fluorescent signals from GFP (green), vascular endothelial cells immunostained with a biotinylated rat anti-CD31/PECAM monoclonal antibody (clone MEC13.3, BD Pharmingen) detected with the TSA amplification system (Perkin Elmer, red) and nuclei counterstained with DAPI (blue). Note how the shape of Nes:GFP $^+$ cells closely follows the contour of vascular endothelial cells (please click using Adobe® Acrobat® hand tool to play movies).



Supplementary Figure 4. Illustrative movies from Z-stacks showing the close association between catecholaminergic nerve fibres and Nes:GFP $^+$ cells in the bone marrow. Movies from \sim 10 μ m Z-stack shown in Fig. 1e (main paper) containing GFP fluorescence (upper panel, green), catecholaminergic nerve fibres immunostained with anti-tyrosine hydroxylase antibodies (middle panel, red) and merged fluorescence (lower panel).

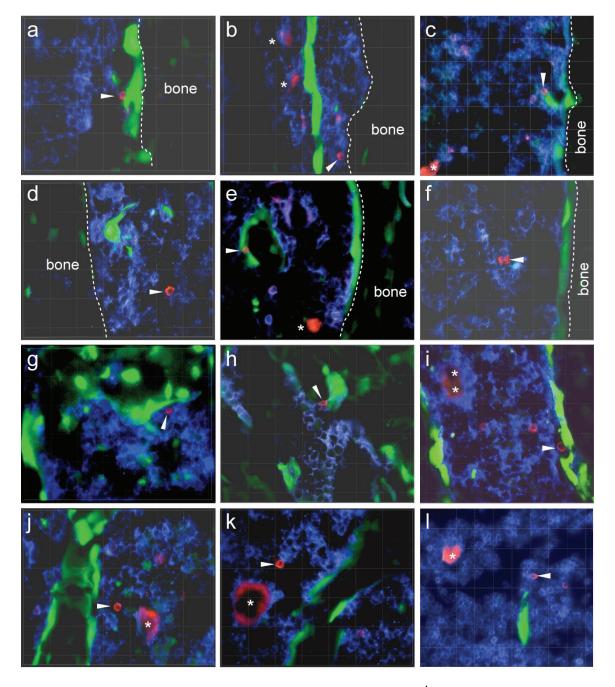


Supplementary Figure 5. Expression of *Angiopoietin-1* is significantly higher in CD45⁻ Nes:GFP⁺ cells than in other bone marrow stromal cells. Expression of *Angiopoietin-1* (*Angpt1*) was 3-4-fold higher in CD45⁻ GFP⁺ cells than in CD45⁻ GFP⁻ cells (sorted from the bone marrow of *Nes-Gfp* transgenic mice) and primary osteoblasts (OB), and > 40-fold higher than in primary osteoclasts (OC). Quantitative real-time RT-PCR. * p < 0.05; *** p < 0.001; unpaired two-tailed t test; n = 3-10. Error bars indicate SEM.



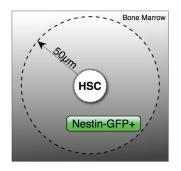
Supplementary Figure 6. Validation of HSC immunostaining.

Fig. 1j of the main paper (a) has been split here to show individual fluorescent signals from (b) GFP, (c) CD150, (d) CD48 and haematopoietic lineage markers to demonstrate that CD150⁺ HSCs identified in our study (arrow points towards an example) were negative for CD48 and haematopoietic lineage markers.



Supplementary Figure 7. HSCs are localized near Nes:GFP $^+$ cells in the bone marrow. Immunostaining for CD150 (red), CD48 and haematopoietic lineage markers (blue) in femoral sections of Nes-Gfp transgenic mice. Examples of CD150 $^+$ CD48 $^-$ Lin $^-$ HSCs are indicated by arrowheads. HSCs were frequently localized (a, c) adjacent or (b, d) close to Nes:GFP $^+$ cells near the endosteum, and mostly (e, g-i) in direct contact with or (j-I) near Nes:GFP $^+$ cells surrounding blood vessels. Asterisks indicate CD150 $^+$ Lin / CD48 $^+$ megakaryocytes, that can be identified by their large size and characteristic CD150 staining pattern. Grid, 50 μ m.

In the histological studies performed, a total number of 42 CD150 $^{+}$ CD48 $^{-}$ Lin $^{-}$ HSC-enriched cells were identified over several femoral sections, and 37 of them were localized within 50 μ m from Nes:GFP $^{+}$ cells.



Cell type	Percentage of BM nucleated cells
CD150 ⁺ CD48 ⁻ Lin ⁻	0.0084 ± 0.0028 % ¹
Nes:GFP ⁺	0.08 ± 0.01 %

The probability of k Nes:GFP⁺ cells existing within an area (A) with a mean occurrence (λ) is given by the Poisson distribution:

$$Px(X = k) = e^{-\mu} \mu^k / k!$$

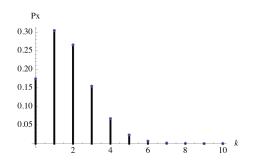
where the parameter μ represents the number of expected cells in the sampling area (A):

$$\mu = \lambda * A$$

 λ was measured as 5.3 \pm 0.8 Nes:GFP⁺ cells per mm² (77.3 \pm 11.7 Nes:GFP⁺ cells in an area of 14.62 \pm 0.24 mm²). The total sampling area (*A*) is the sum of 100 μ m-diameter circles centered on 42 CD150⁺ CD48⁻ Lin⁻ cells:

$$A = 42 * \pi * (50 * 10^{-3} mm)^2 = 0.3297 mm^2$$

The number of Nes:GFP⁺ cells expected in the sampling area is therefore μ = 1.75. The probability of co-localization follows a Poisson distribution shown below. A one-sample inference for the Poisson distribution (small-sample test, p-value method) conclusively shows that the observed frequency of co-localization between CD150⁺ CD48⁻ Lin⁻ and Nes:GFP⁺ cells is statistically significant (p < 10⁻¹⁶).



$$H_0: \mu = \mu_0$$

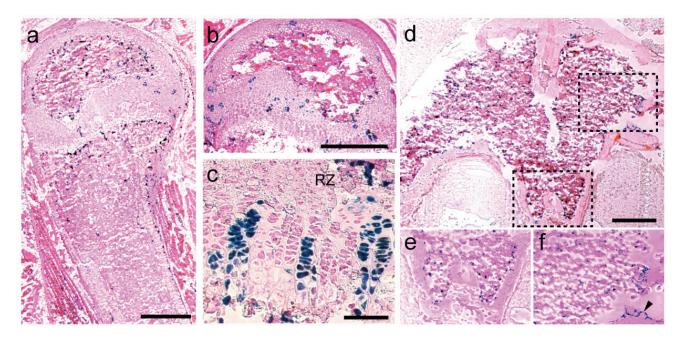
$$H_1: \mu \neq \mu_0$$

$$pvalue = min[2 * (1 - \sum_{k=0}^{x-1} \frac{e^{-\mu_0} \mu_0^k}{k!}), 1]$$

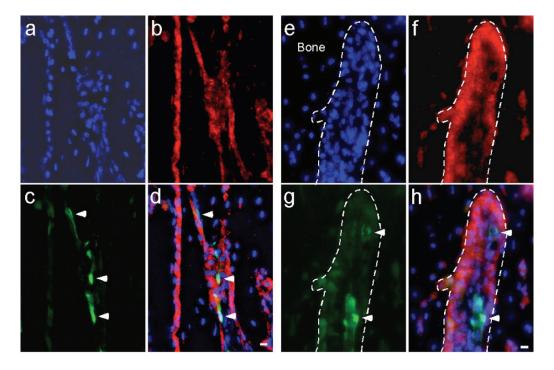
$$p = 2 * \left(1 - \sum_{k=0}^{36} (e^{\wedge}(-1.75)(1.75)^{\wedge}k)/(k!)\right)$$

$$p < 1 * 10^{-16}$$

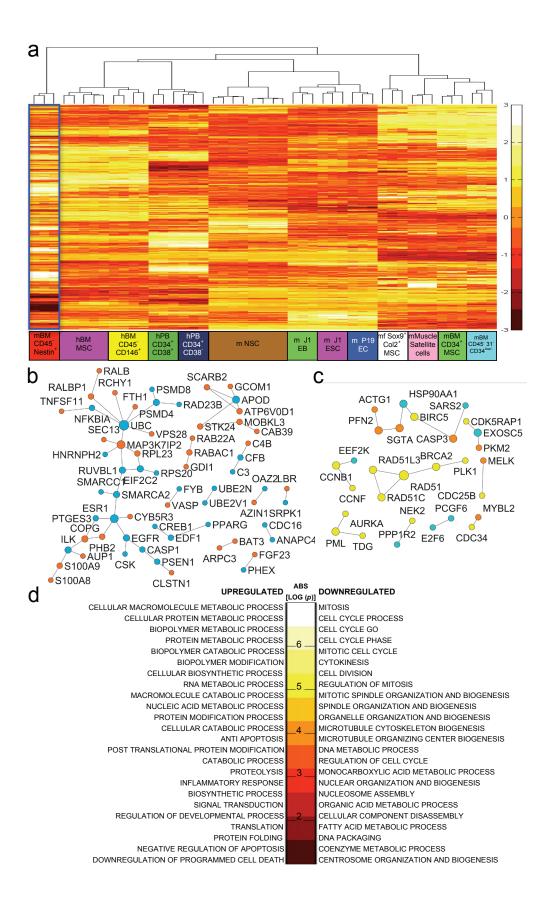
Supplementary Figure 8. The physical association of GFP⁺ and CD150⁺ CD48⁻ Lin⁻ cells in the bone marrow of *Nes-Gfp* transgenic mice is statistically significant.

