

TABLE E-1 Characteristics of All Eligible Studies*

Study	Year	Surgical Procedure or Pathology	Study Design	Sample Size	Mean Age (Range)	Intervention	Control	Primary Outcome Measures	Functional Benefit	Total Follow-up Time	Detsky (%) or NOS (points [of 9]) Quality Score
Cervellin et al. ²³	2011	ACL reconstruction	RCT	40	22.8 (18-29)	Platelet-rich plasma gel	No platelet-rich plasma gel	VISA; VAS	Favors treatment	12 mo	70
Vogrin et al. ²⁴	2010	ACL reconstruction	RCT	50	34.2 (18-50)	Platelet-leukocyte gel added to graft	No platelet-leukocyte gel	Knee stability (arthrometry)	No difference	6 mo	60
Nin et al. ¹³	2009	ACL reconstruction	RCT	100	26.0 (14-59)	Platelet gel added to graft	No platelet gel	Knee stability (arthrometry); graft incorporation (MRI)	No difference	2 yr	86
Orrego et al. ²⁵	2008	ACL reconstruction	RCT	108	30.0 (15-57)	Platelet concentrate or bone plug and platelet concentrate added to graft	Bone plug added to graft or no platelet concentrate	Graft maturation (MRI)	No difference	6 mo	81
Sys et al. ²⁶	2011	Spinal fusion	RCT	40	NR	Platelet-rich plasma application	No platelet-rich-plasma application	VAS; SF-36; ODI; osseous healing (CT scan)	No difference	2 yr	81
Tsai et al. ²⁷	2009	Spinal fusion	RCT	67	61.5 (33-94)	Platelet glue added to graft	No platelet glue	Fusion rate (radiographs + CT scan)	No difference	2 yr	67
Feiz-Erfan et al. ²⁸	2007	Spinal fusion	RCT	50	(29-64)	Cervical allograft with platelet concentrate	No platelet concentrate	Fusion rate (radiographs)	NR	2 yr	62
D'Elia et al. ²⁹	2010	Tibial osteotomy	RCT	25	42.4 (34-51)	Platelet-rich plasma added to iliac bone graft	No platelet-rich plasma	Bone healing (radiographs)	No difference	6 mo	76
Dallari et al. ³¹	2007	Tibial osteotomy	RCT	33	50.7 (25-65)	Lyophilized bone chips with platelet gel	Lyophilized bone chips alone	Osseointegration (radiographs)	No difference	1 year	95
Savarino et al. ³²	2006	Tibial osteotomy	RCT	10	45.0 (25-61)	Lyophilized bone chips with platelet gel	Lyophilized bone chips alone	Bone formation (histomorphometry)	No difference	6 wk	57
Lee and Ahmad ³³	2007	Plantar fasciitis	RCT	61	48.8 (28-66)	Autologous blood injection	Corticosteroid injection	VAS; tenderness threshold (0-11 kg/cm ²)	No difference	6 mo	75
Kiter et al. ³⁴	2006	Plantar fasciitis	RCT	45	50.7 (26-70)	Autologous blood injection	Corticosteroid injection	VAS; AOFAS rearfoot score	No difference	6 mo	71
Casticini et	2011	Rotator cuff	RCT	88	55.3	Platelet-rich fibrin	No platelet-rich	Constant score;	No	16 mo	95

