Driver	Driver Full	Site of Expression	Inducible	Knockout/Reporter	Phenotype	Reference
Acan	aggrecan	Chondrocytes	Tamoxifen	Ai9	Aggrecan-positive chondrocytes give rise to osteoblasts/cytes during development and fracture repair	(Hu et al., 2017)
Acan	aggrecan	Chondrocytes	Tamoxifen	EGFP; LacZ; Tomato	Aggrecan-positive chondrocytes give rise to osteoblasts/osteocytes fracture repair	(Zhou et al., 2014)
Acan	aggrecan	Chondrocytes	Tamoxifen	RBPjk	NOTCH signaling is not essential in differentiated osteoblasts and chondrocytes	(Wang et al.)
Acta2	alpha Smooth Muscle Actin	Myofibroblasts			No Fracture Data	
Adipoq	adiponectin	Adipocytes			No Fracture Data	(Ambrosi et al., 2017)
BGLAP (Ocn)	bone gamma-carboxyglutamic acid-containing protein (Osteocalcin)	Osteoblast		Beta 1 Integrin	No effect on fracture healing	(Shekaran et al., 2014)
BGLAP (Ocn)	bone gamma-carboxyglutamic acid-containing protein (Osteocalcin)	Osteoblasts		Pten	Increased bone strength and ossification; increased intramembranous bone formation	(Burgers et al., 2013)
CAGG	chicken beta actin promoter/enhancer with Cytomegalovirus minimal promoter	Ubiquitous	Tamoxifen	PDGFRβ	Increased woven bone to callus ratio in the callus; inhibits osteogenic differentiation	(Tokunaga et al., 2008)
CatK	Cathepsin K	Osteoclasts		tdTomato	Decreased engraftment of fracture by osteochondral progenitor cells	(Jacome-Galarza et al., 2014)
CD45	Cluster of differentiation 45	Hematopoietic cells		Z/RED	Hematopoietic cells do not contribute to osteogenesis in fracture healing	(Otsuru et al., 2017)
CMV	Cytomegalovirus minimal promoter	Ubiquitous		Rosa26 LacZ	MSC contributed to the callus initiation by expressing BMP-2	(Granero-Moltó et al., 2009)
Col10a1	Collagen, type 10, alpha-1	Chondrocytes		EGFP; LacZ; Tomato	Collagen 10-positive chondrocytes give rise to osteoblasts/osteocytes fracture repair	(Zhou et al., 2014)
Col1a1 2.3	Collagen, type 1, alpha-1	Osteoblasts		IGFR	Increased osteoclasts in early healing; impaired angiogenesis; decreased osteoclasts in late healing	(Wang et al., 2015)
Col1a1 2.3	Collagen, type 1, alpha-1	Osteoblasts		mT/mG	Not highly driven during adult fracture repair	(Stiers et al., 2017)
Col1a1 2.3	Collagen, type 1, alpha-1	Osteoblasts		Nf1	Increased activation of Ras/MAPK pathway; inhibited mineralization	(Sharma et al., 2013)
Col1a1 2.3	Collagen, type 1, alpha-1	Osteoblasts		R26R	Majority of soft callus cells are derived from MSC	(Murao et al., 2013)
Col1a1 3.2	Collagen, type 1, alpha-1	Osteoblasts	Tamoxifen	mT/mG	Highly driven during fracture repair	(Stiers et al., 2017)
Col1a1 3.6	Collagen, type 1, alpha-1	Osteoblasts		Bmp2	No difference between wild-type and knockout mice during early fracture healing	(Mi et al., 2013)
Col1a1 3.6	Collagen, type 1, alpha-1	Osteoblasts		Cx43	Inhibition of mineralization, resorption, and remodeling; decreased RankL/Opg ratio	(Loiselle et al., 2013)
Col1a1 3.6	Collagen, type 1, alpha-1	Osteoblasts		R26R	Majority of soft callus cells are derived from MSC	(Murao et al., 2013)
Col1a1 3.6	Collagen, type 1, alpha-1	Osteoblasts		Smo	Inhibited osteoblast differentiation; decreased fracture mineralization	(Baht et al., 2014)
Col1a1 3.6	Collagen, type 1, alpha-1	Osteoblasts		β-catenin	Inhibited fracture bridging; decreased mineralization	(Chen et al., 2007)
Col2a1	Collagen, type 2, alpha-1	Chondrocytes	Tamoxifen	Ai9	Collagen II-positive chondrocytes give rise to osteoblasts/cytes during development and fracture repair	(Hu et al., 2017)
Col2a1	Collagen, type 2, alpha-1	Chondrocytes	Tamoxifen	Ai9	Induction of recombination without activation of CreERT2 system especially in bone marrow	(Seime et al., 2015)
Col2a1	Collagen, type 2, alpha-1	Chondrocytes		Bmp2	Inhibited osteogenesis; delayed mineralization	(Mi et al., 2013)
Col2a1	Collagen, type 2, alpha-1	Chondrocytes	Tamoxifen	glucocorticoid receptor (GR)	Increased cartilage content in metaphyseal fractures; decreased mineralization	(Tu et al., 2014)
Col2a1	Collagen, type 2, alpha-1	Chondrocytes		mT/mG	Not highly driven during fracture repair	(Stiers et al., 2017)
