**Supplementary Methods**

**Plasmid lentiviral transduction**

Lentiviral vectors were obtained from Sigma-Aldrich (MISSION®) for human and mouse c-Myb, Axin2 knockdown (shRNA TRCN0000040059, TRCN0000040062, TRCN0000042500 and TRCN0000078539, respectively), as well as control vectors (pLV, pLKO-1). The lentiviral vectors that expressed c-Myb were generated by inserting the full-length human c-Myb cDNA fragments into pLV.CMV.bc.puro.

Lentiviral plasmids and 3 helper plasmids (pCMV-VSVG, pMDLg-RRE (gag/pol) and pRSV-REV) were co-transfected into HEK293T cells for lentivirus production. Cell supernatants containing the virus were harvested 48 h after transfection and stored at -80°C.

For generating stable cell lines, cells were infected at 20% confluence with lentiviral supernatants with normal culture medium (120 ng/ml of virus) in the presence of 8 ng/ml polybrene (Sigma) for 24 h. Then the cells were cultured under puromycin (1 µg/ml) selection.

**qPCR primers**

Human:

*GAPDH* Forward: 5’-AGCCACATCGCTCAGACAC-3’

*GAPDH* Reverse: 5’-GCCCAATACGACCAAATCC-3’

c-Myb Forward: 5’- GGCGAGCCCCTTGCA-3’

*c-Myb* Reverse: 5’-CTCCTCCATCTTTCCACAGGAT-3’

*N-cadherin* Forward: 5’-CAGACCGACCCAAACAGCAAC-3’

*N-cadherin* Reverse: 5’-GCAGCAACAGTAAGGACAAACATC-3’

*Snail* Forward: 5’-ACCACTATGCCGCGCTCTT-3’

*Snail* Reverse: 5’-GGTCGTAGGGCTGCTGGAA-3’

*Slug* Forward: 5’-ATGAGGAATCTGGCTGCTGT-3’

*Slug* Reverse: 5’-GAGGAGAAAATGCCTTTGGA-3’

*Vimentin* Forward: 5’-CCAAACTTTTCCTCCCTGAACC-3’

*Vimentin* Reverse: 5’-CGTGATGCTGAGAAGTTTCGTTGA-3’

*Twist* Forward: 5’-GGAGTCCGCAGTCTTACGAG-3’

*Twist* Reverse: 5’-TCTGGAGGACCTGGTAGAGG-3’

*Axin2* Forward: 5’-ATTCGGCCACTGTTCAGACG-3’

*Axin2* Reverse: 5’-GACAACCAACTCACTGGCCTG -3’

*Cyclin D1* Forward: 5’-TCAAGTGTGACCCGGACTGCCT -3’

*Cyclin D1* Reverse: 5’-GCACGTCGGTGGGTGTGCAA-3’

Mouse:

*gapdh* Forward: 5'-AACTTTGGCATTGTGGAAGG-3

*gapdh* Reverse: 5'-ACACATTGGGGGTAGGAACA-3'

*c-myb* Forward: 5’- GCGTTGGTCTGTTATTGC-3’

*c-myb* Reverse: 5’-TTCTGTCCTCCTCTTCTGT-3’

*slug* Forward: 5’-CACATTCGAACCCACACATTGCCT-3’

*slug* Reverse: 5’-TGTGCCCTCAGGTTTGATCTGTCT-3’

*axin2* Forward: 5’-GGTTCCGGCTATGTCTTTGC-3’

*axin2* Reverse: 5’-CAGTGCGTCGCTGGATAACTC-3’

**Luciferase Reporter Assay**

HEK293T cells were seeded in 24 wells plate and transfected with empty vector or HA-c-Myb plasmid plus TOP/FOP flash reporter plasmids. At 24h after transfection, cells were treated with or without 100ng/ml recombinant Wnt3a for 16h. The luciferase activities were analysed by a luminometer (Berthold Technologies). Reporter activity was normalized to β-gal expression.

