

Cell-binding peptides on the material surface guide stem cell fate of adhesion, proliferation and differentiation

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Supplementary Information

Supplementary Table 1-1. Peptide sequences derived from laminin.^{72,87-92}

Origin of ECM domain	Peptide sequences	Ref.
Laminin-derived RGD containing peptide (abbreviated name)		
Laminin α 1	GGGG-TFAL RGD NP (α 1)	87
Laminin α 1	GTFAL RGD NP (α 1-1)	87
Laminin α 1	FAL RGD NP (PA26)	87
Laminin α 1	CGG-AGTFAL RGD NPQG (A99)	89
Laminin α 1	QAGTFAL RGD NPQG (A99)	87
Laminin α 1	CQAGTFAL RGD NPQG	72
Laminin α 1	GGGG-DVEK RGD REEAHVP	88
Laminin α 3	GGGG-IQ RGD IDAMIS	88
Laminin α 4	GGGG-DAVKQLQAA ERGDA	88
Laminin α 5	GGGG-SETQ RGD VFVP	88
Laminin α 5	GGGG-PASY RGD SC	88
Laminin α & other ECMs	GCGYGR RGD SPG	90
Laminin α	RGD SPK	91
Laminin β 4	GGGG-PMQKMR RGD VFSP	88
Laminin γ 2	GGGG- RGD GTG	88
Laminin γ 3	GGGGEAP RGD VYQG	88
Unknown	DGEA RGD SPKRSR	92

Supplementary Table 1-2. Peptide sequences derived from ECM proteins.^{57,72,87,90-103}

Origin of ECM domain	Peptide sequences	Ref.
Laminin-derived IKVAV containing peptide (abbreviated name)		
Laminin α 1	IKVAV	93
Laminin α 1	SIKVAV	87
Laminin α 1	KYGAAS IKVAVSADR	94
Laminin α 1	GCGYG IKVAV	90
Laminin α 1	CCRR IKVAV WLC (cyclic IKVAV)	57
Laminin α 1	CSRARKQAAS IKVAVSADR	57, 95
Laminin α 1	(RADA)4-GGS IKVAV	96
Laminin α 1	(RADA)4-GG IKVAV	97
Laminin α 1	CIKVAV	98
Laminin α 1	CIKVAVS	72
Laminin α 1	AS IKVAVSADR	91
Laminin α 1	CRKQAAS IKVAVS (D12)	72
Laminin α 1	GIIKVAV	99, 100
Laminin α 1	GCGYG IKVAVADR	90
Laminin α 1	(RADA)4GGS IKVAV	101
Laminin α 1	(RADA)4 IKVAV	97
Laminin α 1	YIGSRWYQNMIRIKVAV	92
Laminin α 1	QHREDGS YIGSRIKVAV	92
Laminin α 1	WQPPRARI YIGSRIKVAV	92
Laminin α 1	A4G3D2 IKVAV	102
Laminin α 1	CSRARKQAAS IKVAVSADR	103

Supplementary Table 1-3. Peptide sequences derived from ECM proteins.^{89,91,98,104,105,111,112}

Origin of ECM domain	Peptide sequences	Ref.
Laminin α chain-derived peptides (abbreviated name)		
Laminin α 1	CGG-TWYKIAFQRNRK	98
Laminin α 1	CIKLLI	98
Laminin α 1	CGG-NRWHSIYITRFG (AG10)	98
Laminin α 1	NRWHSIYITRFG (AG10)	91, 112
Laminin α 1	AASIKVAVSADR (LAM-L)	112
Laminin α 1	SSFHFDGSGYAM (AG22)	112
Laminin α 1	TWYKIAFQRNRK(AG32)	111
Laminin α 1	SLVRNRRVITIQ (AG-56)	91, 112
Laminin α 1	CGG-RKRLQVQLSIRT (AG73)	89
Laminin α 1	RKRLQVQLSIRT (AG73)	91
Laminin α 1	CGG-RLQLQEGRLHFXFD (X=Nle)	89
Laminin α 1	CGG-NRWHSIYITRFG (AG10)	89
Laminin α 2	YHYVTITLDLQQ (A2-8)	111
Laminin α 2	YYDETVASRNLSLN (A2-31)	111
Laminin α 2	MIIFEGNDLRIS (A2-56)	111
Laminin α 2	TNLERVLMQITYN (A2-63)	111
Laminin α 2	GGKLYAIYFEA (A2-112)	111
Laminin α 2	DILYDIHYILIK (A2-122)	111
Laminin α 2	ARLEQMTMNINL (A2-144)	111
Laminin α 2	ANRLLGEINSVI (A2-176)	111
Laminin α 2	AKNISFNATAAF (A2-185)	111
Laminin α 3	PPFLMLLKGSTR	104
Laminin α 5	ASKAIQFLLGG	105
Laminin α 5	QQNLGSVNVSTG	105
Laminin α	SINNNR	91

Supplementary Table 1-4. Peptide sequences derived from ECM proteins.^{72,87,90,91,93,97,98,106,107,109,110,113}

Origin of ECM domain	Peptide sequences	Ref.
Laminin-derived β chain containing peptide (abbreviated name)		
Laminin β 1	YIGSR	72, 87, 93
Laminin β 1	GYIGSRY	106
Laminin β 1	EGGYIGSR	109
Laminin β 1	GCGYGYIGSR	90
Laminin β 1	CDPGYIGSR (p31)	113
Laminin β 1	DCDPGYIGSR (p31-A)	107
Laminin β 1	SDPGYIGSR	90
Laminin β 1	(RADA)4-GGSDPGYIGSR	97
Laminin β 1	SDPGYIGSR	91
Laminin β 1	(RADA)4GGYIGSR	110
Laminin β 1	CRYVVLPR	98
Laminin β 2	CRNIAEIIKDI	98
Laminin β	GRYVVLPR	91
Laminin β	LGTIPG	91
Laminin β	PDSGR	91
Laminin β	PDSGR	72

Supplementary Table 1-5. Peptide sequences derived from ECM proteins.^{87,89,91,97-100,107,108,114}

