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*Utilization of nanocomposites and nanoparticles as
osteogenic and bone mineralizing biomaterials in
osteoporotic rat model*

A Thesis

Submitted for Ph.D. Degree in Biochemistry

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List of abbreviation

AkT	Protein kinase B
ALP	Alkaline phosphatase
ANOVA	One-way analysis of variance
AP-1	Activator protein -1
B.wt.	Body weight
BALP	Bone alkaline phosphatase
BGLAP	Bone gamma-carboxyglutamate protein
BMC	Bone mineral content
BMD	Bone mineral density
BMP-2	Bone morphogenetic protein 2
BMPs	Bone morphogenetic proteins
BMSCs	Bone marrow-derived MSCs
BMU	Basic Multicellular Unit
BSP	Bone sialoprotein
C17.2	Murine neural progenitor cells
cDNA	Complementary deoxyribonucleic acid
CtsK	Cathepsin K
DEXA	Dual-energy X-ray absorptiometry
DLS	Dynamic light scattering
Dlx5	Distal-less homeobox 5 gene
E2	Estradiol
EC50	Effective concentration
ECM	Extracellular matrix
ELISA	Enzyme-linked immunosorbent assay
ERK	Extracellular regulated kinase
ERs	Estrogen receptors
ERT	Estrogen replacement therapy
ER- α	Estrogen receptor - alpha
ER- β	Estrogen receptor - beta
FAK	Focal adhesion kinase

FDA	Food and Drug Administration
FESEM	Field Emission Scanning Electron Microscopy
FGF	Fibroblast growth factor
FGF-2	Fibroblast growth factor 2
Fgfr	Fibroblast growth factor receptors
FRAX	Fracture Risk Assessment Tool
Frs2 α	Fgfr substrate 2 alpha
FT-IR	Fourier Transform Infrared Spectroscopy
H ⁺ -ATP	Proton-adenosine triphosphate
HIF-1 α	Hypoxia-inducible transcription factor-1alpha
HRP	Horseradish peroxidase
HRT	Hormone replacement therapy
HR-TEM	High-Resolution Transmission Electron Microscope
i.v	Intravenous
IGF-I	Insulin-like growth factor I
IGF-II	Insulin-like growth factor II
IGF-IIR	Insulin-like growth factor 2 receptor
IL-1	Interleukin-1
IL-1 β	Interleukin-1 beta
IL-6	Interleukin-6
IL-7	Interlukin-7
I κ B	Inhibitor kappa B
JNK	c-Jun-N-terminal kinase
LD ₅₀	Lethal dose
LRP5/6	Lipoprotein receptor-related protein 5 and 6
MAP	Mitogen-activated protein
MAPK	Mitogen-activated protein kinase
MC3T3-E1	Osteoblast cell line
M-CSF	Macrophage colony stimulating factor
MEF-2	Myocyte enhancer factor 2

MHCs	Haematoma-derived cells
miRNA	MicroRNA
MSCs	Mesenchymal stem cells
nAg/HA	Silver/hydroxyapatite nanocomposite
nCh/HA	Chitosan/hydroxyapatite nanocomposite
NFATc1	Nuclear factor of activated T-cells
NF- κ B	Nuclear factor-kappaB
nHA	Nanohydroxyapatite
NNI	National Nanotechnology Initiative
OD	Optical density
OPG	Osteoprotegerin
OPN	Osteopontin
Osx	Osterix
OVX	Ovariectomized
PAK	Serine/threonine-protein kinase
PBS	Phosphate-based buffer
PCR	Polymerase chain reaction
PDI	Polydispersity index
PDL	Human periodontal ligament
PEPI	Estrogen/Progestin Intervention
PGE2	Prostaglandin E2
PHDs	Prolyl hydroxylases
PI3k	Phosphatidylinositol 3-kinase
PiT	Phosphate-transporters
PLGA	Poly lactic-co-glycolic acid
PPi	Inorganic pyrophosphate
PTH	Parathyroid hormone
PTHr1	Parathyroid hormone type 1 receptor
qRT-PCR	Quantitative real time polymerase chain reaction
RANKL	Nuclear factor-kappa B (NF- κ B) ligand
RGD	Arginyl-glycyl-aspartic acid

rhPTH 1–34	Recombinant human parathyroid hormone
ROS	Reactive oxygen species
RQ	Relative quantification
Runx2	Runt-related transcription factors 2
S.E	Standard error
Saos2	Osteoblast-like cells
SDs	Standard deviations
SEM	Scanning Electron Microscopy
SERMs	Selective estrogen receptor modulators
SOST	Sclerostin
SPSS	Statistical Package for the Social Sciences
SVEC4-10 cells	Mouse endothelial cell line
TEM	Transmission Electron Microscope
TGF- β	Transforming growth factor beta
TiAlZr	Titanium aluminide alloys-Zr
TLR4	Toll-like receptor 4
TNF	Tumour necrosis factor
TNF- α	Tumour necrosis factor-alpha
TPP	Tripolyphosphate
TRAF6	TNF receptor-associated factor 6
TRAP	Tartrate-resistant acid phosphatase
USCs	Urinary stem cells
VEGF	Vascular endothelial growth factor
WHI	Women's Health Initiative
WHO	World Health Organisation
Wnt	Wingless
XRD	X-ray diffraction

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