Csf1r	Macrophage Fas-Induced Apoptosis (MaFIA)	Macrophages and dendritic cells			No Fracture Data	
Ctsk	cathepsin K	Osteoclasts			No Fracture Data	
Dmp1	Dentin matrix acidic phosphoprotein 1	Osteocytes	Tamoxifien	IGF-I	No Fracture Data	
Dmp1	Dentin matrix acidic phosphoprotein 1	Osteocytes		IGF-I	Increased mineralization, bone area; decreased chondrogenesis and osteoclastogenesis	(Lau et al., 2016)
Grem1	Gremlin 1	Osteochondroreticular cells			No Fracture Data	
IL6ra	Interleukin 6 receptro complex	Hepatocytes and immune cells			No Fracture Data	
LepR	Leptin Receptor	Mesenchymal cells			No Fracture Data	
Lyz2	Lysozyme	Osteoclasts			No Fracture Data	
Mx1	Myxovirus resistance 1	Ubiquitous	interferon alpha, interferon beta	dnMAML	Decreased chondrogenesis; prolonged expression of pro-inflammatory cytokines	(Dishowitz et al., 2013)
MyoD	Myogenic differentiation 1	Skeletal myocytes		hAP	Myogenic progenitors are involved in fracture repair when muscle fenestration is present	(Liu et al., 2011)
MyoD	Myogenic differentiation 1	Myogenic cells		Nf1	Decreased fracture union; increased cellular proliferation	(El-Hoss et al., 2012)
Osx (Sp7)	Osterix	Osteoblast		Bmp2	No effect on fracture healing	(McBride-Gagyi et al., 2015)
Osx (Sp7)	Osterix	Osteoblast		GFP	Angiogenesis is coupled with osteoblast precursor invasion	(Maes et al., 2010)
Osx (Sp7)	Osterix	Osteoblast		Nf1	Atrophic callus; decreased chondrogenesis	(de la Croix Ndong et al., 2015)
Osx (Sp7)	Osterix	Osteoblast	Tamoxifien	R26R	Expression in hypertrophic chondrocytes, osteoblasts, osteocytes, and bone lining cells during fracture healing	(Hu et al., 2017)
Pax7	Paired box 7	Myogenic cells	Tamoxifen	DTA	Decreased growth factors; deceased osteogenesis; increased angiogenesis	(Abou-Khalil et al., 2015a)
Pax7	Paired box 7	Myogenic cells	Tamoxifen	DTA	Delayed healing; decreased BMP, IGF-1, and FGF-1 expression	(Abou-Khalil et al., 2015b)
Postn	Periostin	Osteoblast		Nf1	Delayed healing; increased osteoclastogenesis	(Wu et al., 2011)

Driver	Driver Full	Site of Expression	Inducible	Knockout/Reporter	Phenotype	Reference
Prx1	Paired related homeobox 1	Mesenchymal cells		BMP2	Inhibited callus formation in Dkk1+/− mice	(Intini and Nyman, 2015)
Prx1	Paired related homeobox 1	Mesenchymal cells		BMP2	Inhibited early callus formation	(Tsuji et al., 2006)
Prx1	Paired related homeobox 3	Mesenchymal cells		BMP4	Fracture healing was not affected	(Tsuji et al., 2008)
Prx1	Paired related homeobox 1	Mesenchymal cells		BMP7	No effect on fracture healing	(Tsuji et al., 2010)
Prx1	Paired related homeobox 4	Mesenchymal cells	Tamoxifen	GFP; LacZ; Rosa26	Osteochondral progenitor cells can differentiate into chondrocytes and osteoblasts in fracture callus	(Kawanami et al., 2009)
Prx1	Paired related homeobox 1	Mesenchymal cells		Nf1	Decreased chondrogenesis; thickened periosteum	(El Khassawna et al., 2012)
Prx1	Paired related homeobox 2	Mesenchymal cells		R26R	Majority of soft callus cells are derived from MSC	(Murao et al., 2013)
Prx1	Paired related homeobox 1	Mesenchymal cells		RBPjk	Decreased fracture union; decreased progenitor cells	(Wang et al.)
Prx1	Paired related homeobox 1	Mesenchymal cells		Runx1	Decreased chondrogenesis	(Soung et al., 2012)
Prx1	Paired related homeobox 1	Mesenchymal cells		β-catenin	Delayed healing and union	(Jin et al., 2015)
Runx2	Runt-related transcription factor 2	Osteoblast			No Fracture Data	
Sox9	Sox9	Mesenchymal cells	Tamoxifen	R26R	Majority of soft callus cells are derived from MSC	(Murao et al., 2013)
TRAP	tartrate-resistant acid phosphatase	Osteoclasts			No Fracture Data	
Twist2 (Dermo1)	Twist homolog 2	Mesenchymal cells		Yap1	Inhibited chondrogenesis and cartilage deposition	(Deng et al., 2016)
UBC	Human ubiquitin C	Ubiquitous	Tamoxifen	Ai9	Induction of recombination without activation of CreERT2 system especially in bone marrow	(Seime et al., 2015)
VEC	vascular endothelial cadherin	Endothelial		Bmp2	No effect on fracture healing	(McBride-Gagyi et al., 2015)
αSMA	α-Smooth muscle actin	Myofibroblasts	Tamoxifen	Ai9	αSMA positive progenitor cells transition to osteoblasts during fracture repair	(Grcevic et al., 2012)