Origin of ECM domain	Peptide sequences	Ref.
Laminin-derived γ chain containing peptide (abbreviated name)		
Laminin γ 1	CDITYVRLKF	98
Laminin γ 1	CGG-KAFDITYVRLKF	89
Laminin γ 1	CGG-KAFDITYVRLKF	98
Laminin γ 1	CDIRVTLNRL	98
Laminin γ 1	CTTVKYIFR	98
Laminin γ Laminin γ (modified)	TSIKIRGTYS DFKLFVAVY	91
Laminin γ	DRNIAEIIKDIC (p20-A)	107
Laminin γ	RNIAEIIKDI (p20)	114
Laminin γ	(APGVGV)12RNIAEIIKDI (E-p20)	108
Laminin γ	RNIAEIIKDI	91
Laminin γ	DITYVRLKF	91
Laminin γ	DIRVTLNRL	91
Laminin γ	TTVKYIFR	91
Laminin-derived peptide		
Laminin	(RADA)4-GGPDSGR	97
Laminin	LREGGGC	99
Laminin	LREGGGC	100
Laminin	SIYITRF	87
Laminin	IAFQRN	87
Laminin	AGQWHRVSVRWG	87
Laminin	TWSQKALHHRVP	87

Supplementary Table 2. Peptide sequences derived from vitronectin and fibronectin.^{86,88,94,98,105}

Origin of ECM domain	Peptide sequences	Ref.
Vitronectin & fibronectin-derived peptides		
BSP (vitronectin)	KGGNGE RGD TYRAY	94
BSP (vitronectin)	NGE RGD TYRAY	94
Vitronectin	KGGPQV TRGD VFTMP	94
Vitronectin	PQV TRGD VFTMP	88
Vitronectin	TRGD VFT	88
Vitronectin	CKGGPQV TRGD VFTMP	98
Vitronectin	CGKKQRFRRHRNRKG	98
Fibronectin (sFN)	GRGD SPK	94
Fibronectin (IFN)	KGGAV TGRGD SPASS	94
Fibronectin & Other ECM	RGD SP	88
Fibronectin	VT GRGD SPAS	88
Fibronectin	PHSRN RGD SP	105
Fibronectin	GRGD SP	105
Fibronectin	GGGG- RGD SG	88
Fibronectin & Other ECM	GGGG- RGD S	88
Fibronectin & Other ECM	GGGG- RGD	88
Fibronectin	GRGD SF	86
Fibronectin	CRGD S	98
Fibronectin	CGWQP PRARI	98
Fibronectin	CDRVRHSR NSIT	98
Fibronectin	CPHSRN	98
Fibronectin	PHSRN	105
Fibronectin	S PPRRARVT	105
Fibronectin	WQP PRARI	105
Fibronectin	KNNQKSE PLIGR KKT	105

Supplementary Table 3. Peptide sequences derived from ECM proteins.^{83,97,98,108,115-124}

Origin of ECM domain	Peptide sequences	Ref.
Collagen-derived peptides		
Collagen I	GGDGEA	97
Collagen I	CDGEA	98
Collagen I	GFOGER	83
Collagen IV	GGPRGDSGYRGDSG	97
Collagen I	GGFPGERGVVEGPGP	97
Other peptides		
	GGRGDS	97
R-peptide	GRKKRRQRRRGGRGD	115
Heparin binding peptide (HBP)	GGGGSPRRARVTY	124
E7 peptide	EPLQLKM	116
Cyclic RGD	GRGDfE	117
Heparin binding domain	KRSR	118
Enamel matrix derivative	WYQNMIR	119
Angiopoietin-1 peptide	QHREDGS	123
Elastin-like peptide	(APGVGV)₁₂	108
Laminin-derived Bone marrow homing peptides	GGSKPPGTSS (BMHP2)	97, 122
Laminin-derived Bone marrow homing peptides	GGPFSSTKT (BMHP1)	97, 122
Peptide for bone marrow purification	GGFLGFPT	97
Osteocalcin peptide	GHK	120
Artificial peptide	Cyclo(-RGDyK)	121

Supplementary Table 4. Peptide sequences derived from ECM proteins.^{86,100,101,110,125-136}

Origin of ECM domain	Peptide sequences	Ref.
Miscellaneous peptides		
Collagen binding peptide (Osteopontin)	GLRSKSKKFRRPDIQYPDATDEDITSHM	125
Fibronectin binding peptide	GGWSHW	134
Fibronectin binding peptide	GGWSHWSPWSS	134, 135
Fibronectin binding peptide	KRFKQDGGWSHWSP	134, 135
Fibronectin binding peptide	KRFKQDGGWSHWSPWSS	135
Laminin binding peptide	IPCNNKGAHSVGLMWWMLAR	136
Tenascin-C	VFDNFVLK	86
N-cadherin peptide	HAVDI	126
N-cadherin peptide	HAVDIGGGC	128
N-cadherin peptide	VVAGKKGHAV	127
Self-assembling peptide (RADA16-I)	(RADA)4	101, 110
Calcium Phosphate nucleating peptide	EEGGC	130
Cationic antimicrobial peptide	LLGDFFRKSKEKIGKEFKRIVQRIKDFLRNLPRTES	129
Bone sialoprotein	CGNGEPRGDTYRAY	131
Bone forming peptide - 1	CGQGFSYPYKAVFSTQ	131
Bone forming peptide - 1 from BMP-7	GQGFSYPYKAVFSTQ	132, 133
Biodegrading peptide (MMP)	GPQGIWGQ	100

Supplementary Table 5. Peptide sequences derived from growth factors.^{105,137-144}

Origin of ECM domain	Peptide sequences	Ref.
Peptides from growth factors		
FGF-2	ANRYLAMKEDGRLLAS (FGF2-001, hexafin)	105
FGF-2	ERGVSISIKGV (FGF2-002)	105
FGF-2	WYVALKRTGQYKLG (FGF2-003, dekafin)	105
FGF-2	HFKDPKRLYCK (FGF2-004, canofin)	105
FGF-2	FLPMSAKS (FGF2-005, canofin)	105
FGF-2	KTGPGQKAIL (FGF2-006, canofin)	105
FGF-2	YRSRKYSSWYVALKR	142
TGF- β 1	LIANAK (cytomodulin-2)	144
TGF- β 1	LIANAK (Cytomodulin-10)	137
BMP-2	KIPKA SSVPT ELSAI STLYL SGGC	140
BMP-2	CKIPKA SSVPT ELSAI STLYL	138, 141
BMP-9	CGG-KVGKACCVPTKLSPISVLYK	139, 143

Supplementary Table 6 Integrin receptors and their binding ECM proteins.^{87,151}

Integrin receptor	ECM proteins
$\alpha 1\beta 1$	Collagen
$\alpha 2\beta 1$	Collagen, Laminin
$\alpha 3\beta 1$	Collagen, Fibronectin, Laminin
$\alpha 4\beta 1$	Fibronectin, Laminin, VCAM
$\alpha 5\beta 1$	Fibronectin
$\alpha 6\beta 1$	Laminin
$\alpha V\beta 1$	Fibronectin
$\alpha L\beta 2$	ICAM-1, ICAM-2
$\alpha M\beta 2$	Fibrinogen, ICAM-1, Factor X
$\alpha IIIb\beta 3$	Fibronectin, Vitronectin, Fibrinogen, von Willebrand factor
$\alpha V\beta 3$	Fibronectin, Vitronectin, von Willebrand factor
$\alpha V\beta 5$	Fibronectin, Vitronectin
$\alpha V\beta b$	Fibronectin