al. ³⁵		repair			(37-72)	matrix application	fibrin matrix application	rotator cuff integrity (MRI)	difference		
Randelli et al. ³⁶	2011	Rotator cuff repair	RCT	53	60.6 (49-70)	Platelet-rich plasma application	No platelet-rich plasma application	VAS; radiographic healing (MRI)	Favors treatment	1 yr	95
Horstmann et al. ³⁷	2010	Total knee arthroplasty	RCT	40	66.5 (51-81)	Autologous platelet gel	No autologous platelet gel	Blood loss (postop. Hgb)	No difference	Immediate postop. period	65
Peerbooms et al. ⁴⁰	2009	Total knee arthroplasty	RCT	102	77.5	Autologous platelet gel application	No autologous platelet gel	Wound score	No difference	3 mo	81
Schepull et al. ³⁹	2011	Achilles tendon rupture	RCT	30	39.6 (48-31)	Platelet-rich plasma injection	No platelet-rich plasma injection	Elasticity modulus; heel raise index	No difference	1 yr	95
de Vos et al. ¹²	2010	Achilles tendinopathy	RCT	54	49.5 (18-70)	Platelet-rich plasma injection	Placebo (saline solution) injection	VISA-A	No difference	2 yr	90
Peerbooms et al. ³⁸	2010	Lateral epicondylitis	RCT	100	47.0 (18+)	Platelet-rich plasma injection	Corticosteroid injection	VAS; DASH score	Favors treatment	1 yr	80
Zavadil et al. ⁴¹	2007	Total shoulder arthroplasty	RCT	40	66.4	Autologous platelet gel application	No autologous platelet gel application	Pain score; range of motion	Favors treatment	6 wk	70
Thomas et al. ⁴²	2009	Total hip arthroplasty	RCT	120	70.8 (40-85)	Osteoinductive gel	No osteoinductive gel	Harris hip score	Favors treatment	1 yr	65
Calori et al. ⁴³	2008	Long-bone nonunion	RCT	120	(19-65)	Platelet-rich plasma application	rhBMP-7 application	VAS; radiographic union	Favors control	9 mo	81
Everts et al. ⁴⁴	2008	Open subacromial decompression	RCT	40	51.0	Platelet-leukocyte gel injection	No platelet-leukocyte gel injection	ASES shoulder function assessment	Favors treatment	6 wk	80
Figueroa et al. ⁴⁵	2010	ACL reconstruction	PCS	50	26.8 (14-28)	Platelet-rich plasma added to graft	No platelet-rich plasma	Graft maturation (MRI)	No difference	6 mo	8
Radice et al. ⁴⁶	2010	ACL reconstruction	PCS	50	31.0 (18-35)	Platelet-rich plasma gel added to graft	No platelet-rich plasma gel	Graft homogenization (MRI)	Favors treatment	Intervention: 9 mo. Control: 1 yr	8
Silva and Sampaio ⁴⁷	2009	ACL reconstruction	PCS	40	26.8 (19-41)	A: platelet-rich plasma added to graft. B: platelet-rich plasma added to graft and intra-articular injections at 2 and 4 wk postop. C: platelet-rich plasma activated with	No platelet-rich plasma	Tendon-to-bone integration (MRI)	No difference	3 mo	6

						thrombin added to graft					
Hartmann et al. ⁴⁸	2010	Spinal fusion	PCS	35	41.8 (18-64)	Platelet-rich plasma added to graft	No platelet-rich plasma	Fusion rate (CT scan); VAS spinal score	No difference	1 yr	5
Jenis et al. ⁴⁹	2006	Spinal fusion	PCS	37	40.9 (28-58)	Autologous growth factor added to graft	No autologous growth factor	Fusion rate (CT scan); VAS	No difference	2 yr	7
Kalaci et al. ²²	2009	Plantar fasciitis	PCS	100	50.58 (30-79)	Autologous blood injection	A: local anesthetic with peppering. B: corticosteroid injection. C: corticosteroid injection with peppering	VAS; Roles and Maudsley scores	Favors control	6 mo	9
Jo et al. ⁵⁰	2011	Rotator cuff repair	PCS	42	60.8 (51-71)	Platelet-rich plasma	No platelet-rich plasma	VAS; UCLA; DASH; SST; SPADI; ASES	No difference	16 mo	7
Mishra and Pavelko ⁵¹	2006	Chronic elbow tendinosis	PCS	20	45.2	Platelet-rich plasma injection	Injection of bupivacaine with epinephrine	VAS; Mayo Elbow Score	Favors treatment	8 wk	6
Everts et al. ⁵²	2007	Total knee arthroplasty	PCS	165	68.4	Platelet gel and fibrin sealant application	No platelet gel and fibrin sealant	Range of motion; length of hospitalization	Favors treatment	5 days	6
Filardo et al. ⁵³	2009	Chronic refractory patellar tendinopathy (jumper's knee)	PCS	31	27.2	Platelet-rich plasma injection and physiotherapy	Only physiotherapy	EQ-VAS; Tegner activity score	No difference	6 mo	8

*All randomized trials were assessed for methodological quality with use of the Detsky scale¹⁴; scores were then converted into percentages. All prospective cohort studies were evaluated for methodological quality with use of the Newcastle-Ottawa Scale (NOS)¹⁵. RCT = randomized controlled trial; PCS = prospective cohort study; ACL = anterior cruciate ligament; MRI = magnetic resonance imaging; VAS = visual analog scale; SF-36 = Short-Form-36; ODI = Oswestry Disability Index; AOFAS = American Orthopaedic Foot & Ankle Society; DASH = Disabilities of the Arm, Shoulder and Hand; VISA-A = Victorian Institute of Sport Assessment-Achilles questionnaire; NR = not reported; ASES = American Shoulder and Elbow Surgeons; UCLA = University of California at Los Angeles; SST = Simple Shoulder Test; SPADI = Shoulder Pain and Disability Index; EQ-VAS = European Quality of Life-Visual Analog Scale; rhBMP-7 = recombinant human bone morphogenetic protein-7.