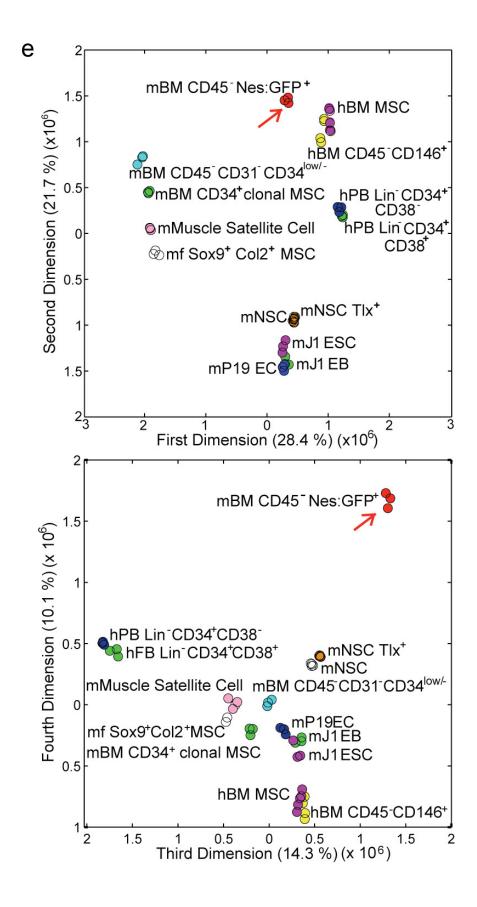


Supplementary Figure 9. Nestin⁺ cells contribute to osteochondral lineages. Lineage tracing studies using *Nes-Cre* mice bred to the *R26R* reporter line have demonstrated the contribution of nestin⁺ cells to bone and cartilage formation. a-c, Longitudinal sections of the femur of a 4 week-old mouse showing the presence of cells derived from nestin⁺ cells in the bone marrow, with higher abundance in the trabecular region, and their contribution to endochondral ossification by derivation into osteoblasts and chondrocytes. Numerous chondrocytes and osteoblasts derived from nestin⁺ cells can be observed in the reserve zone (RZ) and lining the trabecular bone surface, respectively. c, Columnar proliferating and hypertrophying chondrocytes derived from nestin⁺ cells, shown in the growth plate at higher magnification. d-f, Horizontal section of the frontal bone of the skull of a 4 week-old mouse showing the contribution of nestin⁺ cells in intramembranous ossification. Numerous osteoblasts and osteocytes (f, arrowhead) derived from nestin⁺ cells can be observed in the frontal bone. Dashed rectangles (d) are shown below at higher magnification (e-f). Bar scale,100 μm (c); 500 μm (a-b, d).



Supplementary Figure 10. N-cadherin expression in femoral sections from Nes-Gfp transgenic mice. Immunostaining for N-cadherin using a rabbit polyclonal antibody was performed as described 10 . Two illustrative Z-stacks (a-d and e-f) are shown. Individual fluorescence for DAPI (a, e, blue), N-cadherin (b, f, red), GFP (c, g, green) and the merged images (d, h) are shown for comparison. Like osterix cells (please see main paper), N-cadherin cells were much more abundant than Nes:GFP cells in the trabecular bone marrow, and were localized between Nes:GFP cells and the bone surface. GFP+ cells with the typical morphology and distribution of Nes:GFP cells are indicated with arrowheads, and were very different from N-cadherin osteoblastic cells. e-h, Bone margins are indicated with dashed lines. Bar scale, $10 \mu m$.

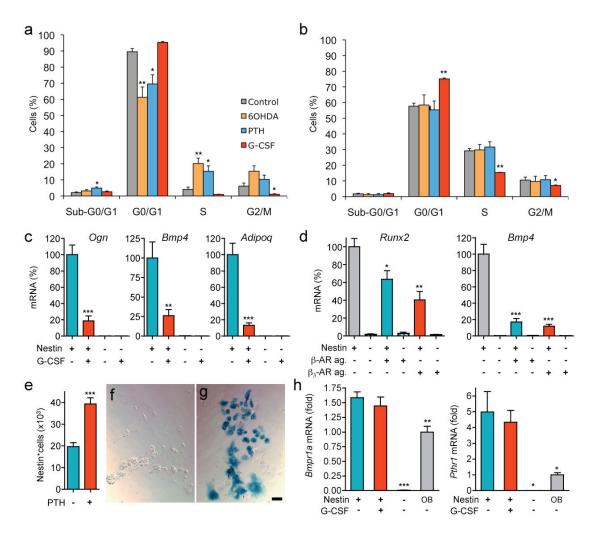




f

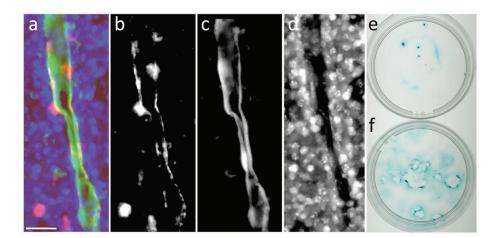
	Experiment
1	GSM545815 mBM CD45*Nes:GFP ⁺
2	GSM545816 mBM CD45 ⁻ Nes:GFP ⁺
3	GSM545817 mBM CD45 ⁻ Nes:GFP ⁺
4	GSM314045 mNSC
5	GSM314046 mNSC
6	GSM314047 mNSC
7	GSM314048 mNSC
8	GSM148485 hBM CD45 ⁻ CD146 ⁺
9	GSM148487 hBM CD45 ⁻ CD146 ⁺
10	GSM148488 hBM CD45 ⁻ CD146 ⁺
11	GSM148491 hBM CD45 ⁻ CD146 ⁺
12	GSM87697 hFB Lin CD34 CD38
13	GSM87693 hFB Lin ⁻ CD34 ⁺ CD38 ⁺
14	GSM87695 hFB Lin ⁻ CD34 ⁺ CD38 ⁺
15	GSM86779 hPB Lin ⁻ CD34 ⁺ CD38 ⁻
16	GSM86781 hPB Lin ⁻ CD34 ⁺ CD38 ⁻
17	GSM86783-4 hPB Lin CD34 CD38
18	GSM72616 J1-EB
19	GSM72618 J1-EB
20	GSM72621 J1-EB
21	GSM93543 P19
22	GSM93541 P19
23	GSM93545 P19
24	GSM86489 mBM CD45 ⁻ CD31 ⁻ CD34 low/-
25	GSM86492 mBM CD45 ⁻ CD31 ⁻ CD34 low/-
26	GSM86495 mBM CD45 ⁻ CD31 ⁻ CD34 low/-
27	GSM86435 mBM CD34 ⁺ clonal MSC
28	GSM86438 mBM CD34 ⁺ clonal MSC
29	GSM86441 mBM CD34 ⁺ clonal MSC
30	GSM86510 mf Sox9 ⁺ Col2 ⁺ MSC
31	GSM86504 mf Sox9 ⁺ Col2 ⁺ MSC
32	GSM86507 mf Sox9 ⁺ Col2 ⁺ MSC
33	GSM73026 mMuscle Satellite Cell
34	GSM73029 mMuscle Satellite Cell
35	GSM73032 mMuscle Satellite Cell
36	GSM72622 J1-ESC
37	GSM72624 J1-ESC
38	GSM72626 J1-ESC
39	GSM194075 hBM MSC
40	GSM194076 hBM MSC
41	GSM194077 hBM MSC
42	GSM194078 hBM MSC
43	GSM194079 hBM MSC
44	GSM252290 mNSC
45	GSM252291 mNSC
46	GSM252292 mNSC
47	GSM252296 mNSC

Supplementary Figure 11. Molecular signature of bone marrow Nestin + cells. Genome-wide expression profile of BM CD45 Nes:GFP+ cells compared to multiple stem cells obtained from Gene stem-base Omnibus (http://www.ncbi.nlm.nih.gov/geo/) and the Expression (http://www.stembase.ca/?path=/), including mouse MSCs (mBM CD34⁺, mf Sox9⁺ Col2⁺ MSCs and mBM CD45 CD31 CD34 Numan MSCs (hBM MSC, hBM CD45 CD146), mouse embryonic (mJ1ESC, mJ1EB) and mouse neural stem cells (mNSC), mouse pluripotent embryonal carcinoma cells (mP19EC), muscle satellite cells and human peripheral blood haematopoietic stem and progenitor cells (hPB CD34⁺ CD38⁻ and CD34⁺ CD38⁻; please see Supplementary Fig. 11b for a complete list with accession numbers). a, Hierarchical clustering; the group of BM CD45 Nes:GFP+ cells, including 3 biological replicates containing two adult Nes-Gfp of different gender each, is marked with a blue square. b-d, Gene Ontology analysis of genes differentially expressed in BM CD45 Nes:GFP⁺ cells. **c-d**, Protein-protein interactions from (**c**) up- and (**d**) down-regulated genes. d, Enrichment of Gene Ontology terms for Biological Processes. e, Principal coordinates analysis of gene expression across all experimental groups. Principal coordinates analysis was conducted on the most variable (top 10 % = 948) ranked genes using the Manhattan (city block) distance metric and the Matlab Statistics Toolbox. Data reconstruction in the first four principal coordinates (accounting for ~ 80% total variation) is shown. f, List of microarray experiments with accession numbers; m, mouse; f, fetal; BM, bone marrow; NSC, neural stem cell; h, human; FB, fetal blood; PB, peripheral blood; EB, embryoid bodies; MSC, mesenchymal stem cell; ESC, embryonic stem cell.