Supplementary Table 7 Six highly conserved RGD-containing sequences from laminin and RGD-containing sequence.⁸⁷

Origin of ECM chain	Abbreviation	Peptide sequences
Laminin- $\alpha 1$	$\alpha 1-1$	G-TFALRGDNP
Laminin- $\alpha 1$	$\alpha 1-1h$	G-TFALRADNP
Laminin- $\alpha 3$	$\alpha 3$	GIQRGDID
Laminin- $\alpha 4$	$\alpha 4$	LQAAERGDA
Laminin- $\alpha 5$	$\alpha 5-1$	YELHSETQRGD
Laminin- $\alpha 5$	$\alpha 5-2$	YRGDS
Laminin- $\beta 4$	$\beta 4$	RGDVFSPPGMVHG

Supplementary Table 8 Peptides derived from bacterial phage library, which bind to $\alpha 6$ integrin of hESCs.⁶⁰

Abbreviation	Morphology	Peptide sequences
7C-1	Cyclic	FWCMGDGRPRCTG
7C-2	Cyclic	WFCLEDGRPKCDR
7C-12	Cyclic	WNCVMRGDFWCPY
15-23	Linear	KPLRAKREITKLKFG

Supplementary Table 9-1 Peptides, which are used as coating materials on biomaterial surface, for stem cell culture and differentiation.^{98,173,174,178-181}

Cells	Peptides	Substrates	Immobilization	Purpose	Ref.
Collagen-derived peptide					
hBMSCs	DGEA, P15 (GTPGPQIAGQAGVV), GFOGER	Hydroxyapatite disk	Coating (1mg/mL)	Cell attachment & differentiation	173
Fibronectin-derived peptide					
hBMSCs	GRGDdSP (FN receptor)	Hydroxyapatite	Coating (1, 10, 100, 1000 µg/mL)	Cell attachment and spreading	174
HeLa, HepG2, A498, Du145, C6, C2C12 myoblasts and hMSCs	FNIN2 (LSISPSDNAVVLNLLPTGE), FNIN3 (TVYAVTGRGDSPASSKPC)	Polymerized dopamine and polymerized tannic acid	Coating (1 µM)	Adhesion, proliferation and differentiation into osteoblasts	180
Vitronectin-derived peptide					
hBMSCs	GPenGRGDSPCA (VN receptor, Disulfide bond between Pen ² and Cys9), Pen=penicillamine	Hydroxyapatite	Coating (1, 10, 100, 1000 µg/mL)	Cell attachment and spreading	174
hBMSCs	GPenGRGDSPCA, EEEEEEGPenGRGDSPCA (Pen=penicillamine)	Hydroxyapatite	Coating	Cell adhesion, spreading	178
hESCs	Peptide-conjugated polyacrylate (Synthemax)	TCPS	Coating	Cell differentiation into insulin-secreting cells	179
hPSC-derived human neural progenitor cells	Vitronectin derived peptide (CGKKQRFRRHRNRKG, CKGGPQVTRGDVFTMP)	TCPS	Coating (100, 200, 500 µM)	Cell adhesion, proliferation differentiation into neural cells	98
Human neural progenitor cells from non-demented patients, Familial Alzheimer's disease patients, and Sporadic Alzheimer's disease patients	Vitronectin-derived peptide (CGKKQRFRRHRNRKG)	TCPS	Coating (minimum 500uM (885 µg/mL))	Differentiation into astrocytes	181
hPSC-derived neural progenitor cells	Vitronectin-derived peptide (CGKKQRFRRHRNRKG)	Microcarriers (Corning Enhanced attachment microcarriers)	Coating (0.5 mM)	Differentiation into astrocytes	181

Supplementary Table 9-2 Peptides, which are used as coating materials on biomaterial surface, for stem cell culture and differentiation. ^{89,92,98,108,182-185}

Cells	Peptides	Substrates	Immobilization	Purpose	Ref.
Laminin-derived peptide					
hPSC-derived human neural progenitor cells	Laminin a1 derived peptide (CGGTWYKIAFQRNRK, CIKLLI, CGGRKRLQVQLSIRT, CIKVAV, CGGNRWHSIYITRFG), laminin β1 (CRYVVLPR) derived peptide, laminin β2 derived peptide (CRNIAEIIKDI) laminin γ1 derived peptide (CDITYVRLKF, CGGKAFDITYVRLKF, CDIRVTLNRL, CTTVKYIFR), fibronectin derived peptide, collagen derived peptide	TCPS	Coating (100, 200, 500 μM)	Cell adhesion, proliferation differentiation into neural cells	98
Neuro2a (mouse neuroblastoma), rat NPSCs	LN-111 peptides, (AG73, RKRLQVQLSIRT; C16, KAFDITYVRLKF; A99, AGTFALRGDNPQG; AG10, NRWHSIYITRFG; EF1XmR, RLQLQEGRLHFXFD with X=Nle)	TCPS	Coating with peptide-BSA conjugates	Cell attachment, neuronal differentiation, neurite outgrowth	89
mouse hiPSCs	ELP-RGD-ELP-p20, ELP-p20 (p20; RNIAEIIKDI, ELP; (APGVGV)12)	TCPS	Coating (0-1000 nM)	Neural differentiation	108
Human Wharton's Jelly-derived MSCs	YIGSRWYQNMIRIKVAV, QHREDGSYIGSRIKAVAV, WQPPRARIYIGSRIKAVAV, DGEARGDSPKRSR	Multilayer graphene oxide	Coating (50μM)	Proliferation, differentiation into osteoblasts	92
RGD-containing peptide					
hNSCs	FAN-RGD-CSAP, TAMRA-RGD-CSAP, TAMRA-RGD-CSAP, dendri(PEO)6-CSAP, dendri(PEO)10-CSAP	Single-walled carbon nanotube	Coating	Cell differentiation into neurons	182
hBMSCs	RGDC-polyaminoamine dendrimer, Polyamidoamine dendrimer-CRGD	PS	Coating (770 μg/mL)	Cell adhesion, proliferation	183
C2C12 cells (mouse myoblasts)	RGD-DWIVA	Glass plates	Coating	Cell adhesion	184
hADSCs	Cyclic RGD (cyclo(RGDfC))	Poly[Lys(Ser(0.9)-DL-Ala(2.7))], SAK coated on titanium alloy or Bio Oss bovine bone substitute (Geistlich Bio-Oss)	Coating	Cell adhesion, differentiation into osteoblasts	185

