

## Supplementary Table S1

Gene Categories	Gene Panel #1	Gene Panel #2
<b>p53 response elements (RE)<sup>1-7</sup></b>	ATM <sup>8</sup> , BRCA1 <sup>9</sup> , CHEK1 <sup>10</sup> , FANCC, GADD45A, MGMT <sup>11</sup> , MLH1, MSH2, MUTYH <sup>12</sup> , PMS2, POLD1 <sup>13</sup> , POLH <sup>14</sup> , PTTG1 <sup>10,15</sup> , RAD51 <sup>16</sup> , RAD51C, TDG <sup>17</sup> , TRP53, XPC	APAF1, ATM <sup>8</sup> , BAX, BBC3, BCL2, BID, BRCA1 <sup>9</sup> , CCNG1, CD82, CDC25C, CDK1, CDKN1A, CHEK1, DDB2, EI24, FAS, GADD45A, LRDD, MDM2, MDM4, MYC, PERP, PMAIP1, PML, PPM1D, PTEN, RAD51 <sup>16</sup> , RB1, RFW2, RRM2B, SERPINB5, SERPINE1, SESN1, SESN2, SFN, STEAP3, TNFRSF10B, TP53I3, TP73, TSC2, ZMAT3
<b>p53-p21 pathways<sup>18-20</sup></b>	BRCA2, CHEK1, EXO1, FEN1, H2AFX, LIG1, PMS1, POLD1, POLD3, POLE, PRKDC, RAD1, RAD9A, RAD18, RAD21, RAD23A, RAD51, RBBP4, SMC1A, SMC3, UNG, WRNIP1, XRCC1, XRCC2, XRCC3	ATR, CCNB1, CCNB2, CCNE1, CDC25A, CDC25C, CDK1, CDK2, CHEK1, CHEK2, E2F1, FANCD2, GTSE1, H2AFX, RAD1, RAD9A, RAD51, RFC1, RPA2, RRM2, SMC1A
<b>p53-miRNA pathways<sup>21,22</sup></b>	CHAF1A, CHEK1, DCLRE1A, EXO1, FANCC, FANCG, FEN1, PTTG1, RAD51, TLK1, UNG, XRCC6	CDK4, CDK6, CHEK1, GTSE1, MDM4, THBS1, TLK1
<b>p53 interactions (e.g. Sp1)</b>	APEX1 <sup>23,24</sup> , POLD1 <sup>13</sup> , PTTG1 <sup>25</sup> , UBE2A <sup>26</sup>	
<b>Other putative p53 and/or lincRNA-p21 regulated genes<sup>27</sup></b>	CRY2 <sup>28</sup> , HUS1, MBD4, MPG, MSH3, OGG1, PRKDC <sup>10</sup> , RBM4 <sup>6</sup> , REV1, TERF1 <sup>29</sup> , TDG, UBE2A <sup>28</sup> , WRN	CCND1 <sup>28</sup> , CCND2, CCNE2 <sup>30</sup> , CDKN1B, CDKN2A, CREB1, NBN, RCHY1, SESN3
<b>Other p21 regulated genes<sup>31</sup></b>	PARP2, RAD50	CASP9, CCND1, CCND3, CDK6, CDKN2A, RAD50

**Supplementary Table S1.** p53 target genes in gene panels. DDR genes used in study are categorised according to type of p53 target gene. p53 target gene categories are defined as genes regulated by a p53 response element, the p53-p21 pathway, the p53-miRNA pathway (e.g. miR-34), p53 interactions (e.g. Sp1), other putative p53 and/or p53-lincRNA-21 regulated genes and other p21 regulated genes. 58/82 DDR genes (70.7%) were identified as a p53 target gene in gene panel #1 compared to 76/95 genes (80%) in gene panel #2. References are provided to support categorisation of genes as p53 target genes (Supplementary References).

