

**Supplementary Table 2 - GRO-Seq data sets**

Cell line	Dataset series	Reference
AC16	GSE41323	Danko CG, Hah N, Luo X, Martins AL et al. Signaling pathways differentially affect RNA polymerase II initiation, pausing, and elongation rate in cells. <i>Mol Cell</i> 2013 Apr 25;50(2):212-22. PMID: 23523369
Hela_danko	GSE62046	Andersson R, Refsing Andersen P, Valen E, Core LJ et al. Nuclear stability and transcriptional directionality separate functionally distinct RNA species. <i>Nat Commun</i> 2014 Nov 12;5:5336. PMID: 25387874
Hela_laitem	E-MTAB-3360	Laitem C, Zaborowska J, Isa NF, Kufs J, Dienstbier M, Murphy S. CDK9 inhibitors define elongation checkpoints at both ends of RNA polymerase II-transcribed genes. <i>Nat Struct Mol Biol</i> . 2015 May;22(5):396-403. doi: 10.1038/nsmb.3000. Epub 2015 Apr 6. PMID:25849141
Hela_duttke	GSE63872	Duttke SH, Lacadie SA, Ibrahim MM, Glass CK et al. Human promoters are intrinsically directional. <i>Mol Cell</i> 2015 Feb 19;57(4):674-84. PMID: 25639469
IMR90	GSE13518	Core LJ, Waterfall JJ, Lis JT. Nascent RNA sequencing reveals widespread pausing and divergent initiation at human promoters. <i>Science</i> 2008 Dec 19;322(5909):1845-8. PMID: 19056941
LNCaP	GSE 47807	Yang et al. Yang L, Lin C, Jin C, Yang JC, Tanasa B, Li W, Merkurjev D, Ohgi KA, Meng D, Zhang J, Evans CP, Rosenfeld MG. <i>Nature</i> . 2013 Aug 29;500(7464):598-602.doi:10.1038/nature12451.Epub 2013 Aug 14.PMID: 23945587
LNCaP	GSE27823	Wang D, Garcia-Bassets I, Benner C, Li W et al. Reprogramming transcription by distinct classes of enhancers functionally defined by eRNA. <i>Nature</i> 2011 May 15;474(7351):390-4. PMID: 21572438
K562	GSE66448	Niskanen EA, Malinen M, Sutinen P, Toropainen S et al. Global SUMOylation on active chromatin is an acute heat stress response restricting transcription. <i>Genome Biol</i> 2015 Jul 28;16:153. PMID: 26259101
BT474, MCF10, SKBR3, ZR75-30	E-MTAB-666, E-MTAB-667, E-MTAB-668 and E-MTAB-675	Kim YJ, Greer CB, Cecchini KR, Harris LN, Tuck DP, Kim TH. HDAC inhibitors induce transcriptional repression of high copy number genes in breast cancer through elongation blockade. <i>Oncogene</i> . 2013 Jun 6;32(23):2828-35. doi: 10.1038/onc.2013.32. Epub 2013 Feb 25.PMID:23435418
GM12004, GM12750	GSE39878	Wang IX, Core LJ, Kwak H, Brady L et al. RNA-DNA differences are generated in human cells within seconds after RNA exits polymerase II. <i>Cell Rep</i> 2014 Mar 13;6(5):906-15. PMID: 24561252
h1ESC	GSE41009	Sigova AA, Mullen AC, Molinie B, Gupta S et al. Divergent transcription of long noncoding RNA/mRNA gene pairs in embryonic stem cells. <i>Proc Natl Acad Sci U S A</i> 2013 Feb 19;110(8):2876-81. PMID: 23382218
HCT116 p53 +/+, p53 -/-	GSE53964	Allen MA, Andrysik Z, Dengler VL, Mellert HS et al. Global analysis of p53-regulated transcription identifies its direct targets and unexpected regulatory mechanisms. <i>Elife</i> 2014 May 27;3:e02200. PMID: 24867637
MCF7	GSE45822	Li W, Notani D, Ma Q, Tanasa B et al. Functional roles of enhancer RNAs for oestrogen-dependent transcriptional activation. <i>Nature</i> 2013 Jun 27;498(7455):516-20. PMID: 23728302