Supplementary Table 9-3 Peptides, which are used as coating materials on biomaterial surface, for stem cell culture and differentiation. ^{129,150,177,186,187}

Cells	Peptides	Substrates	Immobilization	Purpose	Ref.
Other types of peptides					
hBMSCs	hBMP-2 (KIPKACCVPTELSAISMLYL), hOCN (γEPRRγEVCyEL), eBMP-2 (KIPASSVPTELSAISTLYL), eBGa3 (KIPASSVPTELSAISTLYL-AAA- γEPRRγEVCyEL), eBGa1 (KIPASSVPTELSAISTLYL-AAA- γEPRRAVAAL), eBGu3 (KIPASSVPTELSAISTLYL-AAA- EPRREVAEL), eBGu1 (KIPASSVPTELSAISTLYL-AAA- EPRRAVAAL)	Hydroxyapatite grown on PLG (Poly(lactide- co-glycolide) films	Coating (100 μg/mL)	Cell differentiation into osteoblasts	177
Rat MSCs	ALKRQGRTLTGPGG (Osteogenic growth peptide)	Titanium implant	Coating	Cell attachment, cell proliferation, cell differentiation into osteoblasts	186
Rat BMSCs	LL-37 (LLGDFFRKSKEKIGKEFKRIVQRIK DFLRNLVPRTES)	Titanium implant	Coating (5, 50, 100 μg/ mL)	Cell adhesion, cell viability, cell migration, and cell differentiation into osteoblasts	129
hESCs (H9), hiPSCs	Decellularized peptides from bovine neural retina, retinal pigment epithelium	Polystyrene dishes	Coating	Cell differentiation into retinal organoids	187
iPSC-derived neuroepithelial progenitors	p51 peptide, pV1, pM2, pIIB3 peptides	Vinylsulfone functionalized polyvinylalcohol hydrogels	Coating (30 μg/cm ²)	Cell adhesion, proliferation & differentiation	150

Supplementary Table 10-1 Peptides, which are grafted on biomaterial surface, for stem cell culture and differentiation.^{57,60,91,93,94,159,204-211}

Cell	Peptide	Substrates	Reaction method	Purpose	Ref.
Gold-sulfur reaction					
hESCs (H1, H9)	DITYVRLFKF, DIRVTNLRL, TTVKYIFR, RNIAEIIKDI, RYVVLPR	SAM of alkanethiolates on Gold surface	Gold-sulfidyl reaction	Proliferation (cell attachment)	91
hBMSCs	GGGGWGGGRGDSP, BMP receptor binding peptides (BR-BP; GGGKIPKASSVPTELSAISTLYL), Heparin proteoglycan-binding peptide (HPG-BP; GGGKRTGQYKL)	SAM of alkanethiolates on Gold surface	Gold-sulfur reaction	Proliferation (cell attachment), Osteogenic differentiation	204
Human neural stem/progenitor cells	CSRARKQAASIKVAVSADR, CCRRIKVAWLC	Gold surface	Gold-sulfur reaction	Cell attachment, proliferation, migration. Differentiation	57
hADSCs	Cystein modified quadruple-branched RGD	Nanopatterned graphene oxide	Gold-sulfur reaction	Differentiation into osteoblasts	205
Mouse BMSCs (MSCD1)	CALNNAGRKKRRQRRR (cell penetrating peptide)	Gold nanorods conjugated thiolated PEG5000	Gold-sulfur reaction	Cell labelling	206
hESCs (WA01)	11-mercaptoundecanoic acid (MUA)-GGNGEPRGDTYRAYK, 11-MUA-bspRGD(15) (CGGNGEPRGDTTRAT), 11-MUA-GKPLRAKREITKLKFG, 11-MUA-GGRKLRQVQLSIRT, 11-MUA-Ag73 (RKRLQVQLSIRT), FWCMDGGRPRCTG (7C-1)	Au/Pd sputter-coated surface	Gold-sulfur reaction	Cell attachment and proliferation	60
Carbodiimide & succinimide reaction					
Rat Neural stem cells	GGNGEPRGDTYRAY, GRGDSP	Self-assembled Phospholipid bilayer	Dicyclohexylcarbodiimide reaction	Cell adhesion, proliferation, differentiation	207
Mouse Neural stem cells (NE-4C)	IKVAV	PNIPAM-b-poly(acrylchloride)-PEG-IKVAV	DCC/NHS reaction	Cell survival and Differentiation	208
Rat cortical astrocytes, rat skin fibroblasts (CRL-1213)	IKVAV, RGDS, YIGSR, KHIFSDDSE (NCAM).	Glass coverslips	Carbodiimide chemistry (EDC reaction)	Cell attachment	209
hADSCs	G4RGDSP	Oxidized alginate hydrogels	Carbodiimide chemistry (EDC reaction)	Proliferation (cell attachment)	210
hADSCs	RGD, YIGSR, CRARKQAASIKVAVSADR (IKVAV)	Polycaprolactone disk	Aminolysis, EDC/NHS reaction	Cell attachment, proliferation	93
hESCs (H1, H7)	Ac-KGGPQVTRGDVFTMP (VN), KYGAASIKVAVSADR (LM), Ac-KGGNGEPRGDTYRAY (BSP), NGEPRGDTYRAY (BSP), GRGDSPK (sFN), Ac-KGGAVTGRGDSPASS (IFN)	Polyacrylate film	Carbodiimide chemistry (EDC/NHS reaction)	Cell proliferation, differentiation	94
hiPSCs (UMC-C1)	KGGPQVTRGDVFTMP (VN peptide) (Chinapeptides Co. Shanghai)	poly(OEGMA-co-HEMA) film (SAM)	Succinic reaction & EDC/NHS reaction	Cell proliferation	211
hiPSCs	KGGPQVTRGDVFTMP	Polyvinylalcohol/hyaluronan electrospinning nanofibers	Carbodiimide chemistry (EDC/NHS reaction)	Cell attachment	159

Supplementary Table 10-2 Peptides, which are grafted on biomaterial surface, for stem cell culture and differentiation.^{95,115, 131,132,160-162,164,212-215}