**Chromatin immunoprecipitation assay**

Cells were fixed in 1% formaldehyde for 15 min at room temperature and then quenched by 5 min of treatment with 0.125 M glycine. Cells were harvested into ChIP lysis buffer (1% SDS, 50 mM Tris, pH 8.0, 5 mM EDTA and proteinase inhibitors) and sonicated to generate DNA fragments (200–400 bp). After centrifugation for 10 min at 14,000 rpm, the supernatant was diluted with dilution buffer (20 mM Tris pH 8.0, 2 mM EDTA, 1% Triton X-100, 150 mM NaCl, proteinase inhibitors) and then incubated overnight at 4°C with 3 μg of antibodies. Input samples were obtained before adding antibodies. The next day, 50 μl of protein A beads were added and the samples were incubated for 1 h at 4°C. The precipitates were pelleted and washed stepwise as follows: buffer TSE I (0.1% SDS, 20 mM Tris pH 8.0, 2 mM EDTA, 1% Triton X-100, 150 mM NaCl, proteinase inhibitors), TSE II (0.1% SDS, 20 mM Tris pH 8.0, 2 mM EDTA, 1% Triton X-100, 500 mM NaCl, proteinase inhibitors), LiCl buffer (10 mM Tris pH 8.0, 1 mM EDTA, 0.25 mM LiCl, 0.1% NP-40, 1% deoxycholate sodium) and TE (10 mM Tris, pH 8.0, 1 mM EDTA, pH 8.0). Elution buffer (400 μl; 25 mM Tris, pH 8.0, 10 mM EDTA, 0.5% SDS) was used to elute the bound immunocomplexes by incubation with vortexing at 65°C for 15 min. All samples were incubated with RNaseA (Thermo) and proteinase K (Thermo) at 65°C for 6–10 h to reverse the cross-linking and for purification. Two antibodies were used for the ChIP assay: anti-c-Myb (12319s, Cell Signaling) and anti-β-catenin (610154, BD Transduction Laboratories). All of the samples were measured by qRT-PCR. The primer sequences are listed below.

*Actin* promoter Forward: 5’- CTCTGACCTGAGTCTCCTT-3’

*Actin* promoter Reverse: 5’- GAGCCAGTGTTAGTACCTAC -3’

*Axin2* promoter TCF binding Forward: 5’- AAGAAATCAGAACTCGGGC -3’

*Axin2* promoter TCF binding Reverse: 5’- CCAGGACCTTATCAAAGCG -3’

*Cyclin D1* promoter TCF binding Forward: 5’- GGGCTTTGATCTTTGCTTAAC -3’

*Cyclin D1* promoter TCF binding Reverse: 5’- TGGAGGCTCCAGGACTTT-3’

*Axin2* promoter c-Myb binding1 Forward: 5’- GGGACTTTGGAAGAGTAACG -3’

*Axin2* promoter c-Myb binding1 Reverse: 5’- GCCTGAGTGCTAACACCAGT -3’

*Axin2* promoter c-Myb binding2 Forward: 5’- AATGCTGGGATTACAGGC -3’

*Axin2* promoter c-Myb binding2 Reverse: 5’- CACAACCTTCTCTTCTCCGT -3’

**Transwell migration assay**

A total of 5×104 cells were seeded in the upper compartment of 24-well polyethylene terephthalate inserts (Falcon, 8.0-μm pore size). Cyctokines were added into the lower part of the wells. After 16 hours of culture, cells migrated to the lower side of the insert filter. For analysis, cells remaining on the upper side of the membrane were removed, and cells on the lower side of the filter were fixed in 4% paraformaldehyde. After staining with 0.5% crystal violet, the migrated cells were counted and photographed. All experimental result is from one experiment in triplicate samples, the experiment was performed twice with similar results.

**Immunohistochemical staining and evaluation**

We used antibodies against c-Myb (05-175, Merck Millipore) and Axin2 (ab32197, Abcam) for immunohistochemical staining. The tissue microarray (TMA) were conducted from breast cancer patients diagnosed and treated in the Leiden University Medical Center (LUMC) between 1996 and 2006. All sections were deparaffinized and rehydrated, and placed in 0.3% hydrogen peroxide methanol for 20 min to block endogenous peroxidase. Then slides were boiled in 10 mM sodium citrate buffer (pH 6.0) for antigen retrieval. After cooling down, sections were incubated overnight with either c-Myb (1:300) or Axin2 (1:2000) antibodies. This was followed by a 45 min incubation with biotinylated secondary mouse or rabbit antibody (DAKO), and 30 min ABC reagent incubation to amplify the target antigen signal. Sections were visualized in diaminobezidine solution, counterstained with haematoxylin. dehydrated, and mounted in malinol.

Microscopic analysis of c-Myb and Axin2 expression was performed by two independent observers in a blinded manner. The scores of the three punches were averaged. The percentage of positive nuclear staining (c-Myb) or the intensity of cytoplasmic staining (Axin2) were determined. For c-Myb a cut-off of 50% was used to define low (<50%) or high (>=50%) expression. For Axin2 no or weak staining intensity was defined as low Axin2 expression, and moderate or high staining intensity as high Axin2 expression.

**Online clinical datasets**

Figure 1A was analysed from oncomine. Data for Figure 1F and G were downloaded from the Gene Expression Omnibus (GSE2990)([3](#_ENREF_3)). To analyse genes correlation in Figure 3A, the original TCGA gene expression data were obtained from the Cancer Genome Atlas (<https://tcga-data.nci.nih.gov>)([4](#_ENREF_4)); R software was used to calculate genes expression profile and correlation of 534 breast cancer patients. Data in Figure S1A,b were analysed from cBioportal (<http://www.cbioportal.org>). Data in Figure 7D were calculated by using PROGgene (<http://watson.compbio.iupui.edu/chirayu/proggene>).

**References**

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