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Review article

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Synthetic extracellular matrices with function-encoding peptides

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Synthetic extracellular matrices with function-encoding peptides

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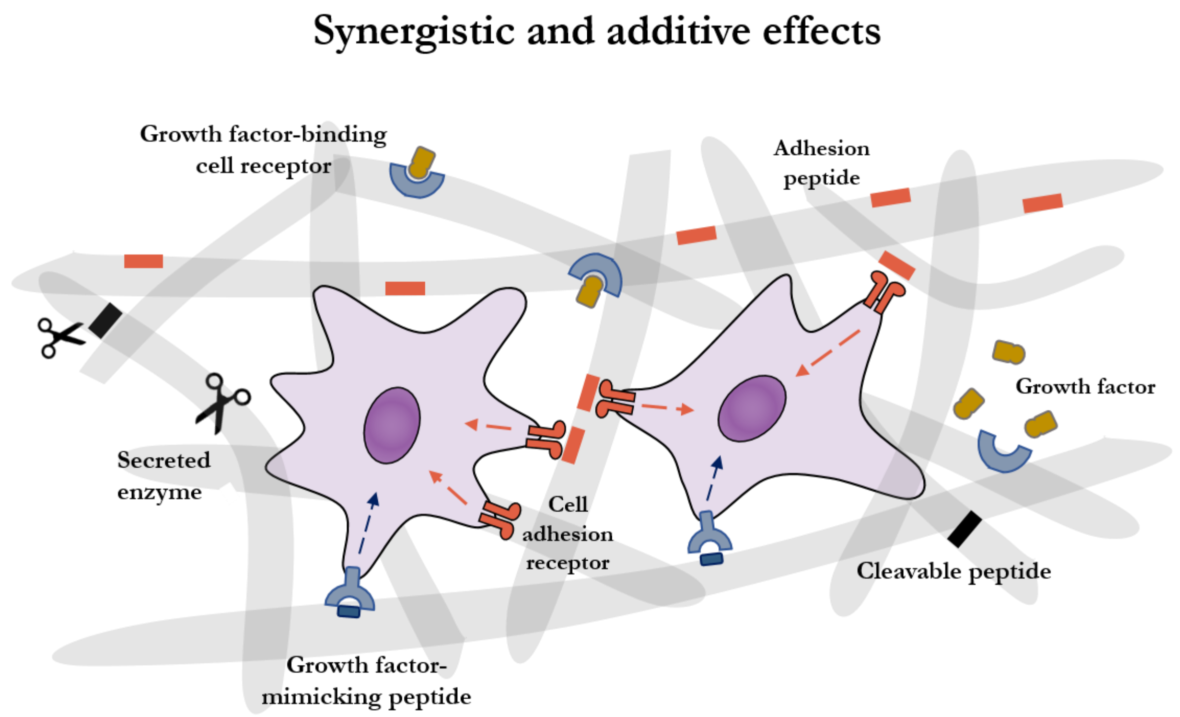

Supplementary figure 1. *Multiple peptide epitopes can be employed in synthetic matrices to achieve synergistic and additive effects. Cell adhesion, growth factor-mimetic, growth factor-binding and cleavable peptides can be used together to elicit a desired cell function.*

The following tables are extended versions of Tables 1-4.

Supplementary Table 1. *Peptide sequences exploited within synthetic scaffolds for direct signalling.*