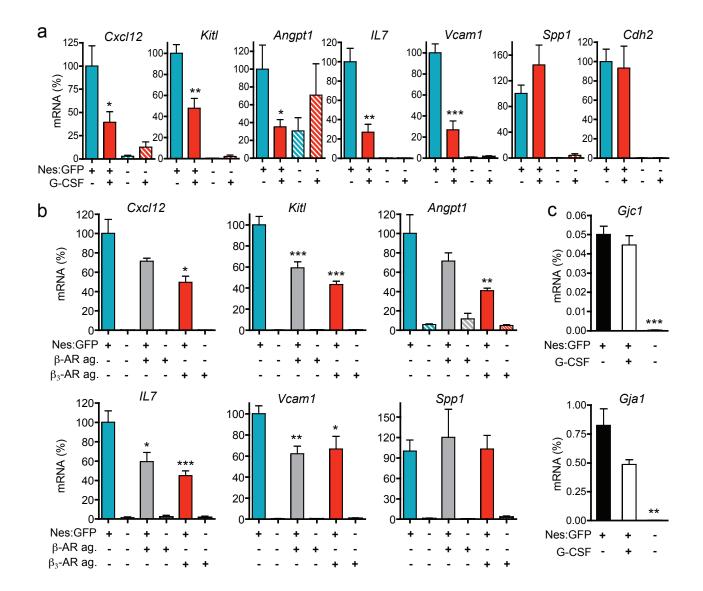
Supplementary Figure 12. Proliferation and differentiation of bone marrow Nes:GFP⁺ MSCs are regulated by hormones, cytokines and the sympathetic nervous system.

a-b, Cell cycle profile of (a) CD45 GFP and (b) CD45 GFP cells sorted from the bone marrow of Nes-Gfp transgenic mice chemically sympathectomized (6OHDA), treated with parathormone (PTH) for 10 days, injected with G-CSF or vehicle (as described in the Methods). Cells were harvested and fixed for > 2h at 4°C in 70% Ethanol and stained with a solution containing 0.2 mg ml⁻¹ DNAse-free RNase A, 0.1% Triton X-100 and 20 μg ml⁻¹ Propidium iodide in PBS. Nes:GFP⁺ cells (a) are much more quiescent (90% G0/G1, 10% S/G2/M) than the remaining CD45 cells (b) but are selectively induced to proliferate by parathormone over 10 days (70% G0/G1, 26% S/G2/M) or by chemical sympathectomy (61% G0/G1, 36% S/G2/M). G-CSF reduced proliferation of both (a) CD45 Nes:GFP⁺ (95% G0/G1, 2% S/G2/M) and (b) CD45⁻ Nes:GFP⁻ (75% G0/G1, 22% S/G2/M) cells (n = 4-5). c, G-CSF selectively and significantly downregulated in CD45 Nes:GFP+ cells genes involved in osteoblastic (osteoglycin, Ogn; bone morphogenetic protein-4, Bmp4) and adipogenic (adiponectin, Adipoq) differentiation, whose expression was 650 to 1325-fold higher in Nes:GFP+ cells than in the rest of the bone marrow CD45 population (n = 6). **d**, Activation of β_3 -AR significantly downregulated osteoblastic differentiation genes (Runx2 and Bmp4) in BM CD45 Nes:GFP+ cells. Animals were injected 2 h before harvest with saline, a non-selective β - (isoproterenol, β -AR) or a selective β_3 -AR (BRL37344) (2 mg kg $^{-1}$, i.p.). Stimulation of the β_3 -AR significantly downregulated these genes in Nes:GFP⁺ cells but not in the remaining bone marrow CD45⁻ population (n = 6). **e-g**, Daily administration of parathormone (80 μ g kg⁻¹; i.p.) over 5 weeks (**e**) doubled the number of CD45⁻ Nes:GFP⁺ cells in the bone marrow and primed them to differentiate into osteoblasts identified by Col2.3-driven β -galactosidase expression (g; n = 4). f-g, Representative examples of CD45 Nes:GFP+ cells sorted from the bone marrow of mice injected with (g) parathormone or (f) saline as described³, and plated for one week in osteoblastic differentiation medium (n = 4). Bar scale, 100 µm. h, Expression of type IA bone morphogenetic protein receptor (Bmpr1a) and parathormone receptor-1 (Pthr1) was significantly higher in CD45 Nes:GFP cells than in CD45 Nes:GFP cells or primary osteoblasts. The expression of these receptors in CD45 Nes:GFP+ cells was not affected significantly by G-CSF treatment (n = 3). c-d, h, Quantitative real-time RT-PCR was performed in RNA samples from primary osteoblasts and from CD45 GFP and CD45 GFP cells sorted from the bone marrow of Nes-Gfp transgenic mice. Unpaired two-tailed t test. * p < 0.05, ** p < 0.01, *** p < 0.001. Error bars indicate standard error.



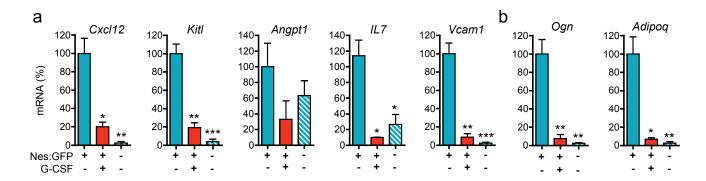
Supplementary Figure 13. Bone marrow Nes:GFP⁺ cells have parathormone receptor and respond to parathormone *in vitro* by proliferating and differentiating into osteoblasts.

a-d, Immunofluorence of trabecular bone marrow from adult *Nes-Gfp* transgenic mouse showing the presence of parathormone receptor-1 (PTHR1, red) on putative osteoblastic cells and also on the surface of GFP⁺ peri-vascular cells (green). A rabbit polyclonal anti-PTHR1 antibody (1:100, Abcam) was detected using the TSA amplification system (red; PerkinElmer). Nuclei were stained with DAPI (blue). Bar scale, 50 μm. **b-d**, Individual fluorescence signals for PTHR1 (**b**), GFP (**c**) and DAPI (**d**) are also shown for comparison. Note the proximity of osteoblasts and Nes:GFP⁺ cells in the trabecular bone marrow. **e-f**, Increased *in vitro* proliferation and osteoblastic differentiation after PTH treatment. An equal number of CD45⁻ GFP⁺ cells were sorted from the bone marrow of *Nes-Gfp / Col2.3-Cre / R26R* triple-transgenic mice and cultured for 4 weeks in sphere-forming conditions (as described in the Methods) with a basic combination of growth factors (FGFb, IGF-1, EGF) with (**f**) or without (**e**) the addition of rat PTH 1-34 (Bachem. Bioscience; 50 ng ml⁻¹). Culture dishes were fixed and stained for X-gal as described in the Methods. Note the increased number of Col2.3⁺ (blue deposits) osteoblasts derived from Nes:GFP⁺ cells in the presence of parathormone (**f**).



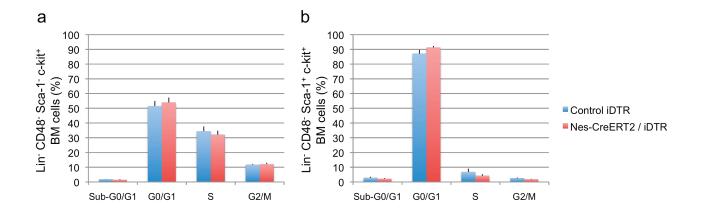
Supplementary Figure 14. Expression of HSC maintenance genes in bone marrow Nes:GFP⁺ cells is regulated by the SNS.

a, Activation of β_3 -AR on bone marrow CD45⁻ Nes:GFP⁺ cells reduced the expression of core HSC maintenance genes. Quantitative real-time RT-PCR was performed in RNA samples from CD45⁻ GFP⁺ and CD45⁻ GFP⁻ cells sorted from the bone marrow of *Nes-Gfp* transgenic mice injected 2h before harvest with saline, a non-selective β - (isoprenaline, β -AR) or a selective β_3 -AR agonist (BRL37344; β_3 -AR) (2 mg kg⁻¹, i.p., n = 6). **b**, Expression of Connexin-45 (Gjc1) and Connexin-43 (Gja1) was 200 to 500-fold higher in Nes:GFP⁺ cells than in the remaining bone marrow CD45⁻ population (n = 3). * p < 0.05, ** p < 0.01, *** p < 0.001; unpaired two-tailed *t* test. Error bars indicate SEM.