## Supplementary Table S2

Up-regulated Genes				Down-regulated genes			
Gene	FC (log <sub>2</sub> ) <sup>1</sup>	Gene	FC (log <sub>2</sub> )	Gene	FC (log <sub>2</sub> )	Gene	FC (log <sub>2</sub> )
TM7SF4	9.16	CHI3L1	5.68	LRP1B	-7.58	DPT	-5.07
SYT12	8.36	TMEM215	5.62	PKHD1L1	-7.24	SLC4A4	-5.07
ZCCHC12	8.33	ASPHD1	5.5	SLC5A5	-7.22	FOXJ1	-5.04
TMPRSS4	8.26	C20orf103	5.5	WSCD2	-6.98	CA4	-5.03
GABRB2	7.81	PDZK1IP1	5.47	C13orf36	-6.80	DGKI	-5.03
KLK10	7.59	ADAMTS14	5.42	TFF3	-6.65	DIO1	-5.02
SLIT1	7.43	CEACAM6	5.39	CCL21	-6.50	IPCEF1	-5.01
STRA6	7.41	SFTPA1	5.38	SEMA3D	-6.344	MPPED2	-4.99
KLK7	7.22	LCN2	5.35	GPC3	-6.33	ASXL3	-4.99
B3GNT3	7.08	CD164L2	5.29	MRO	-6.22	PAK3	-4.97
KRT15	6.84	HPCAL4	5.23	ADH1B	-6.21	GPM6A	-4.96
NGEF	6.79	CACNG4	5.20	TPO	-6.17	FOXP2	-4.96
GRHL3	6.78	LAMB3	5.17	DPP6	-6.17	SLITRK5	-4.93
PRR15	6.67	COMP	5.16	CDH16	-6.07	DLG2	-4.92
SYTL5	6.57	ELFN2	5.15	MAPK4	-5.99	KIF19	-4.91
SLC6A20	6.49	TREM1	5.14	LOC286002	-5.85	PLA2R1	-4.88
RXRG	6.34	SFN	5.12	CWH43	-5.76	CRABP1	-4.79
SFTPB	6.35	GDF15	5.06	EDN3	-5.76	TCEAL2	-4.67
PPP1R1B	6.25	PLEKHN1	5.01	CNTFR	-5.72	GRIN2C	-4.66
RASGRF1	6.18	DPP4	5.01	SLC26A7	-5.69	ATP2C2	-4.64
TMEM163	6.11	SLC34A2	4.98	STXBP5L	-5.66	GPR98	-4.59
KCNN4	6.11	C1orf106	4.94	MT1G	-5.66	OCA2	-4.59
KLHDC8A	5.97	EPHA10	4.93	MT1H	-5.66	DES	-4.58
ST6GALNAC5	5.94	CITED1	4.92	SLC26A4	-5.60	CECR2	-4.57
PCSK1N	5.92	IGSF1	4.86	TFCP2L1	-5.59	C8orf80	-4.57
PVRL4	5.92	GOLT1A	4.85	CHRD1	-5.54	FAM189A1	-4.56
GJB3	5.91	CDH3	4.82	NWD1	-5.41	GDF10	-4.54
HCN4	5.75	CYP2S1	4.78	BMP8A	-5.39	FABP4	-4.53
SERPINA1	5.72	FAM5B	4.78	AOX1	-5.39	IGSF10	-4.53
FN1	5.69	AGR2	4.77	RYR2	-5.10	KCTD16	-4.52

<sup>1</sup>FC- Fold-change

**Supplementary Table S2.** Differentially expressed genes in DTC with high PBF and PTTG expression. Genes are ranked in order of fold-change of expression (log<sub>2</sub> values) in human thyroid tumours compared to matched normal thyroid tissue.

## Supplementary Table S3

PBF Custom Primers	Sequence
Forward	5'-GCA GAG ATG AAG ACA AGA CAT GA-3'
Reverse	5'-GCG TGC ACC TCA CAG GAA G-3'
Probe	5' FAM-TCC AGC ACA TCA GTC CCG ACG-TAMRA 3'.

Commercial Taqman Assays	
Gene target	Catalogue Number
<i>Pttg</i>	Hs00851754_u1
<i>Chek1</i>	Hs00967506_m1
<i>Exo1</i>	Hs01116195_m1
<i>Brcal</i>	Hs01556193_m1
<i>Rad51</i>	Hs00947967_m1
<i>PPIA</i>	Hs04194521_s1
<i>HPRT1</i>	Hs01003267_m1

PCR condition #1			
<b><u>QuantiTect Probe RT-PCR (Qiagen)</u></b>			
<b>Step</b>	<b>Time</b>	<b>Temp</b>	
Reverse transcription	30 min	50°C	
PCR activation step	15 min	95°C	
<b>2-step cycling:</b>			
Denaturation	15 s	94°C	
Combined annealing/ extension	60 s	60°C	
Number of cycles:	40		

PCR condition #2			
<b><u>qPCR</u></b>			
<b>Step</b>	<b>Time</b>	<b>Temp</b>	
Initial step	2 min	50°C	
PCR activation step	10 min	95°C	
<b>2-step cycling:</b>			
Denaturation	15 s	95°C	
Combined annealing/ extension	60 s	60°C	
Number of cycles:	40		

**Supplementary Table S3.** Primers and PCR conditions used in study. Suppliers were Alta Bioscience, Eurogentec and ThermoFisher Scientific. PPIA and HPRT1 Taqman assays were used in combination as internal controls.