	Source	Peptide Epitope	Hydrogel / Substrate	Cells/Tissue (source)	Application	Ref
Cell Adhesion Peptides	Fibronectin	RGDS, GRGDS, YRGDSCGRGDS, CGRGDSY, RGDSPASSKP	PVA	HDFs (human)	Cell adhesion / in vitro model	1
			PEG	SMCs (rat), HUVECs, HDFs (human), IC-21 (mouse)	Cell adhesion / in vitro model	1
			PEG/PPO/PEG	3T3 (mouse)	Cell adhesion / in vitro model	1
			PHEMA	3T3 (mouse)	Cell adhesion / in vitro model	1
			RGDSPFEFEFKFK	CPCs, Heart (rat)	Cell delivery	2
			Fmoc-FF/RGD	HDFs (human)	Cell adhesion / in vitro model	3
			E_3G_3Ada-PA	3T3 (mouse)	Cell adhesion studies	4
			RADA16	hTSPCs (human)	Tendon regeneration	5
		KQAGDV	Peptide-coated plates	Platelets (human)	Cell adhesion studies	6
		PRARI	Peptide crystal	-	Cell adhesion	6
	Laminin	IKVAV, SIKVAV, CQAASIKVAV, CSRARKQAASIKVAVSADR	p(HEMA-co-AEMA)	DRGs (chicken)	Cell adhesion / in vitro model	7
			PEGDA	HUVECs (human), 10T1/2 (mouse)	Cell tubulogenesis	8
			PEG	Primary NP cells (human)	Cell adhesion / in vitro model	9
			RADA16	NSCs (mouse)	Cell adhesion / in vitro model	10
			PA	Spinal cord (mouse)	Nerve regeneration	11
		YIGSR, CDPGYIGSR	PUU-PEG	BAECs (bovine)	Cell adhesion / in vitro model	12
			RADA16	NSCs (mouse)	Cell adhesion / in vitro model	10
			RAD16-I	Hepatocytes (rat)	Cell adhesion / in vitro model	13
		CGGRKRLQVQLSIRT	PEG	Primary NP cells (human)	Cell adhesion / in vitro model	9
		PDSGR	RADA16	NSCs (mouse)	Cell adhesion / in vitro model	10
		RKRLQVQLSIRT	PEGDA	VECs (porcine)	Endothelialization / in vitro model	14
		VFDNFVLK	PA	PC12 (rat)	Neural differentitaion	15

				MSCs (rat)	Osteogenic differentiation	16
			Acetyl-VFDNFVLK	L929, C6, 3T3, LN18 (mouse)	Cell adhesion / in vitro model	17
		RNIAEIIKDI	Polypyrrole	E18 Sprague Dawley cortices (rat), Astrocytes (mouse)	Cell adhesion / in vitro model	18
		RYVVLPR	RAD16-I	HAEC (human)	Endothelialization / in vitro model	19
		AGQWHRVSVRWG	PEG	Diabetic Wound Healing Model (mouse)	Wound healing	20
		IKLLI	Peptide coated plates	Melanoma cells (mouse), HT1080 (human) B16F10 (mouse) NG108-15 (rat), CPAE (bovine), RD (human)	Cell adhesion studies	6
		SINNNR	Peptide coated plates	HT1080 (human)	Cell adhesion studies	6
		LRGDN	Peptide coated plates	HDF (human), PC12 (rat)	Cell adhesion studies	6
	Collagen	POG	Col-PA/E-PA	MSCs (rat), Disc (rabbit)	Intervertebral disc regeneration	21
			KOD	Platelets (human)	Haemostasis	22
		DGEA	PA	MSCs (human)	Osteogenic differentiation	23
				MSC, HUVEC (human)	Osteogenic differentiation	24
		(PKG)$_4$-(POG)$_4$-(DOG)$_4$	PEG	Neuronal-glial cells (rat)	Organoid /in vitro model	25
		GFOGER	PCL	Femoral defect (rat)	Bone regeneration	26
		FPGERGVEGPGP	RADA16	HaCaT (human), 3T3 (mouse)	Cell adhesion / in vitro model	27
		GFPGER	PEG	C2C12 (mouse), EC (bovine), SMCs (rat)	Vascular tissue engineering	28
			PEG	MSC (human)	Osteogenic differentiation	29
		NYYSNS	Boyden chambers	C57BL6 (mouse), B16F1 (mouse)	Cell adhesion studies	6
	Nidogen	FRGDGQ	Peptide-coated plates	Blastocysts (mouse)	Cell adhesion studies	6
	CAM	QIDS	-	-	Cell adhesion studies	30
		LDT	-	-	Cell adhesion studies	30
	VCAM	DELPQLVTLPHPNLH-GPEILDVPST	Peptide-coated plates	T lymphoblastic leukaemia cells (human)	Cell adhesion studies	31
	Netrin	QWRDTWARRLRKFQ-REKKGKCRKA	Peptide-coated plates	CFPAC-1, Fetal pancreatic	Cell adhesion studies	32