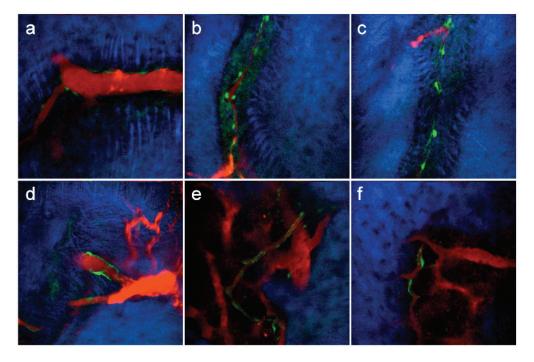


Supplementary Figure 15. Repetition of Q-PCR experiments using β -actin instead of Gapdh as a housekeeping gene.

a-b, Quantitative real-time RT-PCR was performed in RNA samples from CD45⁻ GFP⁺ and CD45⁻ GFP⁻ cells sorted from the bone marrow of *Nes-Gfp* transgenic mice. Very reproducible results were obtained using β -actin instead of *Gapdh* as a housekeeping gene. Core genes involved in (**a**) HSC maintenance in the bone marrow and (**b**) differentiation towards mesenchymal lineages were highly expressed in Nes:GFP⁺ cells compared to the remaining stromal population, and were significantly downregulated after G-CSF treatment (n = 3-7). * p < 0.05, ** p < 0.01, *** p < 0.001; unpaired two-tailed *t* test. Error bars indicate SEM.



Supplementary Figure 16. Selective depletion of nestin⁺ cells in adult Nes-Cre^{ERT2} / iDTR mice does not affect the cell cycle or apoptosis of haematopoietic stem and progenitor cells. Cell cycle profile of (a) Lin⁻ CD48⁻ Sca-1⁻ c-kit⁺ haematopoietic progenitors and (b) Lin⁻ CD48⁻ Sca-1⁺ c-kit⁺ HSC-enriched cells sorted from the bone marrow of 6 to 12-week old Nes-Cre^{ERT2} / iDTR double- and control iDTR single-transgenic mice 16 days after tamoxifen and diphtheria toxin treatment. Cells were harvested and fixed for > 2h at 4° C in 70% ethanol and stained with a solution containing 0.2 mg ml⁻¹ DNAse-free RNase A, 0.1% Triton X-100 and 20 μ g ml⁻¹ Propidium iodide (Sigma) in PBS. No differences were observed in the frequencies of apoptotic (Sub-G0/G1) cells or in cell cycle profiles between the two groups of animals (n = 4-6). Unpaired two-tailed t test. Error bars indicate SEM.



Supplementary Figure 17. **Calvarial bone marrow Nes:GFP**⁺ **cells are peri-vascular**. *In vivo* imaging of the calvarium of *Nes-Gfp* transgenic mice i.v. injected with Qdot (Invitrogen, red). **a-c**, Nes:GFP⁺ (green) cells surrounding blood vessels in the coronal suture. **d-f**, Peri-vascular Nes:GFP⁺ cells in the endosteal region. The blue fluorescence corresponds to second harmonic signal generated by bone collagen when illuminated by femtosecond titanium:sapphire laser pulses, as previously described⁴⁰.

Supplementary Table 1.

Mouse #	X-gal ⁻ and Oil Red O ⁻	X-gal ⁺ and Oil Red O ⁻	X-gal ⁺ and Oil Red O ⁺	Total
1	11	142	102	255
2	15	130	94	239
3	6	77	61	144
4	7	43	30	80
5	0	70	30	100
6	4	66	51	121

Supplementary Table 1. Multipotency of Nes:GFP⁺ **secondary mesenspheres.** Heterotopic bone ossicles loaded with individual clonal spheres obtained from *Nes-Gfp / Col2.3-Cre / R26R* triple-transgenic mice were harvested two months after their subcutaneous implantation into littermates that did not carry the transgenes and enzymatically digested. Secondary spheres were cultured in the same conditions as primary spheres. After three weeks, the cultures were fixed and stained with X-gal and Oil Red O, as described in the Methods. The number of spheres X-gal⁻ Oil Red O⁻, X-gal⁺ Oil Red O⁻ and X-gal⁺ Oil Red O⁺, and the total number of spheres analyzed from each mouse are shown in the Table.

Supplementary Table 2. Sequence of oligonucleotides used for quantitative real-time RT-PCR.

