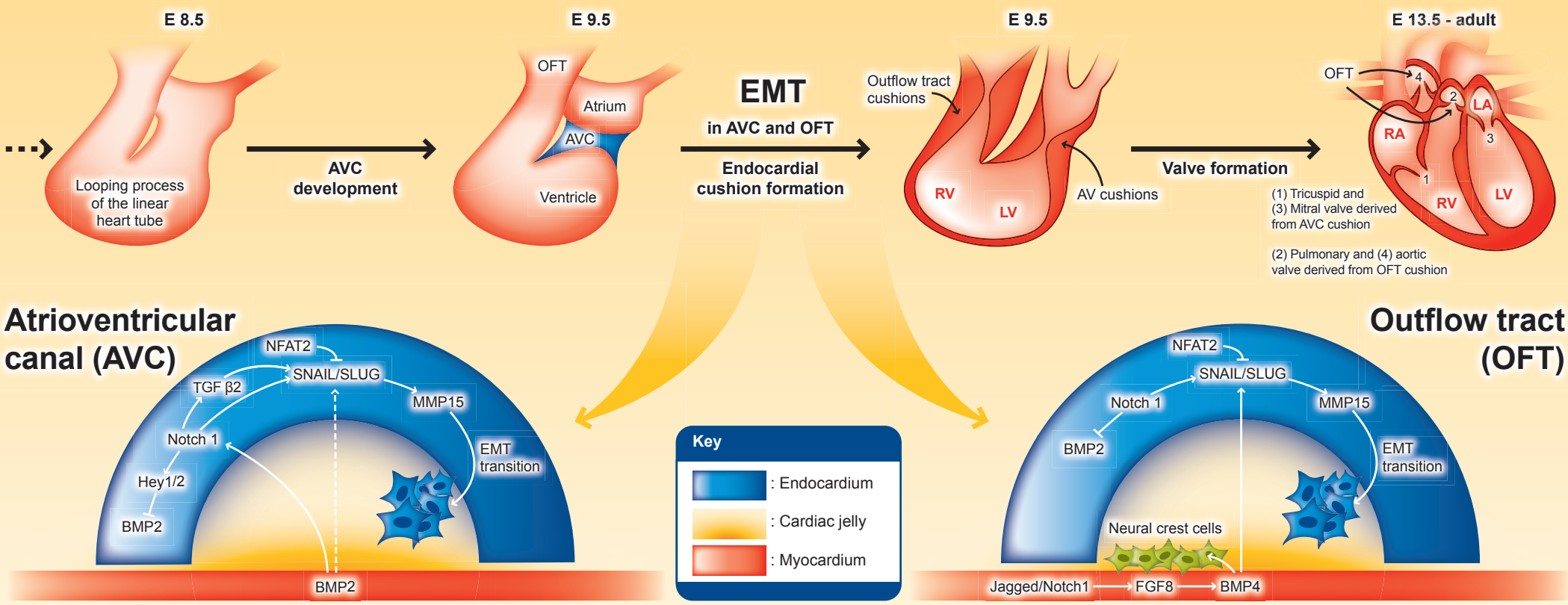
Epithelial-to-Mesenchymal Transition (EMT) in heart development

abcam®
discover more



Epithelial-to-mesenchymal transition (EMT) is a process necessary for formation of 1) the mitral and tricuspid valves in the atrioventricular canal (AVC) and 2) the aortic and pulmonary valves in the outflow tract (OFT) region during development of the heart. An EMT is a biological process that allows a polarized epithelial cell to undergo multiple biochemical changes to become a mesenchymal cell that can migrate away from the epithelial layer in which it originated.

In the endocardium of AVC, Notch1 suppresses BMP2 activity through HEY1/2 activation while it promotes non-invasive EMT through activation of TGFβ2 and SNAIL (SNAI1). BMP2, secreted from the adjacent myocardium, is necessary to trigger a complete invasion of endocardial cells by inducing SNAIL/SLUG (SNAI2) activity in conjunction with Notch1. SNAIL directly interacts with MMP15 to induce mesenchymal phenotype in the endocardial cells. NFAT2 (NFATC1) acts in a cell-autonomous manner to suppress SNAIL/SLUG activity and inhibit EMT.

In the myocardium of OFT, Jagged1/Notch1 signaling stimulates FGF8 and BMP4 signaling. BMP4, in turn, signals to the endocardium to initiate EMT by stabilizing SNAIL/SLUG and by promoting neural crest cell differentiation, which will further contribute to OFT remodeling and septation.