				epithelial cells (human)		
	Thrombospondin	CSVTCG	Peptide-coated plates	Umbilical vein endothelial and dermal microvascular cells (human)	Cell adhesion studies	33,34
	Cadherin	HAVDI	Methacrylated HA	MSCs (human), Subcutanous implantation (mouse)	Chondrogenic differentiation	35
			KLD-12	MSCs (human)	Chondrogenic differentiation	36
			PA	MSCs (human)	Chondrogenic differentiation	37
	De novo	RRETAWA	PEG	MSCs (human)	Osteogenic differentiation	38
Growth Factor Mimetic Peptides	BMP-2	DWIVA, KIPKASSVPTELSAISTLYL	Alginate	7F2s, D1s (mouse)	Osteogenic differentiation	39
			RADA16-PLGA	BMSCs (rat)	Osteogenic differentiation	40
		SSVPT	PA	MSCs, Skull defect (rat)	Osteogenic differentiation / Bone regeneration	41
		SDVGWNDWIV	PA	BMSCs (human)	Osteogenic differentiation	42
	Cytomodulin and TGF-β1	LIANAK	RADA16	BMSCs, Cartilage defect (rabbit)	Chondrogenic differentiation / Cartilage repair	43
	BMP-7	KPSSAPTQLN	RADA16	NPCs, NPDCs (human)	Anti-inflammatory and anti-apoptotic	44,45
	VEGF	KLTWQELYQLKYKGI	RADA16	HUVECs, Embryo CAM (chicken)	Angiogenesis	46
			SLanc	MSCs (human), Subcutanous (rat), Limb ischemia (mouse)	Angiogenesis	46–48
	Osteonectin	GHK	HA-PA-Laponite	MSCs, HUVECs (human), Maxillary sinus floor (rabbit)	Osteogenic differentiation / Bone regeneration	49
	Osteopontin	SVVYGLR	RADA16	MSCs, Myocardium (rat)	Cardiac tissue engineering	50
	Angiopoietin	QHREDG	RADA16	MSCs, Myocardium (rat)	Cardiac tissue engineering	51
	FGF-2	YRSRKYSSWYVALKR	PA	HUVECs (human)	Angiogenesis	52
	Phage-display	KLPGWSG	LDLK-12	NSCs, NPCs (mouse)	Neural tissue engineering	53
		FAQRVPP				54
		QHLPRDH				54
		KLPGWSG	HYDROSAP	NSCs (human)		55