Cxcl12.Fw CGCCAAGGTCGTCGCG	Primers	Sequence	Product (bp)	Annealing (°C)
Addr3_FW	Cxcl12_Fw	CGCCAAGGTCGTCGCCG		
Addrás RV AAACTCCGCTGGAACTAGAGAGG 110 60 6fp FW ATCATGGCCGACAAGCAGAAGAC 6fp FW GTACAGCTCGTCCATGCCGAGAGT 80 60 KII, FW CCTGAAGACTGGGGCTA KIK KIK CCTGTAGAGACTGGGGCT 8 Angpt1, FW CACCTTCTTAGATGCAAGGCT 138 60 Angpt1, FW CACCTTCTTTAGTGAGAGGCT 138 60 IL7, FW GTGCTGCTGACAGTTGTGTG 102 60 Vcam1, FW GACCTGTTCCAGGAGGGTCTA 7 60 Vcam1, FW GACCTGTTCCAGGAGGGGTCTA 121 60 Vcam1, FW GACCTGTCCGGATGTGTG 121 60 Spp1, FW GCCACTACCCGGAGGGTCTA 149 80 Vcam1, FW CTCCAAACGACTGCTGCTTTG 149 80 Ogn, FW ACCATAACGACTGGAATTAGCTTG 122 60 Apl, FW ACCATATCAGGATTAGCCTTGC 122 60 Apl, FW ACATCAGTTTTTGGAG 73 60 Gpmmb, FW CCCCAACCACAGACTTTTGAC 73 60 Runx2, FW TGTCTC	Cxcl12_Rv	TTGGCTCTGGCGATGTGGC	118	60
	Adrb3_Fw	TGCGCACCTTAGGTCTCATTATGG		
Gfp RV GTACAGCTCGTCCATGCCGAGAGT 280 60 Kill, RV CCCTGAAGACTCGGGCCTA Kill, RV CAATTACAAGCGAAATGAGAGCC 65 60 Angpt1 FW CACTTGCTAGACATTCATCACCAG Angpt1 FW CACCTTGCTTTAGTGCAAGTGGT 138 60 IL7, FW GTGCTGCTCGCAAGTTGAAG IL7, FW GTGCTGCTCGCAAGTTGAAG IL7, FW GTGCTGCTCGCAAGTTGAGG IL7, RW AGTCACAGTGTTTGTGTG 102 60 Veam1, FW GACCTGTTCCAGCAGGGGTCTA Vecent IRV CTTCCATCCTCATAGCAGTTAAGGT 121 60 Spp1, FW GACCATCTCCTGGCTCTGTTG 149 60 60 60 60 Spp1, FW GCCCAAGCAGGACTGGAA 73 60		AAACTCCGCTGGGAACTAGAGAGG	110	60
Kitt Fw CCCTGAAGACTGGGGCTA Kitt RW CAATTACAAGCGAAATGAGAGCC 65 60 Angpt1 Fw CTCGTCAGACATTCATCATCATCATCATCATCATCATCATCATCATCA	<i>Gfp_</i> Fw	ATCATGGCCGACAAGCAGAAGAAC		
Kitl. Rv CAATTACAAGCGAAATGAGAAGCC 65 60 Angpt1_FW CTCGTCAGACATTCATCATCACAG 3 60 IL7_FW GTGCTGCTCAGCAAGTTGAAG 1 1 60 IL7_FW AGTCACCAGTSTTHGTGTC 102 60 Vcam1_FW GTCCACCAGTGAGTTTGTGTG 121 60 Vcam1_FW CTCCATCACGAAGGAGTTGA 21 60 Vcam1_FW CTCCATCACGAGAGGTTGT 40 60 Vcam1_FW ACCATCTCCTGGCTCTGTTG 149 60 Spp1_FW ACCACATCCTCGGCTCTGTTG 149 60 Ogn_FW ACCATAAGCAGCTGGAATCTGT 40 60 Alpl_FW ACCACATACCAGCTGGAATCTGT 40 73 60 Alpl_FW ACACACACACACTTTTGCAGCCTGC 65 60 Spmmb_FW CCCCAAGCACACACTTTTGAC 73 60 Spmmb_FW CCTTCTGCTTGCTTGA 73 60 Spr_FW ATGCGTCTCTCTGCTTGATTGA 128 60 Spr_FW ATGCGTACTCCTTGCTTGATTTGA 275 60 Bg	<i>Gfp_</i> Rv	GTACAGCTCGTCCATGCCGAGAGT	280	60
Angpt1 FW	<i>Kitl_</i> Fw	CCCTGAAGACTCGGGCCTA		
Angpt1 Rv	<i>Kitl</i> _Rv	CAATTACAAGCGAAATGAGAGCC	65	60
Angpt1 Rv	Angpt1 Fw	CTCGTCAGACATTCATCATCCAG		
I.7_RW		CACCTTCTTTAGTGCAAAGGCT	138	60
ILT RV				
		AGTTCACCAGTGTTTGTGTGC	102	60
Veam1 Rv CTTCCATCCTCATAGCAATTAAGGTG 121 60 Spp1_Fw TCCCTCGATGTCATCCCTGTTG Topp1_Rv GGCACTCTCCTGGCTCTCTTTG 149 60 Ogn_Fw ACCATAACGACCTGGAATCTGT 00n_Rv ACCATAACGACTTGGCTTGC 122 60 Ogn_Rv AACGAGTTCATTAGCCTTGC 122 60 Alpl_Fw ACACAATATCAAGGATATCGACGTGA 73 60 Gpnmb_Fw CCCCAGGCAGACTTTTGG 65 60 Gpnmb_Rv GCTTTCTGCATCTCCAGCCT 65 60 Runx2_Fw TTACCTACACCCCGCCAGTC 86 60 Runx2_Fw TTACCTACACCCCGCCAGTC 275 60 Sp7_Fw ATGGCGTCCTCTTGCTTGCTTGA 275 60 Sp7_Fw ATGGCGTCGCTCTTTGCTTGA 275 60 Sp7_Fw AGAGGAGGTCCTAAATAGT 183 60 Sp7_Fw GGCCACAATCCAATCACAGG 8 60 Bglap_Fw GGCACAATCCAATCACTCCT 69 60 Adipoq_Fw TGTTCCTCTTAATCCTGCCA 4 Adipoq_Fw TGTTCCTCTTAATCCTGCTCA 4 </td <td></td> <td></td> <td></td> <td></td>				
Spp1_FW	_		121	60
Spp1 Rv GGCACTCTCCTGGCTCTCTTTG 149 60 Ogn_Fw ACCATAACGACCTGGAATCTGT 0gn Rv AACGAGTGTCATTAGCCTTGC 122 60 Alpl_Fw CACAATATCAAGGATATCGACGTGA 73 60 Alpl_Rv ACACAGTCTGTTCTTCGGGTACA 73 60 Gpnmb_Fw CCCCAAGCACAGACTTTTGAG 65 60 Gpnmb_Fw GCTTCTGCACCCGCCAGTC 128 60 Runx2_Fw TTACCTACACCCGCCCAGTC 128 60 Runx2_Fw TTACCTGCACCCGCCCAGTC 128 60 Sp7_Fw ATGGCGTCCTCTCTGCTTGCTGA 57 60 Sp7_Fw GAGGAGTGGTAGTCATTTG 275 60 Bglap_Fw GGCACACAGGTCCTAAATAGT 183 60 Bmp4_Fw TAGGACTCCGTCGCCATT 40 60 Adipoq_Fw TATGAGACTCCATCCTTTGAC 40 60 Adipoq_Fw TGTTCCTTAATCCTGCCCA 40 60 Apparg_Fw ACCACTGCACTTGTGAATC 100 60 Pparg_Fw ACCACTGCACACTTTGCTTTGAC 7 60 <td></td> <td></td> <td></td> <td></td>				
Ogn, Fw ACCATAAGGACCTGGAATCTGT 122 60 Ogn, Rv AACGAGTGTCATTAGCCTTGC 122 60 Alpl, Fw CACAATATCAAGGATATCGACGTGA Alpl, Fw CACAATATCAAGGATATCGACGTGA Alpl, Rv ACATCAGTTCTGTCTCGGGTACA 73 60 Gpmmb, Fw CCCCAAGCACAGACTTTTGAG 65 60 Gpmmb, Rw GCTTTCTGCATCCCAGCCT 65 60 Runx2, Fw TTACCTACACCCCGCCAGTC 128 60 Runx2, Rw TGCTGGTCTGGAGGGTCC 128 60 Sp7, Fw ATGGCGTCCTCTGCTGTGC 128 60 Sp7, Rv GAAGGGTGGTAGTCATTTG 275 60 Bglap, Fw GCAGCACAGGTCCTAAATAGT 183 60 Bglap, Rv GCAGCACAGCTCGCACTT 80 60 Bmp4, Fw TAAGAACTGCGTGCCATT 80 60 Bmp4, Fw TGAGCACATCCAATCCATTCC 69 60 Adipoq, Fw TGTTCCTTTAATCCTGCCCA 40 60 Apparg, Fw ACCACTGCACATCCTTTGAATCA 100 60 Ctd			149	60
Ogn Rv AACGAGTGTCATTAGCCTTGC 122 60 Alpl Fw CACAATATCAAGGATATCGACGTGA 73 60 Opnmb_Fw CCCCAAGCACAGACTTTGAG 73 60 Opnmb_Fw CCCCAAGCACAGACTTTGAG 65 60 Rumx2_Fw TTACCTACACCCGCCCAGTC 8 60 Rumx2_Fw TTACCTACACCCGCCCAGTC 2 60 Sp7_Fw ATGCGGTCCTCTCTGCTTGA 5 60 Sp7_Fw ATGGCGTCCTCTCTGCTTGA 5 60 Bglap_Fw GGGCAATAAGGTAGTGAACAG 8 60 Bglap_Fw GGGCACAGGTCCTAAATAGT 183 60 Bmp4_Fw TAAGAACTGCCGTCGCCATT 8 60 Adipoq_Fw TAAGAACTGCCGTCGCCATT 8 60 Adipoq_Fw TGTTCCTCTTAATCCTGCCCA 69 60 Adipoq_Fw ACCACTCGCATCAGTTCCTTTGAC 103 60 Pparg_Fw ACCACTCGCATCAGAGTTCCCTT 103 60 Cfd_Fw TGGGTCAACACTTGGAATCA 100 60 Cfd_Fw TGCATCAACCTTGGACTTG				