Cell	Peptide	Substrates	Reaction method	Purpose	Ref.
hESCs (H9), hiPSCs (HPS0077)	KGGPQVTRGDVFTMP	Poly(vinylalcohol-co-itaconic acid) hydrogels	Carbodiimide chemistry (EDC/NHS reaction)	Proliferation	164
Rat BMSCs	KRSR, FHRRKA (heparin binding domain, bone mineralization)	Plasma treated-Polyhedral oligomeric silsesquioxane (POSS) nanoparticle crosslinked with polycarbonate-based urea-urethane film	Carbodiimide chemistry (EDC/NHS reaction)	Cell attachment and differentiation (osteoblast)	272
hiPSCs (UMC1-C1), hESCs (H9)	KGGPQVTRGDVFTMP (VN peptide), KGGQFSYPYKAVFSTQ (BFP-1 peptide)	Carboxymethyl chitosan-grafted polydopamine surface (polydopamine-coated dishes)	Carbodiimide chemistry (EDC/NHS)	Cell attachment, proliferation, differentiation into osteoblasts	160
Rat BMSCs	KIPKASSVPTLSAISTLYL (BMP peptide)	Mesoporous silica nanoparticles	Activation by 3-aminopropyltriethoxysilane and EDC/NHS reaction	Cell viability, differentiation into osteoblasts	212
hMSCs	RGD	Gold nanoparticles	Poly(amidoamine) coating and maleimide-amine reaction, EDC/NHS reaction	Gene delivery	213
Murine multipotent cells (C3H10T1/2, MSCs)	pBSP (CGNGEPRGDTYRAY), pFibro (CGGPHSRNGGGGGRGDG), pBMP-9 (CGGKVGKACCVPTKLSPISVLYK)	Polycaprolactone films	Carbodiimide chemistry (EDC/NHS reaction), S-S binding exchange reaction	Cell adhesion	131
hESCs (H9), hiPSCs (HPS0077)	VN1 (KGGPQVTRGDVFTMP), VN1G (GGGGKGGPQVTRGDVFTMP), VN2C (GCGGKGGPQVTRGDVFTMP), BSP (KGGNGEPRGDTYRAY), HBP1 (GKKQFRHRNRKG), HVP2C (GCGGKQFRHRNRKG)	Poly(vinylalcohol-co-itaconic acid) hydrogels	Carbodiimide chemistry (EDC/NHS reaction)	Cell proliferation, pluripotency, differentiation	161
Human neural stem cells	CSRARKQAASIKVAVSADR	Silk fibroin hydrogels	EDC/NHS reaction	Cell viability, proliferation, differentiation into neuron	95
hiPSCs (hNF-C1), hESCs (H9)	VN peptide (KGGPQVTRGDVFTMP)	Carboxymethyl chitosan-coated polycaprolactone nanofibers	Carbodiimide chemistry (EDC/NHS)	Cell proliferation, pluripotency, differentiation into osteoblasts	162
hMSCs	BFP-1 (GQGFSYYPYKAVFSTQ) from BMP-7	Carboxymethylchitosan-grafted polydopamine-coated surface	Carbodiimide chemistry (EDC/NHS reaction)	Cell viability, antiinflammatory activity assay, differentiation into osteoblasts	132
hBMSCs (Lonza)	EEEEEEEDGWA (collagen I peptide), 25 uM of 100uL	Poly(butylene succinate)/β-tricalcium phosphate scaffold	Carbodiimide chemistry (EDC/NHS reaction)	Osteogenic differentiation	214
hBMSCs	GRKKRRQRRRGGGRGD (R peptide)	Electrospinning polycaprolactone nanofibrous scaffolds	Plasma treatment, Carbodiimide chemistry (EDC/NHS reaction)	Cell spreading, cell proliferation	115
hBMSCs	EEEEEE (Glu), DDDDDD (ASP), EEEEEEK, DDDDDDK	PLGA electrospinning nanofibers	Plasma treatment, Carbodiimide chemistry (EDC/NHS reaction)	Cell adhesion, differentiation into osteoblasts	215

Supplementary Table 10-3 Peptides, which are grafted on biomaterial surface, for stem cell culture and differentiation.^{68,105,109,163,168,216-222} [1-12]

Cell	Peptide	Substrates	Reaction method	Purpose	Ref.
hiPSCs (hNF-C1)	VN (KGGPQVTRGDVFTMP), Bone forming Protein peptide (KGGQGFSYPYKAVFSTQ)	Carboxymethyl chitosan-immobilized dishes	Carbodiimide chemistry (EDC/NHS)	Cell adhesion, proliferation, colony formation, differentiation into osteoblasts	163
hiPSCs (hNF-C1)	KGGPQVTRGDVFTMP, KGGQGFSYPYKAVFSTQ (BFP)	Carboxymethyl chitosan hydrogels	Carbodiimide chemistry (EDC/NHS)	Cell proliferation and differentiation (osteoblast)	163
hADSCs	EGGYIGSR	Chitosan coated dishes	Carbodiimide chemistry (EDC/NHS)	Cell attachment, pluripotent stem cell marker expression	109
hESCs (H1), hiPSCs (HPS0076), hiPSCs (hUSiPS1)	rMAP-ASKAIQFLLGG, rMAP-QQNLGSVNVSTG, rMAP-PHSRN, rMAP-RGD, rMAP-GRGDSP, rMAP-PHSRN-GRGDSP, rMAP-SPPRRARVT, rMAP-WQPPRARI, rMAP-KNNQKSEPLIGRKKT, rMAP-NRWHSIYITRFG, rMAP-TWYKIAFQRNRK	Cell culture plate	Carbodiimide chemistry (EDC/NHS)	Cell attachment and proliferation	105
hPSCs (H1)	E-cadherin mimicking peptides; HAV10 (LFSHAVSSNG), HAV6 (SHAVSS), ADT10 (QGADTPPVGV), ADT6 (ADTPPV)	Alginate hydrogels	Carbodiimide chemistry (EDC/NHS)	Proliferation	216
hESCs (H1), hiPSCs (HPS0077)	GGGGPASYRGDSC, GGGGKGGPASYRGDSC PMQKMRGDVFSP, GGGGPMQKMRGDVFSP, GGGGKGGPQKMRGDVFSP, GCGGKGGPQKMRGDVFSP, GGGGKGGPQVTRGDVFTMP, GCGGKGGPQVTRGDVFTMP	Polyvinyl(alc ohol-co-itaconic acid) hydrogels	Carbodiimide chemistry (EDC/NHS)	Proliferation, Differentiation into cardiomyocytes	68
hPSCs (H9), hiPSCs (NL1)	VN1 (KGGPQVTRGDYCTFP)- and VN2 (KGGPGVTRGDYFTFP)-conjugated nussel adhesive protein	TCPS dishes or nanofiber	Carbodiimide chemistry (EDC/NHS reaction)	Differentiation into Oligodendrocytes	168
Rat BMSCs	Graphene paper binding peptide (TWWNPRLVYFDY)	Hydroxyapatite rod, graphene paper	Carbodiimide chemistry (EDC/NHS)	Attachment, proliferation, osteogenic differentiation	217
Rat BMSCs	G4RGDSP	Alginate hydrogels	Carbodiimide chemistry (EDC/Sulfo-NHS)	Bone formation	218
hBMSCs	Cyclic RGD (G4CRGDSPC), G4RGDSP (linear)	Alginate hydrogels	Carbodiimide chemistry (EDC/sulfo-NHS)	Cell differentiation into osteoblasts	219
hBMSCs	GGGGRGDY	Alginate scaffold	Carbodiimide chemistry (EDC/sulfo-NHS)	Cell adhesion, differentiation into chondrocytes	220
Murine osteoblast (7F2), Murine MSCs (D1s)	G4DWIVA, G4RGDSP CGKIPKASSVPTLSAISTLYL (Lysine-containing BMP-2 knuckle epitope peptide)	Alginate hydrogels	Carbodiimide chemistry (EDC/sulfo-NH)	Cell differentiation into osteoblasts	221
Nurine MSCs (D1), Rat BMSCs	GGGGDGEASP (collagen I mimetic peptide DGEA), GGGGRGDSP	Alginate hydrogels	Carbodiimide chemistry (EDC/Sulfo-NHS)	Cell adhesion, differentiation into osteoblasts	222