		SSLSVND			Neural tissue engineering	
	BDNF	RGIDKRHWNSQ	RADA16	UC-MSCs (human), astrocytes (rat)	Neural tissue engineering	56
			RADA16	SCs, DRGs, Sciatic nerve (rat)	Nerve regeneration	57
			PA	Cortical neurons (mouse)	Neural tissue engineering	58
	NGF	CTDIKGKCTGACDGK-QC	RADA16	SCs, DRGs, Sciatic nerve (rat)	Nerve regeneration	57
	NCAM	EVYVVAENQQGKSKA	RADA16	DRGs (rat)	Neural tissue engineering	59
Antimicrobial Peptides	Myxinidin	WGIRRILKYGKRS	PA	*P. aeruginosa*, *C. albicans*	Antimicrobial	60
	Melittin	GIGAVLKVLTTGLPAL-ISWIKRKRQQ	H_3-$(QL)_6$	*E. coli*, 3T3 (mouse)	Antimicrobial	61
			Chitosan coating	MC3T3-E1 (mouse), MRSA and VRSA bacteria	Antimicrobial	62
	Melittin-Cecropin	KWKLFKKIGIGAVLKVLTTGLPALISC	Dibromomaleimide polymer films	*E. coli* BL21	Antimicrobial	63
	de novo	K_6-$(SL)_6$-K_6	CASP-K6	*P. auruginosa*	Antimicrobial	64
		NAVSIQKKK	NAVSIQKKK	WI-38 (human), *E. coli*, *S. aureus*	Antimicrobial	65
		PEP6R	PEP6R	RBCs, MSCs (human), *E. coli*, *S. aureus*, *P. aeruginosa*	Antimicrobial	66
		MAX1	MAX1	*S. epidermidis*, *S. aureus*, *S. pyogenes*, *K. pneumonia*, *E. coli*	Antimicrobial	67
		MARG1	MARG1	Methicillin-resistant *S. aureus*	Antimicrobial	68
		NapFFKK	NapFFKK	L-929 (mouse), *S. epidermidis*, *S. aureus*, *P. aeruginosa*, *E. coli*	Antimicrobial	69
		X-FFKK (X=Ibu, Ind, Npx)	X-FFKK (X=Ibu, Ind, Npx)	L-929 (mouse), RBCs (equine), *S. epidermidis*, *S. aureus*, *P. aeruginosa*, *E. coli*	Antimicrobial	70
		PA-1(+AgNPs)	PA	*E. coli*	Antimicrobial	71
		Fmoc-FFECG (+AgNPs)	Fmoc-FFECG	HeLa (human), *B. subtilis*, *E. coli*	Antimicrobial	72
Im	Ovalbumin	ISQAVHAAHAEINEAGR	Q11	Mice	Immune adjuvant	73

				BMDCs, DC2.4 (mouse), Mice	Immune adjuvant	74
			FKFEFKFE	Lymphocytes (mouse), Mice	Immune adjuvant	75
		SIINFEKL	PA	Splenocytes (mouse), Mice	Immune adjuvant	76
	T-cell and enolase from *S. aureus*	PADRE + KFEGTEDAV-ETIIQAIEA	Q11	T-cells (mouse), Mice	Immune adjuvant	77
	H1N1	SSLENFRAY		BALFs, T cells (mouse), Mice	Immune adjuvant	78
	P. falciparum	$(NANP)_3$		HepG2 (human), Mice	Immune adjuvant	79
	EV71 capsids 1, 3	YPTFGEHKQEKDLEY,HYRAHARDGVFDYYT	PA	Splenocytes (mouse), Mice	Immune adjuvant	80
	HIV-1 T cell epitope	SLYNTVATL	EAK16-II	MDDCs (mouse), Mice	Immune adjuvant	81
	West Nile Virus	EIII protein domain	FKFEFKFE	Mice	Immune adjuvant	82
	de novo	FLIVIGSIIGPGGDGPGGD	He9	Mice	Immune adjuvant	83,84

Supplementary table 2. *Peptide sequences exploited within synthetic hydrogels for binding GFs, ECM components and ions.*

	Source	Peptide Epitope	Target	Hydrogel / Substrate	Cells/Tissue (source)	Application	Ref
GF-Binding Peptides	Phage display	HSNGLPL	TGF-β1	PA	ATDC5 (mouse)	Growth factor binding / release	85
					MSCs (human), Knee cartilage (rabbit)	Cartilage repair	86
				Hyal-pN	-	Growth factor binding / release	87
				(KLDL)3	Chondrocytes (bovine)	Growth factor binding / release	88
				Pep-HGelMA	uMSCs (human), Knee cartilage (rabbit)	Cartilage repair	89
		TSPHVPYGGGS	BMP-2	PA	C2C12 (mouse), Spine (rat)	Spinal Arthrodesis	90
		YPVHST	BMP-2	Hyal-pN	-	Growth factor binding / release	87
	De novo	Biotin-IGF-1	IGF-1	RADA16	Cardiomyocytes, Heart (rat)	Cardiac tissue engineering	91
			IGF-1	(KLDL)3	BMSCs (bovine)	Growth factor binding / release	88
		PDGF-BB	PDGF-BB	RADA16	RNCMs, ECs, FBs (rat)	Myocardial protection	92
	Heparin	VVAGEGD	BMP-2, HGF, VEGF, NGF and FGF-2	PA	Saos-2 (human)	Osteogenic mineralisation	93
					H5V (mouse), HUVECs (human), Cornea (rat)	Angiogenesis	94
					PC12 (rat)	Growth factor binding / release	95
	Polysaccharide	GlcNAc	BMP-2, BMP-4, FGF-1, FGF-2, VEGF, Shh and Noggin	PA	C2C12 (mouse), BaF3-FR1C (mouse), Spine (rat)	Growth factor binding / release	96
Peptides Binding	Cardin-Weintraub sequence	LRKKLGKA	Heparin (in turn FGF-2 and VEGF)	PA	PAEC (bovine), MSCs (mouse), Islet cells	Angiogenesis	97–99

