

# TGF- $\beta$ family signaling in endothelial cells and angiogenesis $\mbox{Ma, J}.$

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## Abbreviations

ALK1Activin receptor-like kinase 1ALK2Activin receptor-like kinase 2ALK3Activin receptor-like kinase 3ALK5Activin receptor-like kinase 5ALK6Activin receptor-like kinase 6AMDAge-related macular degenerationAMHAnti-müllerian hormoneAMH1Anti-müllerian hormoneAMH1AMH type II receptorANOVAA two-way analysis of varianceASAtherosclerosisATCCAmerican Type Culture CollectionAVAtrioventricularBAECsBovine aortic endothelial cellsBCABicinchoninic acidbHLHBaisc helix-loop-helixBMBLBiosafety in Microbiological and Biomedical LaboratoryBMPBone morphogenetic proteinBMPRIBMP type I receptorBOECsBlood outgrowth endothelial cellsBEEBovine serum albumincaALK2Constitutively active forms of ALK2CADCoronary artery diseaseCAFsCancer-associated fibroblastsCas9CRIRSPR-associated proteinCTMCardiac tissue mimeticsDAPI4',6-diamidino-2-phenylindoleDLAVDorsal longitudinal anastomotic vesselDMEMDulbeco's Molified Eagle MediumDMSODimethyl sulfoxideDoCDuct of CuvierdpfDays post-injectionEBElution bufferECFC-ECSHuman endothelial colony forming cell-derived ECSECMExtracellular matrixECSEndotheli	ADME	absorption, distribution, metabolism and excretion
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ECs Endothelial cells	ECFC-ECs	Human endothelial colony forming cell-derived ECs
EDTA Ethylenediaminetetraacetic acid	ECs	Endothelial cells
	EDTA	Ethylenediaminetetraacetic acid

EGF	Epidermal growth factor
EMT	Epithelial-to-mesenchymal transition
EndMT	Endothelial-to-mesenchymal transition
EndMT-TFs	EndMT transcription factors
End-MyoT	Endothelial-to-myofibroblast transition
ER	Estrogen receptor
ERK	Extracellular-signal-regulated kinase
F-actin	Filamentous actin
FBS	Fetal bovine serum
FDA	Food and Drug Administration
FGF	Fibroblast growth factor
	0
FOP FSP-1	Fibrodysplasia ossificans progressiva
	fibronectin and fibroblast-specific protein-1
GAPDH	Glyceraldehyde 3-phosphate dehydrogenase
GDF	Growth differentiation factor
GS	Glycine-serine-rich
HAoECs	Heart aortic ECs
HCMECs	Human cutaneous microvascular ECs
HFD	High-fat diet
HGF	Hepatocyte growth factor
HMECs	Human dermal microvascular endothelial cells
HMGA1	High Mobility Group AT-hook 1
HMVECs	Human dermal microvascular endothelial cells
hpf	Hours post-fertilization
hpi	Hours post-injection
HRP	Horseradish peroxidase
HUVECs	Human umbilical vein endothelial cells
HVEC	Human vascular endothelial cell
IB	Immunoblotting
$IC_{50}$	Half-maximum inhibitory concentration
ICIs	Immune checkpoint inhibitors
ID	Inhibitor of DNA binding
IF	Immunofluorescence
IL	Inflammatory interleukin
IPH	Idiopathic portal hypertension
ISV	Intra segmental vessel
JNK	Jun amino-terminal kinase
kDa	kilodalton
LAP	latency-associated peptide
LB	Lysogeny broth
LCMS	liquid chromatography mass spectrometry
MAECs	Mouse aortic endothelial cells
MAPK	MAP kinase
MCECs	Mouse cardiac endothelial cells
MESECs	Mouse embryonic stem cell-derived ECs
MET	Mesenchymal-to-endothelial transition

MKL	Modulator magakaryoblastic leukemia
mRL mPAP	Mean pulmonary artery pressure
MS-1	Murine pancreatic microvascular endothelial cell
MSCs	Mesenchymal multipotent cells
NHEJ	Non-homologous end joining
NT	
	Non-targeting
NTRK1	Neurotrophic receptor tyrosine Kinase 1
PAECs	Pulmonary artery ECs
PAH	Pulmonary arterial hypertension
PAI1	Plasminogen activator inhibitor-1
PBS	Phosphate-buffered saline
PDGF	Platelet-derived growth factor
PDX	Patient-derived xenograft
PEI	Polyethyleneimine
PI3K	Phosphoinositide 3-kinases
PVDF	Polyvinylidene difluoride
RFP	Red fluorescent protein
RIPA	Radioimmunoprecipitation assay
RIPF	Radiation-induced pulmonary fibrosis
rPAECs	Rat pulmonary arterial endothelial cells
RVSP	Right ventricular systolic pressure
SDS-PAGE	Sodium dodecyl sulphate polyacrylamide gel electrophoresis
sgRNA	Single guide RNA
shRNA	Short hairpin RNA
SIV	Subintestinal vessel
SM22a	Smooth muscle protein 22a
SMAD	Sma and Mad related protein
SMCs	Smooth muscle cells
SRPK1	Serine-arginine protein kinase 1
STAT	Signal transducer and activator of transcription
ΤβRΙ	TGF-β type I receptor
ŢβRII	TGF-β type II receptor
, TAK1	TGF-β activated kinase 1
TBST	Tris-buffered saline with Tween 20
TGFβR	TGF-β receptor
TGFβ	Transforming growth factor-β
TIE1	Tyrosine kinase with immunoglobulin-like and EGF-like domains 1
TIE2	Tyrosine kinase with immunoglobulin-like and EGF-like domains 2
TMJD	Temporal mandibular joint disorder
TNF	Tumor necrosis factor
TRAF6	TNF-receptor associated factor 6
VE-Cadherin	Vascular endothelial-Cadherin
VEGF	Vascular endothelial growth factor
VEGFR2	Vascular endothelial growth factor receptor 2
vWF	Von Willebrand Factor
α-SMA	$\alpha$ -smooth muscle actin

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#### **Curriculum Vita**

Jin Ma was born on 11st of November 1991 in Shanxi province, China. From 1th September 2010, she started her bachelor study in pharmacy at the College of pharmacy in Lanzhou University, China. She obtained her bachelor degree in June 2014. From 1st September 2014, Jin started her master study in Pharmacy at National Engineering Research Center for Biomaterials, Sichuan University, China. During her master internship, under the supervision of Prof. Zhongwei Gu and Dr. Qiangving Yi, she investigated multiple pH responsive zwitterionic micelles for stealth delivery of anticancer drugs and peptide dendrimers functionalized zwitterionic drug nanocarriers for stimuli-responsive cancer theranostics. She obtained her master degree in June 2017. From September 2017, Jin started her PhD study funded by a CSC scholarship at the Department of Cell and Chemical Biology, Leiden University Medical Center, the Netherlands. During her PhD, she studied TGF-β signaling in endothelial cells and angiogenesis under the supervision of Prof. Peter ten Dijke. She focused on obtaining new insights of the underlying mechanisms that govern TGF-\beta-induced endothelial to mesenchymal transition. Besides, she identified two novel BMP type I receptor macrocyclic kinase inhibitors for inhibiting endothelial cell function in normal and tumor angiogenesis.

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