Supplementary Table 10-4 Peptides, which are grafted on biomaterial surface, for stem cell culture and differentiation.^{57,117,124,133,223-229}

Cell	Peptide	Substrates	Reaction method	Purpose	Ref.
hMSCs	RGD peptide (GGGGRGDASSP), Bone forming peptide-1 (BFP-1, GQGFSYPYKAVFSTQ from BMP-7)	Mesoporous silica nanoparticles (pep@MSNs) - loaded Alginate hydrogels	Carbodiimide chemistry (EDC/Sulfo-NHS)	Cell differentiation into osteoblasts	223
hBMSCs	BFP-1 (GQGFSYPYKAVFSTQ) from BMP-7	Alginate scaffolds	Carbodiimide chemistry (EDC/Sulfo-NHS)	Cell adhesion, proliferation, differentiation into osteoblasts	133
hESC (H9)-derived cardiomyocytes, dermal fibroblasts	G4RGDY, G4SPRRRARVTY (Heparin binding peptide)	Alginate scaffolds	Carbodiimide chemistry (EDC/Sulfo-NHS)	Cell adhesion, cell function maintenance	124
Rabbit BMSCs	(GPO)8-CG-RGDS	Hyaluronic acid hydrogels	Carbodiimide chemistry (EDC/sulfo-NHS)	Cartilage differentiation	224
Neural stem cells	RGDSP, cyclic(RGDfK)	PEG-NHS diacrylate hydrogels	NHS chemistry (PEG-NHS & peptide), photo-initiated polymerization	Cell differentiation into neuron, astrocytes	225
Thiol-ene reaction					
hBMSCs	CRGDSD, CRGDSCG, CGGGGGGGGRGDSD	PEG (PEGDA) hydrogels	Photo-initiated thiol-acrylate reaction	Cell survival	226
hMSCs	GCGYGRGDSPG	Acrylated PEG hydrogels functionalized with acryloyl chloride	Michael type addition (Thiol-ene Click reaction) using acrylated PEG	Cell viability, differentiation into chondrocytes	227
hBMSCs	CGRGDS	Self assembled polystyrene-block-polyethylene oxide	Michael-type addition (Maleimide-thiol reaction)	Cell adhesion, Cell spreading, differentiation into osteoblasts	228
Rat neural stem/progenitor cells	rat PDGF-A, GLNDIFEAQKIEWHE, EFPKPSTPPGSSGGAP	Hyaluronan-methyl cellulose	Michael-type addition (Maleimide-thiol reaction), biotin ligase enzyme, Avidin-biotin reaction, maleimide-streptavidine	Injectable hydrogels, cell viability, cell differentiation into oligodendrocytes	229
Human neural stem/progenitor cells	CSRARKQAASIKVAVSADR, CCRRIKVAVWLC	PEG hydrogels	Michael-type addition reaction (thiol-ene reaction)	Cell attachment, proliferation, migration. Differentiation	57
Rat BMSCs	Cyclic RGD (GRGDfE-C12-C12-C), BFP-1 (CGQGFSYPYKAVFSTQ)	Quartz plate	Aminosilane reaction, Michael-type addition (Maleimide-thiol reaction)	Cell adhesion, differentiation into osteoblasts	117

Supplementary Table 10-5 Peptides, which are grafted on biomaterial surface, for stem cell culture and differentiation. ^{90,126,128,130,138,203,230-236}