TABLE E-2 Characteristics of Study Protocol and Platelet Separation Systems Used

Study	Year	Surgical Procedure or Pathology	Study Design	Manufacturer of Platelet Separation System	Intervention Protocol					Control Protocol
					Anticoagulant Used? (Y/N)	Activating Agent	Procedure	No. of Applications	Final Volume (mL)	
Cervellin et al. ²³	2011	ACL reconstruction	RCT	Biomet (GPS II)	Y	Autologous thrombin + calcium chloride	Platelet-rich plasma gel applied to both patellar and tendon bone plug harvest sites	1	NR	Standard procedure for ACL reconstruction with bone-patellar tendon-bone graft
Vogrin et al. ²⁴	2010	ACL reconstruction	RCT	Medtronic (Magellan)	Y	Autologous thrombin	After hamstring-tendon autograft positioning, platelet-leukocyte gel applied to femoral and tibial tunnels and graft	1	6	Standard procedure for ACL reconstruction with hamstring-tendon graft
Nin et al. ¹³	2009	ACL reconstruction	RCT	Not mentioned	Y	Calcium chloride	Ligament covered in platelet gel and sutured over itself with gel inside. Remaining gel applied inside tibial tunnel	1	4	Standard procedure for ACL reconstruction with patellar tendon allograft
Orrego et al. ²⁵	2008	ACL reconstruction	RCT	Biomet (GPS System)	Y	Autologous thrombin + calcium chloride	5 mL of platelet concentrate added between strands of graft. Once graft fixed, remaining platelet concentrate added into femoral tunnel	1	6	Standard procedure for ACL reconstruction with hamstring-tendon graft or bone plug placed at level of femoral tunnel

Sys et al. ²⁶	2011	Spinal fusion	RCT	DePuy (Symphony)	Y	Autologous thrombin + calcium chloride	Cages immersed in plasma-thrombin solution until clotting occurred visually	1	NR	Standard procedure for posterior lumbar interbody fusion using midline posterior approach
Tsai et al. ²⁷	2009	Spinal fusion	RCT	Not mentioned	N	Calcium chloride	Platelet concentrate added to local fragmented laminectomy bone and calcium sulfate pellets. Platelet-glue bone filler mixture applied to graft site	1	7	Standard procedure for posterolateral lumbar fusion
Feiz-Erfan et al. ²⁸	2007	Spinal fusion	RCT	DePuy (Symphony)	Y	None	Platelet concentrate added to cervical allograft for anterior cervical fusion	1	NR	Standard procedure for anterior cervical fusion with blood-soaked cervical allograft
D'Elia et al. ²⁹	2010	Tibial osteotomy	RCT	Haemonetics (MCS Plus)	Y	Autologous thrombin + calcium chloride	Platelet-rich plasma combined with bone marrow aspirate to form biological graft to use in opening wedge osteotomy	1	70	Standard procedure for tibial opening wedge osteotomy >7.5 mm using bone graft from iliac crest
Dallari et al. ³¹	2007	Tibial osteotomy	RCT	Not mentioned	Y	Autologous thrombin	Lyophilized bone chips with platelet gel packed into defects during high tibial osteotomy	1	16	Standard procedure for opening-wedge high tibial osteotomy with lyophilized bone chips