					(mouse), Subcutaneous implantation (mice), Ischemia model (mouse)		
			Heparin (in turn VEGF)	RADA16	Myocardial infarction (rat)	Cardiac tissue engineering	100
	Decorin	LRELHLNNN	Collagen I	PA	3T3 (mouse), Lungs, liver, spleen, and kidney (lamb)	Organ adhesion and sprayable therapeutic delivery	101
	De novo	K_3	Hyaluronic Acid	PA	MSCs (human)	Peptide/protein co-assembly	102
		K_2, K_3, K_4, E_3	Elastin-like polypeptides		ADSCs (human)	Peptide/protein co-assembly	103
		VPGIGK_3, H_2K, K_3, E_3	Keratin		3T3 (mouse), ADSCs (human)	Peptide/protein co-assembly	104
		H_2K	Keratin, Fibronectin		PDACs, PSCs (human)	Cancer in vitro model	105
					OVCAR-4, MSCs, HUVECs (human)	Cancer in vitro model	106
		E_3CY	Resilin		-	Peptide/protein co-assembly	107
		YN, YS, YL,VL	β-lactoglobulin and BSA	Fmoc-X (X=YN, YS, YL, VL)	-	Peptide/protein co-assembly	108
		FF	Haemoglobin, myoglobin, serum albumin and fibrinogen	FF	-	Peptide/protein co-assembly	109
Peptides Binding Ions And Crystals	*De novo*	FF and R	Hydroxyapatite	Fmoc-FF, Fmoc-R	3T3 (mouse)	Bone tissue engineering	110
		FF/S and RGD	Hydroxyapatite	Fmoc-FF/S, Fmoc-RGD	Raw 264.7 (mouse)	Bone tissue engineering	111
	Collagen I	NPYHPTIPQSVH	Hydroxyapatite	PA	MC3T3-E1 (mouse)	Biomineralisation	112
	Phage-display	MLPHHGA	Hydroxyapatite	MDG1	OCCM-30 (mouse)	Biomineralisation	113
	De novo	PD-$(FD)_5$-P	Hydroxyapatite	P_{FD}-5	FOB 1.19 (human),	Biomineralisation	114

					Bone defect (rat)		
		QQRFEWEFEQQ	Hydroxyapatite	P11−4	Enamel lesions (human)	Enamel regeneration	115
	Amelogenin	P26, P32	Hydroxyapatite	Chitosan	Molar enamel (human),	Enamel regeneration	116
		LEAWPATDKTKREEVD	Hydroxyapatite	Lysozyme	Osteoblasts, Enamel (human), Oral cavity (rat)	Enamel regeneration	117
		TKREEVD	Hydroxyapatite	$C_{18}H_{35}O$-TKREEVD	Molar enamel (human)	Enamel regeneration	118
	Dentin phosphoprotein	DSS	Hydroxyapatite	8DSS	Incisor enamel (bovine), Molar enamel (human)	Enamel regeneration	119
	Statherin	DDDEEKFLRRIGRFG	Fluorapatite	ELP	-	Biomineralisation	120

Supplementary table 3. *Enzymatically cleavable peptide sequences exploited within synthetic hydrogels to allow matrix degradation.*