Cell	Peptide	Substrates	Reaction method	Purpose	Ref.
Rabbit BMSCs	Cytomodulin-10 (LIANAK, LIANAKC for Crick reaction), cytomodulins (growth factor-b1 mimicking peptide cytomodulin), P24 (KIPKA SSVPT ELSAI STLYL SGGC, BMP-2 mimicking peptide)	Injectable PLLA-g-PHEMA-acrylic nanofibrous hollow microspheres	Michael type addition (Thiol-ene Click reaction)	Cell differentiation into chondrocytes, osteoblasts	230
hMSCs	EEGGC	PLA (electrospun nanofibers)	Acryloyl chloride reaction, Michael addition (thiol-ene reaction)	Cell differentiation into osteoblasts	130
rat MSCs	KKRGDfKKEGCc(cRGD-K), DDRGDfDDEGCc(cRGD-D), GGRGDfGGEGCc(cRGD-G), PFSSTKTEGC(cBMHP1)	Quartz plate	Aminosilane reaction, Michael-type addition (Maleimide-thiol reaction)	Cell adhesion, differentiation into osteoblasts	231
hBMSCs	CG-K(PEG3-TAMRA (5-carboxytetramethylrhodamine))-GGRGDS (Ref 22), CKIPKASSVPTELSAISMLYL (BMP-2 peptide, 73-92)	Aminated glass	Aminosilane reaction, Michael-type addition (Maleimide-thiol reaction)	Cell differentiation into osteoblasts	138
hBMSCs (SCR108)	[RGDS-Ahx-Ahx (Ahx: 2-Aminohexanoic acid)]-(PHSRN-Ahx-Ahx)-K-βA-C (Branched peptide), MPA-Ahx-Ahx-RGDS, MPA-Ahx-Ahx-Ahx-PHSRN, (MPA: 3-mercaptoproionic acid)	Ti surface	Aminosilane reaction, Michael-type addition (Maleimide-thiol reaction)	Cell adhesion (attachment), cell differentiation into osteoblasts	232
Murine ESCs	HAVDIGGGC (HAVDI, n-cadherin peptide)	PEG dimethacrylate hydrogels	Michael addition (thiol-ene reaction) (Alkene-sulfhydryl reaction)	Cell survival, cell differentiation into neural cells	126
hiPSC (ND2.0)-derived neural stem cells	HAVDIGGGC (N-cadherin peptide)	PEG dimethacrylate hydrogels	Michael-type addition (thiol-ene reaction)	Cell survival, differentiation	128
Dental pulp pluripotent-like stem cells	CRRR, CKKK, CHHH, CDDD	Acrylate-terminated Poly(β-amino ester)	Michael addition (Alkene-thiol reaction)	Gene delivery, cell differentiation into osteoblasts	233
hiPSCs	CGGPQVTRGDVFTMPK (VN peptide)	Chitosan films	NHS-PEG-Maleimide reaction (Michael-type addition (Maleimide-thiol reaction))	Cell proliferation, pluripotency	234
hBMSCs	CG-K(PEG3-TAMRA (5-carboxytetramethylrhodamine))-GGRGDS, CKIPKASSVPTELSAISMLYL (BMP-2 peptide, 73-92)	Borosilicate Glass slides	Michael-type addition (Maleimide-thiol reaction) using APTES and SMPB	Cell adhesion, differentiation into osteoblasts	235
hESC (H9)-derived Neural stem/progenitor cells	RGD (GCGYGRGDSPG), IKVAV (GCGYGIKVAVADR), YIGSR (GCGYGYIGSR)	Hyaluronic acid Hydrogels	Michael-type addition (Maleimide-thiol reaction)	Cell proliferation, differentiation into oligodendrocytes & neurons	90
BMSCs	BMP-2 peptide (SKIPKASSVPTELSAISTLYL DDDD)	Polydopa-coated Nano hydroxyapatite/PLLA/gelatin nanofibers	Michael addition & Schiff base reaction)	Cell differentiation into osteoblasts	203
hPSCs (H9)	cyclo(RGDfK)	Porous thiol-acrylate high internal phase emulsion materials (polyHIPE)	Michael-type addition (Maleimide-thiol reaction)	Cell attachment	236

Supplementary Table 10-6 Peptides, which are grafted on biomaterial surface, for stem cell culture and

Cell	Peptide	Substrates	Reaction method	Purpose	Ref.
Human ADSCs	CSRARKQAASIKVA/VSADR	N-methacrylate glycol Chitosan hydrogels	Michael type addition (Methacrylate- thiol reaction)	ADSC delivery and angiogenesis	237
hiPSCs, hiPSC- derived neuroepithelial progenitors	p51 (CDTFPYLGGWWNPNEYRY), pV1, pM2, pIb3 peptides	Vinylsulfone functionalized polyvinylalcohol hydrogels	Vinylsulfone- thiol reaction	Cell adhesion, proliferation, differentiation	150
Rat BMSCs	WEAKLAKALAKALAKHLAKALAKALKAC EA (KALA peptide)	Mesoporous silicon nanoparticles (MSN)	SPDP reaction (thiol-ene reaction)	Cell viability, osteogenic differentiation	238
hDPSCs	SH-KIPKASSVPTLSAISTLYL (BMP-2- mimetic peptide), C terminal end (N- terminal end?)	Gelatin methacrylate- Bioprinted constructs	Michael addition (thiol- ene reaction)	Differentiation into osteoblasts (dental constructs)	239
Rat BMSCs	Vasoactive intestinal peptide (CFTDNYRLRKQMAVKKYNSILN), RGD (GCGYGRGDSPG)	Methacrylated Hyaluronic acid hydrogels crosslinked with dithiothreitol	Michael addition (thiol- ene reaction)	Differentiation into osteoblasts	240
Rabbit BMSCs	(GPO)8-CGRGDS [Collagen mimetic peptide], GCRDGPQIWGQDRCG [MMP sensitive peptide]	Hyaluronic acid hydrogels	EDC/sulfo-NHS, Michael type addition (Methacrylate- thiol reaction)	MSC differentiation into cartilage	224
Rat neural stem/progenitor cells	Laminin-111 peptide (AG73(CGG- RKRLQVQLSIRT), C16 (CGG- KAFDITYVRLKF), A99 (CGG- AGTFALRGDNPQG), AG10 (CGG- NRWHSIYTRFG), EF1XmR (CGG- RLQLQEGRLHFXFD), x=Nle)	Maleimido-functional BSA	Michael-type addition (Maleimide- thiol reaction)	NPSC adhesion and differentiation	89
Rat neural stem/progenitor cells	CGGRKRLQVQLSIRT (AG73, mouse LN α 1 chain), CGGKAFDITYVRLKF (C16, mouse LN γ 1 chain), CGGAGTFALRGDNPQG (A99, mouse LN α 1 chain), CGGNRWHSIYTRFG (AG10, mouse LN α 1 chain), CGGRLQLQEGRLHFXFD (X=Nle) (EF1XmR, mouse LN α 1 chain)	Maleimide-BSA coated TCPS surface	Michael type addition (Maleimide- thiol reaction)	Differentiation into neuron and astrocytes	89
HUVECs, Murine Neural precursor cells	WGGRGDSP, AGTFALRGDNPQG, ALRGDN, cRGD, ALRGDNGGKIKVAV, ALRGDNGGYIGSR, ALRGDNGGVGVAPG, ALRGDNGGEIKLLIS, ALRGDNLRLSR, KQNCLSSRASFRGCVRNLRLSR, FRLVFRYG	Amino-PEG- Cellulose paper, cellulose	DIC/HOBt reaction, Michael type addition (thiol-Maleimide reaction), SMCC reaction	Cell attachment	241
Azide reaction					
hMSCs	RGDSP, TYRSRKY (a heparin/heparan sulfate-binding peptide)	Gold surface	EDC/NHS reaction, CuAAC reaction	Cell adhesion, spreading	242
mESCs (D3)	GYIGSR	Aligned and random polylactide nanofibers	Azide-peptide & DIBO reaction	Cell differentiation into neurons	243
hESCs (Mel-1 mCherry)	GRGDG	Alkyne-PNIPAM-b- PSt nanoworm hydrogels	CuAAC Click reaction	Proliferation	244

Supplementary Table 10-7 Peptides, which are grafted on biomaterial surface, for stem cell culture and differentiation.^{99,100,198,245-249}