Savarino et al. ³²	2006	Tibial osteotomy	RCT	Not mentioned	Y	Autologous thrombin	Lyophilized bone chips mixed with platelet-rich plasma gel packed into defects during high tibial osteotomy	1	16	Standard procedure for opening-wedge high tibial osteotomy with lyophilized bone chips
Lee and Ahmad ³³	2007	Plantar fasciitis	RCT	None	N	None	Autologous blood from antecubital vein and mixed with 1 mL of 2% lignocaine HCl. Injection made at origin of plantar fascia on medial tubercle of calcaneus	1	15	Corticosteroid injection with 20 mg of triamcinolone acetone, mixed with 2 mL of 1% lignocaine HCl
Kiter et al. ³⁴	2006	Plantar fasciitis	RCT	None	N	None	Autologous blood from ipsilateral or contralateral upper extremity mixed with 1 mL of 2% prilocaine. Injection made through plantar aspect of heel pad	1	2	40 mg of methylprednisolone acetate mixed with 1 mL of 2% prilocaine injected in plantar aspect of heel pad
Castricini et al. ³⁵	2011	Rotator cuff repair	RCT	Not mentioned	Y	Calcium chloride	Platelet-rich fibrin matrix positioned under supraspinatus tendon	1	NR	Standard procedure for arthroscopic rotator cuff repair
Randelli et al. ³⁶	2011	Rotator cuff repair	RCT	Biomet (GPS System)	Y	Autologous thrombin + calcium chloride	At end of arthroscopic procedure, platelet-rich plasma and autologous thrombin delivered at level of lesion, between tendon and bone and over tendon	1	6	Standard procedure for arthroscopic rotator cuff repair
Horstmann et al. ³⁷	2010	Total knee arthroplasty	RCT	Biomet (GPS System)	Y	Autologous thrombin +	After implantation of knee prosthesis, 11 mL	1	11	Standard procedure for

						calcium chloride	of platelet gel sprayed with dual syringe into medial and lateral recess			total knee arthroplasty
Peerbooms et al. ⁴⁰	2009	Total knee arthroplasty	RCT	Biomet (GPS System)	Y	Autologous thrombin + calcium chloride	Using a spray tip at a distance of 10-15 cm with knee flexed 90°, exposing knee cavity, 6 mL of autologous platelet gel applied to dried wound site	1	6	Standard procedure for total knee arthroplasty
Schepull et al. ³⁹	2011	Achilles tendon rupture	RCT	Not mentioned	Y	Calcium chloride	After conventional open Achilles tendon repair, 6 mL of platelet concentrate injected into rupture site; then skin sutured. Remaining 4 mL injected into rupture site transdermally	1	10	Standard open Achilles tendon repair using dorsomedial approach
de Vos et al. ¹²	2010	Achilles tendinopathy	RCT	Biomet (Recover System)	Y	None	2 mL of 0.5% marcaine injected in skin and subcutaneous tissue. Then, under ultrasound guidance, platelet-rich plasma injected through 3 different puncture locations, leaving 5 small deposits at each site	1	4	Same procedure with saline solution
Peerbooms et al. ³⁸	2010	Lateral epicondylitis	RCT	Biomet (Recover System)	Y	None	1 mL of platelet-rich plasma with 0.5% bupivacaine HCl and epinephrine injected directly into area of maximum tenderness. Then, using a peppering technique, remaining platelet-rich plasma injected into common extensor tendon	1	3	40 mg/mL of triamcinolone acetonide with 0.5% bupivacaine HCl and epinephrine injected directly into area of maximum tenderness. Then, using a peppering

										technique, remaining corticosteroid injected into common extensor tendon
Zavadil et al. ⁴¹	2007	Total shoulder arthroplasty	RCT	Medtronic (Magellan)	Y	Autologous thrombin + calcium chloride	5-6 mL of autologous platelet gel sprayed down intermedullary canal of humerus. After reduction and checking stability, last 2-3 mL of gel added extra-articularly	1	9	Standard procedure for total shoulder arthroplasty
Thomas et al. ⁴²	2009	Total hip arthroplasty	RCT	Arthrex Bio System (Osteokin)	NR	NR	6 mL of autologous platelet-rich plasma gel added to 10 mL of autologous cancellous bone chips and 10 mL of autologous bone marrow cells to form osteoinductive gel, which was placed on implants	1	6	Standard procedure for total hip arthroplasty with cementless Spongiosa Metal hip prosthesis, using lateral transgluteal approach
Calori et al. ⁴³	2008	Long-bone nonunion	RCT	Not mentioned	Y	NR	Platelet-rich plasma applied to long-bone nonunions with any necessary bone graft procedure	1	20	Same procedure with rhBMP-7
Everts et al. ⁴⁴	2008	Open subacromial decompression	RCT	Medtronic (Magellan)	Y	Autologous thrombin	Intracapsular injection of 10 mL of platelet-leukocyte gel. Before skin closure, another 3 mL of gel injected under subcutaneous layer covering incision length	1	13	Standard procedure for open subacromial decompression performed via 4-cm shoulder-strap skin incision over acromioclavicular joint