	Enzyme	Cleavable Peptide	Hydrogel / Substrate	Cells/Tissue (source)	Application	Ref
Metalloproteinases (MMPs)	MMP-1	GPQGIWGQ	Hyaluronic Acid/PA	DFs (human)	Cell remodelling studies	121
			PEG	Intestinal stem cells (mouse)	Organoid culture	122
			PEG-Heparin	HK-2, CiPTEC, Proximal tubule cells (human)	Renal tubulogenesis	123
		VPMSMRGG IPESLRAG	PEG	Myofibroblasts (mouse), Aortic ring (chicken)	Cell remodelling studies	124
	MMP-2	GTAGLIGQ	PA	-	Drug delivery	125
				RPC-C2A (rat)	Cell remodelling studies	126
		PVGLIG	RADA16	-	Cell remodelling studies	127
			PTMC polymer	-	Cell remodelling studies	128
			Alginate	MSCs (human), Subcutaneous implant (mouse)	Cell delivery	129
		SLGK	Ac-I_3SLKG-NH_2	3T3 (mouse), HeLa (human)	Peptide delivery	130
		LDLPVGLIGKLD	KMP2	MSCs (mouse), HK2, HUVECs (human), Renal capsule (mouse)	Vesicle delivery	131
		GPQGIAGQ, IPVSLRSG	MASP1	-	Peptide degradation	132
		SGESPAYYTA	-	Phage display	Cell remodelling studies	133
		VPMSMRGG IPESLRAG	PEG	Myofibroblasts (mouse), Aortic ring (chicken)	Cell remodelling studies	124
	MMP-3	GAPFALRLV	-	Phage display	Cell remodelling studies	134
	MMP-7		-	Phage display	Cell remodelling studies	
	MMP-9	FFAGLDD	PhAc-FFGLDD	-	Material topology manipulation (Micelle-to-fibre transition)	135
		PLGL	SNFV	PC12, Cortical neurons (rat), Brain (mouse)	Brain repair	136
	MMP-11	GGYAELRMGG	-	Phage display	Cell remodelling studies	137
	MMP-13	PTG-XKV (X = I, L, F, A)	β-hairpin DP	SW1353 (human)	Cell remodelling studies	138

		GPLGYLWAR	-	Phage display	Cell remodelling studies	139
		GPLGMRGL	-	Phage display	Cell remodelling studies	
Others	Protein Kinase A	RRASV	PA	MDA-MB-231, HUVECs (human), 3T3 (mouse)	Peptide assembly / disassembly	140
	Cathepsin B	GFLG	Amphiphilc mPEGylated-dendron	4T1, 3T3 (mouse), Solid tumour (mouse)	Anti-cancer therapy	141
		AVPIAQFRRG	PEG	MC3T3-E1, RAW 264.7 (mouse), Bone slices (porcine)	Anti-cancer therapy	142
	Cathepsin K	GGMGPSGPWGG K	Drug-drug conjugates	MDA-MB-231, MCF-7, HT-29, HDF, HUVECs (human), 4T1 (mouse), H9C2 (Rat), Tumor (mouse)	Anti-cancer therapy	143
	Thermolysin	FF, X (X = G, A, V, L, F, P)	FF + Fmoc-X (X = G, A, V, L, F, P)	-	Peptide assembly / disassembly	144
	α-chymotrypsi n	KKFFVLK	PA	-	Peptide assembly / disassembly	145
	α-chymotrypsi n	FEFK	FEFK	-	Peptide assembly / disassembly	146
	α-chymotrypsi n	FKFE	$(FKFE)_2$	-	Peptide assembly / disassembly	147
	α-chymotrypsi n	F, W, OMe, OEt, OMe	Fmoc-F, Fmoc-W, F-OMe, F-OEt, Y-OMe	-	Peptide assembly / disassembly	148
	Hydrolysis	QQKFQXQFEQQ (X= glycolic acid, lactic acid, 2-hydroxycaproic acid, and 3-phenyllactic acid)	Q11, Depsi-X (X = G, A, L, F)	C3H10T1/2 (mouse)	Cell remodelling studies	149

Supplementary table 4. *Multiple peptide epitope exploited within synthetic hydrogels for synergistic and additive effects.*