Cell	Peptide	Substrates	Reaction method	Purpose	Ref.
mESCs (D3)	LREGGGC, GIKVAV (Laminin peptide)	Hyaluronic acid hydrogels	Michael addition (Alkene-sulfidyl reaction), EDC/NHS reaction, DBCO-Azide click reaction	Cell proliferation, pluripotency, differentiation into neural cells	99
Rabbit BMSCs	cyclo(RGDfK), HAVDIGGGK (N-cadherin mimetic peptide)	Poly(L-glutamic acid) hydrogels	Carbodiimide chemistry (EDC/NHS reaction), azide-alkyne cycloaddition (SPAAC) reaction	Cell adhesion, differentiation into chondrocytes	245
Mouse BMSCs (D1)	HAVDIGGGK (N-cadherin-mimetic peptide)	Polyacrylamide hydrogels	sulfo-SANPAH reaction	Cell attachment, differentiation into myocytes, secretion of VRGF, IGF-1	246
Mouse MSCs (D1)	Ac-HAVDIGGGK-OH, N-cadherin EC1-5, N-cadherin EC1-2	Polyacrylamide hydrogels	sulfo-SANPAH reaction	Paracrine secretion of MSCs, Myogenic differentiation	246
Peripheral blood cells, mouse MSCs, human umbilical arterial smooth muscle cells (HUASMCs), HUVECs	Endothelial progenitor cell-targeting peptide (TPSLEQRTVYAL)	TiO ₂ -coated 316L SS substrates	Click reaction using azide (Azide-alkene reaction), N ₃ -PEG5-COOH, DBCO-maleimide	Cell adhesion and proliferation	198
hiPSC-derived neural stem cells	LREGGGC, IKVAV, KCGPQGIWGQCK	Hyaluronic acid hydrogels	Michael-type addition (Maleimide-thiol reaction), azide-DBCO reaction	ECM remodeling, Neurite extension	100
hADSCs	Protamine peptide (CVSRRRRRRGGRRRR)	Poly-(amidoamine) (G5) dendrimer	SPDP reaction (thiol-ene reaction)	Gene delivery (GFP, IL-12 plasmid)	247
rat BMSCs	GGGRGDSGGGY	Poly(N-(2-hydroxyethyl)-L-glutamine) hydrogels	CuAAC reaction between azidoacetic peptide and propargylated unit of Poly(N-(2-hydroxyethyl)-tyramine (azide-alkyne reaction)	Proliferation	248
Acrylated or methacrylated peptide reaction					
BMSCs	(Proline-Hydroxyproline-Glycine) ⁷ -tyrosine	PEG hydrogels	Copolymerization using acryloyl-PEG-peptide with PEGDA	Cell viability, cell differentiation into chondrocytes	249
hBMSCs	GRGDS, GCRDGPQGIWGQDRCG (MMP-sensitive peptide)	PEG hydrogels	Acrylated reaction using acryloyl chloride and polymerization	Cell viability, cell differentiation into osteoblasts and chondrocytes	250

Supplementary Table 10-8 Peptides, which are grafted on biomaterial surface, for stem cell culture and differentiation.^{87,88,104,120,201,237,251-256}

Cell	Peptide	Substrates	Reaction method	Purpose	Ref.
hADSCs, hiPSC-derived CM	RGDSP, PMQKMRGDVFSP (β 4), SETQRGDVFVP (α 5-1), PQVTRGDVFTMP (Vn), VTGRGDSPAS (Fn), PASYRGDSC (α 5-2), DAVKQLQAAERGDA, TRGDVFT (VN-2), DVEKRGDREEAHVP (α 1), IQRGDIDAMIS (α 3), RSDGTG (γ 2), EAPRGDVYQG (γ 3)	PEG hydrogels	Random copolymerization of PEGDA and methacrylated peptide	Cell adhesion	88
Human ADSCs	GGGGRGDS	N-methacrylate glycol Chitosan hydrogels	N-acryloxysuccinimide reaction to peptides & copolymerization	ADSC delivery and angiogenesis	237
HUVECs	RGDS, AGQWHRVSVRWG, SIKVAV, YIGSR, SIYITRF, IAFQRN, TWSQKALHHRVP (+ RGD)	PEG hydrogels	Copolymerization of Methacrylated peptide and PEGDA	Cell attachment	87
Diels-alder reaction					
Rat Neural stem/progenitor cells	GRGDS (fibronectin-derived peptide)	Gellan gum hydrogels	Diels-Alder chemistry between maleimide with furan	Cell survival, outgrowth, differentiation	251
BMSCs	E7 (CEPLQLKM)	Maleimide functionalized poly(carbonate ester)	Diels-Alder reaction, Michael-type addition (Maleimide-thiol reaction)	Cell adhesion, proliferation	252
Other reactions					
Neural stem cells	C(K)GGYIGSR, C(K)GGRGD	PSt, PLGA, Silica, Titanium surface	Polydopamine coating, Michael type addition	Proliferation and differentiation	253
hADSCs	BMP-2 peptide (KIPKASSVPTELSAISTLYLGKK)	Polyurethan acrylate-polyglycidyl methacrylate nanopatterned surface	Epoxide-amine reaction	Cell differentiation into osteoblasts	254
hADSCs	KIPKASSVPTELSAISTLYLGKK	Poly(lactic-co-glycolic acid) PLGA scaffold	Polydopamine coating, Michael type addition	Cell differentiation into osteoblasts	201
hESCs (H9, H7, H14, H1, IMR90-4)	GAG-binding protein (GBP), GKKQRFRHRNRKG, GNGEPRGDTYRAY (BSP), GPQVTRGDVFTMP (VTN), GGKAFDITYVRLKF (C16), Cyco[RGD-D-FK(biotin-PEG-PEG)] (cRGD), GGCRRETAWAC (CRRETAWAC)	Streptavidin-coated dishes	Avidin-biotin reaction	Differentiation into ectoderm, motor neuron, endoderm, mesoderm lineage	255
Rat BMSCs	PPFLMLLKGSTR	Hyaluronic acid Hydrogels	Carbonyldiimidazole (1,10-carbonyldiimidazole) reaction	Cell viability, cell adhesion, Regeneration of spinal cord tissue in rat SCI model	104
UCB-MSCs (3D)	GHK peptide (GGGGGHKSP)	Oxidized alginate (Alginate di-aldehyde, ADA)	Aldehyde-amine reaction	Cell viability, differentiation into osteoblasts	120
Human periodontal ligament stem cells	SDSSD	Sodium alginate/gelatin/nano-hydroxyapatite hydrogels	Physical Mixing	Osteogenic differentiation, bone formation, bone healing	256