Figuerola et al. ⁴⁵	2010	ACL reconstruction	PCS	Medtronic (Magellan)	Y	NR	Of 10 mL of platelet-rich plasma, 3 mL applied in both tibial and femoral tunnels. 4 mL applied in intra-articular portion of graft	1	10	Standard procedure for ACL reconstruction with hamstring-tendon graft
Radice et al. ⁴⁶	2010	ACL reconstruction	PCS	Biomet (GPS System)	Y	NR	Platelet-rich plasma added homogeneously to graft to completely cover it	1	5	Standard procedure for ACL reconstruction with hamstring or bone-patellar-tendon graft
Silva and Sampaio ⁴⁷	2009	ACL reconstruction	PCS	Biomet (Mini GPS)	Y	Autologous thrombin only for intervention C	In all three intervention groups (A, B, C), 15 mL of platelet-rich plasma placed between strands of graft in each femoral tunnel. Patients given intervention B also received platelet-rich plasma intra-articular injections at 2 and 4 wk postop.	1 for intervention A and C, while 3 applications for B	3	Standard procedure for double-bundle arthroscopic ACL reconstruction using hamstring-tendon grafts for all patients
Hartmann et al. ⁴⁸	2010	Spinal fusion	PCS	Biomet (GPS System)	Y	Autologous thrombin	Gel comprised of platelet-rich plasma and autologous bone applied around titanium cage	1	NR	Standard procedure for anterior fusion using titanium cage
Jenis et al. ⁴⁹	2006	Spinal fusion	PCS	Not mentioned	NR	Thrombin	Autologous growth factor mixed with crushed cancellous allograft chips	1	NR	Standard procedure for anterior lumbar fusion using titanium cage

Kalaci et al. ²²	2009	Plantar fasciitis	PCS	None	NR	None	Local injection of 2 mL of autologous blood	1	2	Local injection of 2 mL of (A) lidocaine using a peppering technique, (B) triamcinolone alone, (C) triamcinolone using a peppering technique
Jo et al. ⁵⁰	2011	Rotator cuff repair	PCS	Caridian BCT (COBE Spectra LRS Turbo)	Y	Calcium gluconate	3 platelet-rich plasma gels placed at repair site	1	3	Standard procedure for arthroscopic rotator cuff repair
Mishra and Pavelko ⁵¹	2006	Chronic elbow tendinosis	PCS	Biomet (GPS System)	Y	None	2-3 mL of platelet-rich plasma injected into common extensor or flexor tendon using a peppering technique	1	5	Same procedure with bupivacaine with epinephrine
Everts et al. ⁵²	2007	Total knee arthroplasty	PCS	Sorin Group (Electa)	Y	Autologous thrombin + calcium chloride	10 mL of platelet gel injected in back of knee cavity. After closure of the knee capsule, another 10 mL of gel injected between stitches on repaired extensor mechanism and prepatellar fat	1	20	Standard procedure for total knee arthroplasty using medial parapatellar approach
Filardo et al. ⁵³	2009	Chronic refractory patellar tendinopathy (jumper's knee)	PCS	Not mentioned	Y	Calcium chloride	3 platelet-rich plasma injections on 3 different occasions 2 wk apart into site of patellar tendinopathy	3	15	Standard physiotherapy protocol

*RCT = randomized controlled trial; PCS = prospective cohort study; ACL = anterior cruciate ligament; NR = not reported; HCl = hydrochloride; rhBMP-7 = recombinant human bone morphogenetic protein-7.

TABLE E-3 Electronic Search Strategies

MEDLINE (OVID WEB)	Embase (OVID WEB)
1. exp platelet-rich plasma/	1. exp thrombocyte-rich plasma/
2. limit 1 to (English language and humans and [comparative study or randomized controlled trial])	2. (platelet-rich plasma or platelet gel or autologous platelet concentrate or osteoinductive gel or PRP gel or autologous platelet-rich plasma or autologous PRP gel or platelet-leukocyte gel or autologous platelet-derived growth factors or platelet glue).tw
	3. 1 or 2
	4. exp orthopedic surgery/
	5. sports medicine/
	6. 4 or 5
	7. 3 and 6
	8. limit 7 to (human and English language)