	Source	Peptide Epitope	Hydrogel / Substrate	Cells/Tissue (source)	Application	Ref
Multiple Cell Adhesion Peptides	Fibronectin (RGDS and PHSRN)	RGDS and PHSRN	Multidomain peptides	HUVECs (human)	Cell adhesion studies / in vitro model	150
			PEGDA	Osteoblasts (rat)	Cell adhesion studies / in vitro model	151
	Fibronectin (RGDS), Laminin (IKVAV,YIGSR)	RGDS, IKVAV,YIGSR	PA	-	Peptide design and assembly	152
	Fibronectin (RGDS, REDV), Laminin (IKVAV,YIGSR)	RGDS, REDV, IKVAV,YIGSR	Q11	HUVECs (human)	Cell adhesion studies / in vitro model	153
	Fibronectin (FRGDF), Laminin (DIKVAV)	FRGDF, DIKVAV	Fmoc-FRGDF and Fmoc-DIKVAV	C2C12 (mouse)	Cell adhesion studies / in vitro model	154
	Laminin (IKVAV and YIGSR)	IKVAV, YIGSR	PA	Neurons (rat)	Cell adhesion studies / in vitro model	155
	Fibronectin (RGDS)	RGDS	PA	Femur defect (rat)	Bone regeneration	156
	Fibronectin (RGD), Cadherin (HAVDIGGGK)	RGD, HAVDIGGGK	poly(L-glutamic acid)	BMSCs (rabbit), Dorsal region (rat)	Chondrogenic differentiation	157
	Fibronectin (FNIII$_{9-10}$ + FNIII$_{12-14}$ domains)	FNIII$_{9-10}$ + FNIII$_{12-14}$	Fibrin	ECs, SMCs, MSCs (human), Skin (mouse), Bone defect (rat)	Bone regeneration	158
	Fibronectin	Full-length fibronectin	PEGylated FN	HUVECs, HDFs (human), chick embryo CAM model, Bone defect (mouse)	Bone regeneration	159
	Fibronectin (GRGDSP), Laminin (YIGSR), Collagen IV (TAGSCLRKFST)	GRGDSP, YIGSR, TAGSCLRKFST	RADA16	Hepatocytes (rat)	Cell adhesion studies / in vitro model	13
	Fibronectin (RGD), Tenascin C (TN C)	RGD, TN C	PEG	BMSCs (rat)	Cell adhesion studies / in vitro model	160
Cell Adhesion + GF-Mimetic/Binding	Bone marrow homing motif (SKPPGTSS), Heparin-binding motif (FHRRIKA) and Fibronectin (PRGDSGYRGDS)	SKPPGTSS + FHRRIKA + PRGDSGYRGDS	RADA16	ADSCs (human)	Stem cell culture	161
	Fibronectin (GPRGDSGYRGDS), VEGF	GPRGDSGYRGDS + KLTWQELYQLKYKGI	RADA16	DPSCs, HUVECs (human), Molar (rat)	Dentin pulp regeneration	162