Alp/Fw CACATATCAAGGATATCGACGTGA Alp/I RV ACATCAGTTCTGTTCTTCGGGTACA 73 60 Gpnmb_Fw CCCCAAGCACAGACTTTTGAG G G Gpnmb_RV GCTTTCTGCATCTCCAGCCT 65 60 Runx2_Fw TTACCTACACCCCGCAGTC B 60 Runx2_Fw TGCTGGTCTGGAAGGGTCC 128 60 Sp7_Fw ATGGCGTCCTCTCGCTTGA 275 60 Sp7_Fw ATGGCGTCCTCTGCTTGA 275 60 Sp7_Fw GAAGGGTGGTAGTCATTTG 275 60 Bglap_Fw GAAGGGTGCTAGATCATTTG 275 60 Bglap_Fw GCAGCACAGGTCCTAAATAGT 183 60 Bmp4_Fw TAAGAACTGCCGTCGCCATT 36 60 Adipoq_Fw TGTTCCTTAATCCATCCACA 69 60 Adipoq_Fw TGTTCCTTAATCCTGCCCA 40 40 60 Pparg_Fw ACCACTGCACATTCCTTTGAC 60 60 Cfd_Fw TGCATCAACTCAAGATTCAATCA 70 60 Cfd_Fw TGCACTCCTGGACTAATCA 50			122	60
Aip_RV ACATCAGTTCTGTCTTCGGGTACA 73 60 Gpnmb_FW CCCCAAGCACAGACTTTTGAG 6 6 Gpnmb_RV GCTTTCTGCATCTCCAGCCT 65 60 Runx2_FW TTACCTACACCCCGCCAGTC 128 60 Runx2_RV TGCTGGTCTGGAAGGGTCC 128 60 Sp7_RV ATGGCGTCCTCTCTGCTTGA 275 60 Bglap_FW GAGGGCATAAGGTAGTAGACAG 8 60 Bglap_FW GGCCACAAGGTCCTAAATAGT 183 60 Bmp4_FW TAAGAACTGCCGTCGCCATT 183 60 Bmp4_FW TAAGAACTGCCGTCGCCATT 4 60 Adipoq_FW TGTTCCTCTTAATCCTGCCA 69 60 Adipoq_FW TGTTCCTCTTAATCCTGCCA 69 60 Adipoq_FW TGCTCAACACACTCTTTGCTTT 103 60 Pparg_FW ACCACTCGCATTCCTTTGCAC 7 60 Cfd_RV TGCGCAGATTGCAGTGTCAATCA 7 60 Cfd_RV TGCGCAGATTCCAGCCTGGACTTTG 269 60 Coll11a2_FW TGCACCTCCTGGT			122	
Gpnmb_Fw CCCCAAGCACAGACTTTTGAG 65 60 Gpnmb Rv GCTTTCTGCATCTCCAGCCT 65 60 Runx2_Fw TTACCTACACCCCGCCAGTC TRACTACACCCCGCCAGTC Runx2_Rv TGCTGGTCTGGAAGGGTCC 128 60 Sp7_Fw ATGGCGTCCTCTGCTTGA 5 60 Sp1_Fw GAAGGTGGGTAGTCATTTG 275 60 Bglap_Fw GGCACAAAGTCCATACAG 8 60 Bglap_Fw GGCACAAGTCCATACAG 8 60 Bmp4_Fw TAAGAACTGCCGTCGCCATT 8 60 Bmp4_Fw GGCACAAATCCAATCATTCC 69 60 Adipoq_Fw TGTTCCTCTAATCCTGCCA 4 60 Adipoq_Fw TGTTCCTCTAATCCTTGCCA 4 60 Adipoq_Fw ACACCTGCAATCCATCTTTGAC 7 60 Pparg_Fw ACCACTGCATCCTTTTGCAC 7 60 Cfd_Fw TGCGCACATTCCTTTGACA 7 60 Cfd_Fw TGCGCAGATTGCAGGTTGT 50 60 Cfd_Fw TGCACCAGAGAGCAGT 269 6			73	60
Gpnmb RV GCTTTCTGCATCTCCAGCCT 65 60 Runx2 Fw TTACCTACACCCGCCAGTC 128 60 Sp7_Fw ATGCTGCATCGCAGGGTCC 128 60 Sp7_Fw ATGCGTCCTCTCTGCTTGA 275 60 Bglap_Fw GAGGGTAGTGAACAG Bglap_Fw 60 Bglap_Fw GCACCACAGGTCCTAATAGT 183 60 Bmp4_Fw TAGAGACTGCCGTCGCCATT 40 60 Bmp4_Fw TAGACACTGCCGTCGCCATT 69 60 Adipoq_Fw TGTTCCTCTAATCCTGCCCA 7 60 Adipoq_Fw TGTCTCTAATCCTGCCCA 7 60 Adipoq_Fw TGCTCCTTAGATCCTTTGAC 7 60 Pparg_Fw ACACTCGCATTCCTTTGAC 7 60 Cfd_Fw TGCGTCAACTCTGGAATG 5 60 Cfd_Fw TGCGACATCCTGGACTTGT 5 60 Acan_Fw CACGCTACACCCTGGACGAAGT 269 60 Col11a2_Fw TGCGACTCCTGGTCCAGAAG 7 60 Col22a1_Fw GTGGAGCAGCAAGAGCAAGAGCA			10	
Runx2_Fw TTACCTACACCCGCCAGTC Runx2_Rv TGCTGGTCTGGAAGGGTCC 128 60 Sp7_Fw ATGGCGTCCTCTGCTTGA 5 60 Sp7_Rv GAAGGGTGGGTAGTCATTTG 275 60 Bglap_Fw GGGCAATAAGGTAGTGAACAG 8 60 Bglap_Rv GCAGCACAGGTCCTAAATAGT 183 60 Bmp4_Fw TAAGAACTGCCGTCGCCATT 69 60 Adipoq_Fw TGTTCCTCTAATCCTGCCCA 69 60 Adipoq_Fw TGTTCCTCTAATCCTGCCCA 60 60 Adipoq_Fw ACCACTGCACAGTTCCCTT 103 60 Pparg_Fw ACCACTGCACAAGTTCCCCTT 103 60 Pparg_Fw ACCACTGCACAGTTCCTTTGAC 70 60 Cff_Fw TGGACAGATTCCAGAGTGTCAATCA 70 60 Cfd_Rv TGGGCAGATTGCAGGTTG 50 60 Acan_Fw CACGCTACACCCTGGACTTG 269 60 Col11a2_Fw TGGCACAGCAGGAGAGA 269 60 Col22a1_Fw GTGGAGCAGCAGAGAGAGA 333 60	_		65	60
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$\begin{array}{cccccccccccccccccccccccccccccccccccc$	_		128	60
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			120	00
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			275	60
Bglap_RvGCAGCACAGGTCCTAAATAGT18360 $Bmp4$ _FwTAAGAACTGCCGTCGCCATT6960 $Bmp4$ _RvGGCCACAATCCAATCCATTCC6960 $Adipoq$ _FwTGTTCCTCTTAATCCTGCCCA $Adipoq$ _RvCCAACCTGCACAAGTTCCTTT10360 $Pparg$ _FwACCACTCGCATTCCTTTGAC $Pparg$ _RvTGGGTCAGCTCTTGTGAATG10060 Cfd _FwTGCACCACTCGAGTTCATCA Cfd _RvTGCGCAGATTGCAGTGT5060 $Acan$ _FwCACGCTACACCCTGGACTTTG $Acan$ _RvCCATCTCCTCAGCGAAGCAGT26960 $Col11a2$ _FwTGGCACTCCTGGTCAGAAG $Col11a2$ _RvGCCGGGCTTTCCTGCTA12060 $Col2a1$ _FwGTGGAGCAGCAAGAGCAAGGA $Col2a1$ _RvCTTGCCCCACTTACCAGTGTG33360 $Sox9$ _FwCAAGCGGAGGCCGAAGA $Sox9$ _RvCAGCTGCACGTCGGTTT18660 $Pthr1$ _FwACCGTGGCTGGCTCATCCT $Pthr1$ _RvCCAGCGTGAAGCCAGAGTAG14460 $Bmpr1a$ _FwAACGCTTGCGGCCAATC60 $Bmpr1a$ _RvGACATTAGCTTCAAACTGCTCGAA7260 $Gjc1$ _FwAGACCACACACATTCGACATTC60 $Gjc1$ _FwAGACCACACACGTCCATCCTG60 $Gja1$ _FwAGACCCATAGATGACACGG $Gapdh$ _FwTGAACCCA			213	00
Bmp4_Fw Bmp4 RvTAAGAACTGCCGTCGCCATT GGCCACAATCCAATCATTCC6960Adipoq_Fw Parg_FwTGTTCCTCTTAATCCTGCCA TGTCCCTTTAATCCTTGCCA10360Adipoq_RvCCAACCTGCACAAGTTCCTTT Pparg_Fw10060Cfd_Fw Cfd_FwTGGGTCAGCTCTTGTGAATG TGCATCAACTCAGAGTGTCAATCA Cfd_Rv10060Cfd_FwTGCGCAGATTGCAGGTTGT TGCACACCCTGGACTTTG Acan_Fw CAACGCTACACCCTGGACTTTG Acan_Rv5060Col11a2_Fw Col11a2_Fw Col11a2_Fw TGGCACTCCTGGTCCAGAAG Col2a1_Fw12060Col2a1_Fw Sox9_FwGTGGAGCAGCAAGAGCAAGAG COl2a1_Rv12060Col2a1_Rv Sox9_FwCAAGCGAGGCAGAGA CAGCGTGGAGCCAAGAG COl2a1_Rv33360Sox9_Fw Sox9_Rv CAGCTTGCACGTGGTCTCATCCT CAGCGGAGCCAAGA Sox9_Rv18660Pthr1_Fw Bmpr1a_Fw GACATTAGCTTCAACACTGCT Bmpr1a_Rv GACATTAGCTTCAACACTGCT Bmpr1a_Rv GACATTAGCTTCAAACTGCTCGAA GACATTAGCTTCAAACTGCTCGAA GGC1_Fw GACATTAGCTTCAAAACTGCTCGAA GGC1_Fw GACATTAGCTTCAAAACTGCTCGAA GGC1_Rv TCCCAGGTACATCACAGAGGG GGAAGACACGCAAGGTGAAGAT GG11_Rv TGCAGGCAAGGTGAAGAT GGAACCATAGATGACATCACAGGGG GGA1_Fw GACACCATAGATGACATCACAGGGG GGAPh_Fw TGTGTCCGTCGTGGATCTGA Gapdh_Fw TGTGTCCGTCGTGGATCTGA Gapdh_Fw GCTGCTTCACCACCTTCTTGT7760 β -actin_Fw GCTTCTTTGCAGCTCCTTCGT7760			102	60