References:

1. Pompa et al., Dev Cell 22(2):244-54 (2012)
2. MacGrogan et al., Birth Defects Research (Part A): Clinical and Molecular Teratology 91:449-459 (2011)
3. Wu et al., Cir. Research 109:183-192 (2011)
4. Tao et al., Dev Bio 359(2):209-221 (2011)

Produced in collaboration with Dr. Kristina Buac

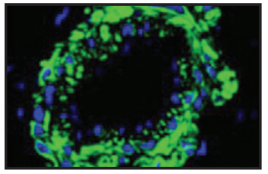
Epithelial to Mesenchymal Transition (EMT) related products from Abcam

Antibodies	Clonality	Applications	Host	Cross Reactivity	Product code
BMP2	P	WB, ICC/IF	Rb	Ms, Hu	ab82511
BMP2	P	Dot Blot, ELISA, WB, ICC/IF, IHC-Fr, IHC-P	Rb	Ms, Rat, Hu	ab14933
BMP4	P	WB, IHC-P, ICC/IF	Rb	Ms, Rat, Hu	ab39973
FGF8	P	WB, IHC-P	Rb	Ms, Rat, Hu	ab81384
HEY1	P	WB, IHC-P	Rb	Ms, Hu	ab22614
HEY2	P	WB	Rb	Ms	ab25404
Jagged1	P	WB, ICC/IF	Rb	Hu	ab85763
MMP15	M	IHC-P, WB	M	Hu	ab56308
NFAT2	M	ICC, ChIP, WB, IHC-FoFr, IP, Gel supershift assays, IF, IHC-P	M	Ms, Rat, Hu, Mk	ab2796
NFAT2	P	IHC-P, WB	Rb	Ms, Rat, Chk, Hu, Chmp	ab25916
Nkx2.5	P	WB, IHC-P	Rb	Ms, Hu	ab35842
Notch1 (activated)	P	IHC-P, IHC-Fr, ICC/IF, WB, Flow Cyt	Rb	Ms, Hu	ab8925
Notch1	P	WB, ChIP, ICC/IF, IHC-Fr, IHC-P	Rb	Ms, Hu	ab27526
NOTCH3	P	WB, IHC-P, ICC/IF, IHC-FoFr, IHC-Fr	Rb	Ms, Rat, Hu	ab23426
NOTCH4	P	WB, ICC	Rb	Hu	ab33163
SNAIL + SLUG	P	Sandwich ELISA, WB, ICC/IF, IHC-P, ChIP, IP	Rb	Ms, Rat, Hu	ab85931
TGF beta 2	M	IHC-P, WB, IHC-Fr	M	Ms, Cow, Hu	ab36495
TGF beta 2	P	WB, IP, ELISA, IHC-P, ICC/IF	Rb	Ms, Rat, Hu	ab66045

Proteins	Host	Size	Product code
BMP2 (Hu)	E. coli	50µg	ab87065
BMP4 (Hu)	E. coli	10µg	ab51998
FGF8 (Hu)	E. coli	25µg	ab50128
NFAT2 (Hu)	Sf9	50µg	ab64307
Notch1 (Hu)	wheat germ	10µg	ab114178
Notch3 (Hu)	wheat germ	10µg	ab114234
TGB beta 2 (active) (Hu)	HEK 293	5µg	ab84070

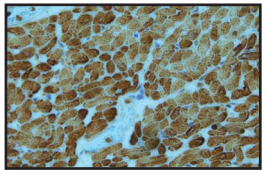
Kits	Tests	Product code
BMP2 Human ELISA Kit	96	ab119581
BMP2 Human ELISA Kit	96	ab119582
BMP4 Human ELISA Kit	96	ab99982
TGF beta 2 Human ELISA Kit	96	ab100648

Featured antibodies



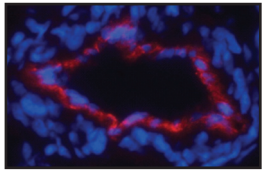
Anti-Calponin antibody (ab700)

Clonality	Applications	Host	Species cross reactivity
M	IHC-Fr, Flow Cyt, ICC/IF, IHC-FoFr, IHC-P	M	Rat, Hu



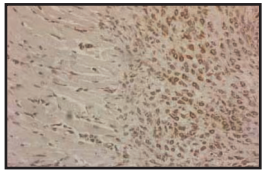
Anti-Cardiac Troponin I antibody (ab47003)

Clonality	Applications	Host	Species cross reactivity
P	WB, ICC/IF, IHC-P, Flow Cyt	Rb	Ms, Rat, Hu, Pig



Anti-CD31 antibody (ab28364)

Clonality	Applications	Host	Species cross reactivity
P	IHC-Fr, IHC-P, ICC/IF, IHC-FrFl, WB	Rb	Ms, Hu



Anti-Nkx2.5 antibody (ab35842)

Clonality	Applications	Host	Species cross reactivity
P	WB, IHC-P	Rb	Ms, Hu

Anti-SM22 alpha antibody (ab14106)

Clonality	Applications	Host	Species cross reactivity
P	ICC/IF, IHC-P, IHC-Fr, WB, ICC	Rb	Ms, Rat, Chk, Cow, Hu, Pig

092_12_KM

Discover more at abcam.com/emt