	(KLTWQELYQLKY KGI)					
	Fibronectin (RGDS), BMP-2 (KIPKASSVPTELS AISTLYL)	GGRGDS + KIPKASSVPTELSA ISTLYL	PLEOF	BMSCs (rat)	Osteogenic differentiation	163
	Fibronectin (RGD, $(GRGDSP)_4K$), Vitronectin (FRHRNRKGY), Laminin (IKVAV) and IGF-1	$GRGDSP)_4K$, FRHRNRKGY, IKVAV and IGF-1	EAK	Myenteric neurons (mouse)	Enteric nerve system tissue engineering	164
	Fibronectin (RGDS), VEGF (SVVYGLR), Collagen (DGEA)	RGDS + SVVYGLR + DGEA	PA	ADSCs, HUVECs (human)	Bone tissue engineering / in vitro model	24
	Laminin (IKVAV), BDNF (RGIDKRHWNSQ)	IKVAV + RGIDKRHWNSQ	RADA16	Schwann cells, Sciatic nerve (rat)	Peripheral nerve regeneration	165
GF-Mimetic	NGF (CTDIKGKCTGAC DGKQC) and BDNF (RGIDKRHWNSQ)	CTDIKGKCTGACD GKQC + RGIDKRHWNSQ	RADA16	Schwann cells, DRGs, PC12, Sciatic nerve (rat)	Peripheral nerve regeneration	57
	VEGF (KLTWQELYQLKY K), BDNF (RGIDKRHWNSQ)	KLTWQELYQLKY KGI + RGIDKRHWNSQ	RADA16	Schwann cells, Sciatic nerve (rat)	Peripheral nerve regeneration	166
Others	MMP-2 cleavage site (LRG), Fibronectin (RGDS)	LRG + RGDS	MDPs	SHED cells (human)	Cell adhesion studies / in vitro model	167
	Fibronectin (RGD), MMP-2 cleavage site (TPGPQGIAGQ)	RGD + TPGPQGIAGQ	PA	CSFs (human)	Self-release culture tissue	168
	Fibronectin (RGDS), Statherin (DDDEEKFLRRIGR FG)	RGDS + DDDEEKFLRRIGR FG	ELR	MSCs, Calvarial bone (rat)	Mineralisation and bone regeneration	169
	Fibronectin (RGDS, REDV), Hydroxyapatite	RGDS + REDV + HAP	ELR	MSCs (rat)	Mineralisation	170
	Entactin/nidogen, vitronectin, vWF (RGD), netrin-1 (QWRDTWAR), fibronectin (PHSRN-RGD), collagen I/IX (GFOGER, DGEA), fibrinogen (GPR YSMKKTTM), osteopontin (SVVYLR), thrombospondin (VTCG), tenascin-C (AEIDGIEL), laminins (IKVAV, LRE, YIGSR), MMP-1	RGD + QWRDTWAR + PHSRN-RGD + GFOGER + GPR + SVVYLR + YSMKKTTM + VTCG + DGEA + AEIDGIEL + IKVAV + LRE + YIGSR + IPESLRAG + GPLGLWAR + VPLSLYSG + VPLSLTMG + RPFSMIMG + SGESPAYYTA + VPMSMRGG	PEG	MSCs (human)	Bone marrow in vitro model	171

	(VPMLRGG), MMP-2 (SGESPAYYTA), MMP-3 (RPFSMIMG), MMP-7 (VPLSLTMG), MMP-9 (VPLSLYSG), MMP-13 (GPLGLWAR), MMP-14 (IPESLRAG).					
	Collagen I (DGEA), IV (FYFDLR), XVIII (IVRRADRAAVP), laminin α (IKVAV), laminin β (YIGSR), thrombospondin (VTCG), tenascin C (EIDGIEL), periostin (ALMKYHILNTLQCSE), nidogen, fibulin, fibrinogen (RGD)	DGEA + FYFDLR + IVRRADRAAVP + IKVAV + YIGSR + VTCG + EIDGIEL + ALMKYHILNTLQCSE + RGD + IPVSLRSG + RPFSMIMG + VPLSLYSG + VPLSLTMG + IPESLRAG	PEG	Astrocytes (human)	Brain in vitro model	172

Supplementary table 5. *Peptides that have reached the market.*

Product name	Application	Ref.
PuraMatrix™ (3-D Matrix Ltd)	These peptide hydrogels offer reproducible, chemically-defined platforms for cell culture applications. These materials offer high levels of biocompatibility, ECM biomimicry, and tunable properties.	173
HydroMatrix™ (Sigma-Aldrich)		174
PuraStat®, PuraBond®, and PuraSinus™ (based on RADA16)	Peptide hydrogels used as injectable medical device for hemostatic control of post-operative bleeding, such as vascular anamostoses and endoscopic operations.	175
Sciobio® (based on EAK16-II)	Peptide hydrogels used as injectable medical device for the treatment of severe bedsore, chronic diabetic ulcers, and wound healing.	176
Curolox® (based on P11-4)	Peptide hydrogels used as injectable medical device for the treatment of dental caries.	177
AC5® (based on T45K)	Peptide hydrogels used as injectable medical device for haemostatic control in patients undergoing antiplatelet therapy.	178

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