Bmp4_RvGGCCACAATCCAATCATTCC6960Adipoq_FwTGTTCCTCTTAATCCTGCCA $$ $$ Adipoq_RvCCAACCTGCACAAGTTCCTTT $$ $$ Pparg_FwACCACTGCATTCCTTTGAC $$ $$ Pparg_RvTGGGTCAGCTCTTGTGAATG $$ $$ Cfd_FwTGCATCAACTCAGAGTGTCAATCA $$ $$ Cfd_RvTGCGCAGATTGCAGGTTGT $$ $$ Acan_FwCACGCTACACCCTGGACTTTG $$ $$ Acan_RvCCATCTCCTCAGCGAAGCAGT $$ $$ Col11a2_FwTGGCACTCCTGGTCCAGAAG $$ $$ Col2a1_FwGTGGAGCAGCAAGAGCAAGGA $$ $$ Col2a1_FwGTGGAGCAGAGAGCAAGGA $$ $$ Sox9_FwCAAGCGGAGGCCGAAGA $$ $$ Sox9_RvCAGCTTGCACGTCGGTTT $$ $$ Pthr1_FwACCGTGGCTGTCCTCATCCT $$ $$ Pthr1_RvCCAGCGTGAAGCCAGAGTAG $$ $$ Bmpr1a_FwAACGCTTGCGGCCAATC $$ $$ Bmpr1a_RvGACATTAGCTTCAAACTGCTCGAA $$ $$ Gjc1_FwAGATCACAACATTCGACATTT $$ $$ Gjc1_RvTCCAGGTACATCACAGAGGG $$ $$ Gja1_FwAGAACCGGCAAGGTGAAGAT $$ $$ Gapdh_FwTGTGCCCTCTGTGATCCTTCTGA $$ $$ $$ $$ $$ $$ $$ $$ TGAACCCATAGATGTACCACTGG $$ $$ <tr< td=""><td></td><td></td><td>100</td><td>00</td></tr<>			100	00
Adipoq_FwTGTTCCTCTTAATCCTGCCCAAdipoq_RvCCAACCTGCACAAGTTCCTTT10360 $Pparg_Fw$ ACCACTGGCATTCCTTTGAC10060 $Pparg_Rv$ TGGGTCAGCTCTTGTGAATG10060 Ctd_Fw TGCATCAACTCAGAGTGTCAATCA5060 Ctd_Fw TGCGCAGATTGCAGGTTGT5060 $Acan_Fw$ CACGCTACACCCTGGACTTTG26960 $Acan_Rv$ CCATCTCCTCAGCGAAGCAGT26960 $Col11a2_Fw$ TGGCACTCCTGGTCCAGAAG12060 $Col2a1_Fw$ GTGGAGCAGCAAGAGCAAGGA2060 $Col2a1_Fw$ GTGGAGCAGCAAGAGCAAGGA33360 $Sox9_Fw$ CAAGCGGAGGCCGAAGA33360 $Sox9_Fw$ CAAGCTTGCACGTCGGTTT18660 $Pthr1_Fw$ ACCGTGGCTGTGCTCATCCT77 $Pthr1_Fw$ ACCGTGGAGCCAGAGTAG14460 $Bmpr1a_Fw$ AACGCTTGCGCCAATC347260 $Gjc1_Fw$ AGATCACAACCATTCGACATTT60 $Gjc1_Fw$ AGATCACAACCATTCGACATTT24560 $Gja1_Fw$ AGAACACGGCAAGGTGAAGAT24560 $Gja1_Fw$ AGAACACGGCAAGGTGACATC11960 $Gapdh_Fw$ TGAACCCATAGATGACACTGG11960 $Gapdh_Fw$ TGTGTCCGTCGTGGATCTTA7760 $Gapdh_Fw$ GCTTCTTTGCACCTTCTTGT7760			60	60
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			09	00
Pparg_FwACCACTCGCATTCCTTTGAC $Pparg_Rv$ TGGGTCAGCTCTTGTGAATG10060 Cfd_Fw TGCATCAACTCAGAGTGTCAATCA5060 Cfd_Rv TGCGCAGATTGCAGCTTGT5060 $Acan_Fw$ CACGCTACACCCTGGACTTTG26960 $Acan_Rv$ CCATCTCCTCAGCGAAGCAGT26960 $Col11a2_Fw$ TGGCACTCCTGGTCCAGAAG12060 $Col11a2_Rv$ GCGGGCTTTCCTGCTA12060 $Col2a1_Fw$ GTGGAGCAGCAAGAGCAAGGA33360 $Sox9_Fw$ CAAGCGGAGGCCGAAGA33360 $Sox9_Fw$ CAAGCGGAGGCCGAAGA33360 $Sox9_Rv$ CAGCTTGCACGTCGGTTT18660 $Pthr1_Fw$ ACCGTGGCTGTGCTCATCCT14460 $Pthr1_Fw$ ACCGTGGAAGCCAGAGTAG14460 $Bmpr1a_Fw$ AACGCTTGCGGCCAATC347260 $Bmpr1a_Fw$ AACGCTTGCGGCCAATC363660 $Bmpr1a_Fw$ AGATCACAACCATTCGACATTT3660 $Gjc1_Fw$ AGATCACAACCATTCGACATTT3660 $Gja1_Fw$ AGAACACGGCAAGGTGAAGAT3660 $Gja1_Fw$ AGAACACGGCAAGGTGAAGAT3660 $Gapdh_Fw$ TGAACCCATAGATGTACCACTGG11960 $Gapdh_Fw$ TGTGTCCGTCGTGGGATCTGA3760 $Gapdh_Fw$ CCTGCTTCACCACCTTCTTGA7760			102	60
Pparg RvTGGGTCAGCTCTTGTGAATG10060 Cfd FwTGCATCAACTCAGAGTGTCAATCA Cfd RvTGCGCAGATTGCAGGTTGT 50 60 $Acan$ FwCACGCTACACCCTGGACTTTG $Acan$ Rv $CCATCTCCTCAGCGAAGCAGT$ 269 60 $Col11a2$ FwTGGCACTCCTGGTCCAGAAG $Col11a2$ Fw $CCGGGCTTTCCTGCTA$ 120 60 $Col11a2$ FwGTGGAGCAGCAAGAGCAAGGA $Col2a1$ Fw $CTTGCCCCACTTACCAGTGTG$ 333 60 $Sox9$ FwCAAGCGGAGGCCGAAGA $Col2a1$ Fw $CAGCTTGCACGTCGGTTT$ 186 60 $Sox9$ FwCAGCTTGCACGTCGGTTT 186 60 $Pthr1$ FwACCGTGGCTGTGCTCATCCT $Col2a1$ Fw $CCAGCGTGAAGCCAGAGTAGG$ 144 60 $Bmpr1a$ FwACCGTGGGCCAATC $Col2a1$ Fw C			103	00
Cfd_FwTGCATCAACTCAGAGTGTCAATCACfd_RvTGCGCAGATTGCAGGTTGT5060Acan_FwCACGCTACACCCTGGACTTTG26960 $Acan_Rv$ CCATCTCCTCAGCGAAGCAGT26960Col11a2_FwTGGCACTCCTGGTCCAGAAG12060Col12a1_FwGTGGAGCAGCAAGAGCAAGGA60Col2a1_FwCTTGCCCCACTTACCAGTGTG33360Sox9_FwCAAGCGGAGGCCGAAGA33360Sox9_RvCAGCTTGCACGTCGGTTT18660Pthr1_FwACCGTGGCTGTGCTCATCCT14460Pthr1_RvCCAGCGTGAAGCCAGAGTAG14460Bmpr1a_FwAACGCTTGCGGCCAATC36060Bmpr1a_RvGACATTAGCTTCAAAACTGCTCGAA7260Gjc1_FwAGATCCACAACCATTCGACATTT6060Gja1_FwAGAACACGCAAGGTGAAGAT60Gja1_FwAGAACACGCAAGGTGAAGAT60Gja1_RvTGAACCCATAGATGTACCACTGG11960Gapdh_FwTGTGTCCGTCGTGGATCTGA7760Gapdh_FwTGTGTCCGTCGTGGATCTGA7760 $Gapdh_Rv$ CCTGCTTCACCACCTTCTTGT7760			100	60
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			100	60
Acan_FwCACGCTACACCCTGGACTTTGAcan_RvCCATCTCCTCAGCGAAGCAGT26960 $Col11a2$ _FwTGGCACTCCTGGTCCAGAAG12060 $Col11a2$ _RvGCCGGGCTTTCCTGCTA12060 $Col2a1$ _FwGTGGAGCAGCAAGAGCAAGGA33360 $Col2a1$ _RvCTTGCCCCACTTACCAGTGTG33360 $Sox9$ _FwCAAGCGGAGGCCGAAGA18660 $Sox9$ _RvCAGCTTGCACGTCGTTT18660 $Pthr1_Fw$ ACCGTGGCTGTGCTCATCCT $Pthr1_Rv$ ACCGTGGAGCCAGAGTAG14460 $Bmpr1a_Fw$ AACGCTTGCGGCCAATC $Bmpr1a_Fw$ AACGCTTGCGGCCAATC $Bmpr1a_Rv$ GACATTAGCTTCAAAACTGCTCGAA7260 $Gjc1_Fw$ AGATCCACAACCATTCGACATTT60 $Gjc1_Fw$ AGATCACAACCATTCGACATTT24560 $Gja1_Fw$ AGAACACGGCAAGGTGAAGAT24560 $Gja1_Fw$ AGAACACGGCAAGGTGAAGAT31960 $Gapdh_Fw$ TGAACCCATAGATGTACCACTGG11960 $Gapdh_Fw$ TGTGTCCGTCGTGGATCTGA7760 $Gapdh_Fw$ GCTTCTTTGCACCCCTTCTTGA7760	_		50	00
Acan RvCCATCTCCTCAGCGAAGCAGT26960 $Col11a2$ FwTGGCACTCCTGGTCCAGAAG12060 $Col11a2$ RvGCCGGGCTTTCCTGCTA12060 $Col2a1$ FwGTGGAGCAGCAAGAGCAAGGA33360 $Col2a1$ RvCTTGCCCCACTTACCAGTGTG33360 $Sox9$ FwCAAGCGGAGGCCGAAGA88 $Sox9$ RvCAGCTTGCACGTCGGTTT18660 $Pthr1$ FwACCGTGGCTGTGCTCATCCT814460 $Pthr1$ RvCCAGCGTGAAGCCAGAGTAG14460 $Bmpr1a$ FwAACGCTTGCGGCCAATC87260 $Gjc1$ FwAGATCCACAACCATTCGACATTT7260 $Gjc1$ FwAGATCCACAACCATTCGACATTT60 $Gja1$ FwAGAACACGGCAAGGTGAAGAT11960 $Gja1$ FwTGAACCCATAGATGTACCACTGG11960 $Gapdh$ FwTGTGTCCGTCGTGGATCTGA7760 $Gapdh$ RvCCTGCTTCACCACCTTCTTGA7760 F -actin FwGCTTCTTTGCAGCTCCTTCGT			50	60
Col11a2_FwTGGCACTCCTGGTCCAGAAGCol11a2_RvGCCGGGCTTTCCTGCTA12060Col2a1_FwGTGGAGCAGCAAGAGCAAGGA33360Col2a1_RvCTTGCCCCACTTACCAGTGTG33360Sox9_FwCAAGCGGAGGCCGAAGA88Sox9_RvCAGCTTGCACGTCGGTTT18660Pthr1_FwACCGTGGCTGTGCTCATCCT814460Pthr1_RvCCAGCGTGAAGCCAGAGTAG14460Bmpr1a_FwAACGCTTGCGGCCAATC814460Bmpr1a_RvGAÇATTAGCTTCAAAACTGCTCGAA7260Gjc1_FwAGATCCACAACCATTCGACATTT6060Gjc1_FwAGACCAGGCAAGGTGAAGAT60Gja1_FwAGAACACGGCAAGGTGAAGAT11960Gapdh_FwTGTGTCCGTCGTGGATCTGA7760Gapdh_RvCCTGCTTCACCACCTTCTTGA7760 β -actin_FwGCTTCTTTGCAGCTCCTTCGT			000	00
Col11a2_RvGCCGGGCTTTCCTGCTA12060Col2a1_FwGTGGAGCAGCAAGAGCAAGGA33360Sox9_FwCAAGCGGAGGCCGAAGA33360Sox9_RvCAGCTTGCACGTCGGTTT18660Pthr1_FwACCGTGGCTGTGCTCATCCTPthr1_RvACCGTGGCTGAAGCCAGAGTAG14460Bmpr1a_FwAACGCTTGCGGCCAATCBmpr1a_RvGAÇATTAGCTTCAAAACTGCTCGAA.7260Gjc1_FwAGATCCACAACCATTCGACATTTGjc1_RvTCCCAGGTACATCACAGAGGG24560Gja1_FwAGAACACGGCAAGGTGAAGATGja1_RvTGAACCCATAGATGTACCACTGG11960Gapdh_FwTGTGTCCGTCGTGGATCTGAGapdh_RvCCTGCTTCACCACCTTCTTGA7760 β -actin_FwGCTTCTTTGCAGCTCCTTCGT			269	60
Col2a1_FwGTGGAGCAGCAAGAGCAAGGACol2a1_RvCTTGCCCCACTTACCAGTGTG33360Sox9_FwCAAGCGGAGGCCGAAGA18660Sox9_RvCAGCTTGCACGTCGGTTT18660Pthr1_FwACCGTGGCTGTGCTCATCCT14460Pthr1_RvCCAGCGTGAAGCCAGAGTAG14460Bmpr1a_FwAACGCTTGCGGCCAATC37260Bmpr1a_RvGAÇATTAGCTTCAAAACTGCTCGAA7260Gjc1_FwAGATCCACAACCATTCGACATTT3760Gja1_FwAGAACACGGCAAGGTGAAGAT31960Gapdh_FwTGAACCCATAGATGTACCACTGG11960Gapdh_FwTGTGTCCGTCGTGGATCTGA7760 $Gapdh$ _RvCCTGCTTCACCACCTTCTTGA7760 β -actin_FwGCTTCTTTGCAGCTCCTTCGT	_		400	00
Col2a1_RvCTTGCCCCACTTACCAGTGTG33360Sox9_FwCAAGCGGAGGCCGAAGA $\\$ <td></td> <td></td> <td>120</td> <td>60</td>			120	60
Sox9_FwCAAGCGGAGGCCGAAGASox9_RvCAGCTTGCACGTCGTTT18660 $Pthr1_Fw$ ACCGTGGCTGTGCTCATCCT $Pthr1_Rv$ CCAGCGTGAAGCCAGAGTAG14460 $Bmpr1a_Fw$ AACGCTTGCGGCCAATC $Bmpr1a_Rv$ GAÇATTAGCTTCAAAACTGCTCGAA7260 $Gjc1_Fw$ AGATCCACAACCATTCGACATTT $Gjc1_Rv$ TCCCAGGTACATCACAGAGGG24560 $Gja1_Fw$ AGAACACGGCAAGGTGAAGAT $Gja1_Rv$ TGAACCCATAGATGTACCACTGG11960 $Gapdh_Fw$ TGTGTCCGTCGTGGATCTGA $Gapdh_Rv$ CCTGCTTCACCACCTTCTTGA7760 $β$ -actin_FwGCTTCTTTGCAGCTCCTTCGT				
Sox9_RvCAGCTTGCACGTCGGTTT18660 $Pthr1_Fw$ ACCGTGGCTGTGCTCATCCT $Pthr1_Rv$ CCAGCGTGAAGCCAGAGTAG14460 $Bmpr1a_Fw$ AACGCTTGCGGCCAATC $Bmpr1a_Rv$ GAÇATTAGCTTCAAAACTGCTCGAA7260 $Gjc1_Fw$ AGATCCACAACCATTCGACATTT $Gjc1_Rv$ TCCCAGGTACATCACAGAGGG24560 $Gja1_Fw$ AGAACACGGCAAGGTGAAGAT $Gja1_Rv$ TGAACCCATAGATGTACCACTGG11960 $Gapdh_Fw$ TGTGTCCGTCGTGGATCTGA $Gapdh_Rv$ CCTGCTTCACCACCTTCTTGA7760 $β$ -actin_FwGCTTCTTTGCAGCTCCTTCGT			333	60
$Pthr1_Fw$ ACCGTGGCTGTGCTCATCCT $Pthr1_Rv$ CCAGCGTGAAGCCAGAGTAG14460 $Bmpr1a_Fw$ AACGCTTGCGGCCAATC $Bmpr1a_Rv$ GAÇATTAGCTTCAAAACTGCTCGAA7260 $Gjc1_Fw$ AGATCCACAACCATTCGACATTT24560 $Gjc1_Rv$ TCCCAGGTACATCACAGAGGG24560 $Gja1_Fw$ AGAACACGGCAAGGTGAAGAT11960 $Gapdh_Fw$ TGAACCCATAGATGTACCACTGG11960 $Gapdh_Fw$ TGTGTCCGTCGTGGATCTGA7760 $Gapdh_Rv$ CCTGCTTCACCACCTTCTTGA7760 β -actin $_Fw$ GCTTCTTTGCAGCTCCTTCGT				
Pthr1_RvCCAGCGTGAAGCCAGAGTAG14460 $Bmpr1a_Fw$ AACGCTTGCGGCCAATC $Bmpr1a_Rv$ GACATTAGCTTCAAAACTGCTCGAA7260 $Gjc1_Fw$ AGATCCACAACCATTCGACATTT $Gjc1_Rv$ TCCCAGGTACATCACAGAGGG24560 $Gja1_Fw$ AGAACACGGCAAGGTGAAGAT $Gja1_Rv$ TGAACCCATAGATGTACCACTGG11960 $Gapdh_Fw$ TGTGTCCGTCGTGGATCTGA $Gapdh_Rv$ CCTGCTTCACCACCTTCTTGA7760 $β$ -actin_FwGCTTCTTTGCAGCTCCTTCGT			186	60
Bmpr1a_FwAACGCTTGCGGCCAATCBmpr1a_RvGAÇATTAGCTTCAAAACTGCTCGAA7260 $Gjc1_Fw$ AGATCCACAACCATTCGACATTT7260 $Gjc1_Rv$ TCCCAGGTACATCACAGAGGG24560 $Gja1_Fw$ AGAACACGGCAAGGTGAAGAT11960 $Gapdh_Fw$ TGTGTCCGTCGTGGATCTGA7760 $Gapdh_Rv$ CCTGCTTCACCACCTTCTTGA7760 $β$ -actin_FwGCTTCTTTGCAGCTCCTTCGT	_			
Bmpr1a_RvGAÇATTAGCTTCAAAACTGCTCGAA7260 $Gjc1_Fw$ AGATCCACAACCATTCGACATTT7260 $Gjc1_Rv$ TCCCAGGTACATCACAGAGGG24560 $Gja1_Fw$ AGAACACGGCAAGGTGAAGAT11960 $Gapdh_Fw$ TGTGTCCGTCGTGGATCTGA7760 $Gapdh_Rv$ CCTGCTTCACCACCTTCTTGA7760 $β$ -actin_FwGCTTCTTTGCAGCTCCTTCGT			144	60
Gjc1_FwAGATCCACAACCATTCGACATTTGjc1_RvTCCCAGGTACATCACAGAGGG24560Gja1_FwAGAACACGGCAAGGTGAAGATGja1_RvTGAACCCATAGATGTACCACTGG11960Gapdh_FwTGTGTCCGTCGTGGATCTGAGapdh_RvCCTGCTTCACCACCTTCTTGA7760 β -actin_FwGCTTCTTTGCAGCTCCTTCGT	· -			
$Gjc1_Rv$ TCCCAGGTACATCACAGAGGG24560 $Gja1_Fw$ AGAACACGGCAAGGTGAAGAT11960 $Gja1_Rv$ TGAACCCATAGATGTACCACTGG11960 $Gapdh_Fw$ TGTGTCCGTCGTGGATCTGA7760 $Gapdh_Rv$ CCTGCTTCACCACCTTCTTGA7760 $β$ -actin $_Fw$ GCTTCTTTGCAGCTCCTTCGT			, 72	_ , 60
Gja1_FwAGAACACGGCAAGGTGAAGATGja1_RvTGAACCCATAGATGTACCACTGG11960Gapdh_FwTGTGTCCGTCGTGGATCTGAGapdh_RvCCTGCTTCACCACCTTCTTGA7760 β -actin_FwGCTTCTTTGCAGCTCCTTCGT				
$Gja1_Rv$ TGAACCCATAGATGTACCACTGG11960 $Gapdh_Fw$ TGTGTCCGTCGTGGATCTGA7760 $Gapdh_Rv$ CCTGCTTCACCACCTTCTTGA7760 $β$ -actin $_Fw$ GCTTCTTTGCAGCTCCTTCGT			245	60
Gapdh_FwTGTGTCCGTCGTGGATCTGAGapdh_RvCCTGCTTCACCACCTTCTTGA7760β-actin_FwGCTTCTTTGCAGCTCCTTCGT	Gja1_Fw	AGAACACGGCAAGGTGAAGAT		
Gapdh_RvCCTGCTTCACCACCTTCTTGA7760β-actin_FwGCTTCTTTGCAGCTCCTTCGT	Gja1_Rv	TGAACCCATAGATGTACCACTGG	<u> </u>	60
β-actin_Fw GCTTCTTTGCAGCTCCTTCGT	Gapdh_Fw	TGTGTCCGTCGTGGATCTGA		
β -actin_Fw GCTTCTTTGCAGCTCCTTCGT		CCTGCTTCACCACCTTCTTGA	77	60
				
	β-actin_Rv	ATCGTCATCCATGGCGAACT	62	60