# Supplementary Appendix

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### **Data Sources**

This study was granted an exemption by our Institutional Review Board in April 2023, classifying the project as Secondary Research (research involving only information collection and analysis involving the investigator's use of identifiable health information when that use is for the purposes of research). Data about the patient's case and clinical care were abstracted from the patient's electronic medical record (EMR) at St. Jude Children's Research Hospital (SJCRH). Photographs of bone marrow histology were taken by a pathologist.

The germline *BARD1* and somatic mutations were reported as part of the St. Jude Clinical Genomics (ClinGen) program which employs three-platform whole-genome (WGS), wholeexome (WES) and transcriptome (RNA-Seq) sequencing to report somatic and germline pathogenic/likely pathogenic variants<sup>1</sup>. A modified version of a two-platform (WES and RNA-Seq) pipeline was later developed for analyzing FFPE samples, which included our index patient sample (ID SJNBL031647). ClinGen genomic data from consented patients are uploaded to St. Jude Cloud<sup>2</sup>, where we obtained the BAM files (WES and RNA-Seq) used in this study. In addition to the index patient, fifty-eight (58) other neuroblastomas profiled by ClinGen during 2016–2019 were included in the synthetic lethality score estimation (Table S1).

The pathogenic germline *BARD1* mutation identified in our index patient is a 2-bp deletion located at chr2: 215,646,058–215,646,059 in GRCh37 coordinates. It causes a frameshift mutation in exon 4 of *BARD1* (NM\_000465.4:c.539\_540del, p. S179\_Y180fs), which matches a known pathogenic ClinVar variant (VCV000186576) previously found in families with breast and ovarian cancer.

#### Analysis of Bi-allelic Loss of BARD1

To assess the allelic state of the 2-bp germline mutation *BARD1* S179 Y180fs at chr2: 215,646,058–215,646,059 in GRCh37 coordinates (Fig. S1B) in the tumor genome of the index patient, we first obtained the unique read counts of wildtype and mutant alleles in WES and RNA-Seq BAM files by running indelPost<sup>3</sup>, a software tool that performs indel re-alignment to ensure accuracy. This resulted in a VAF of 0.5, 0.4 and 0.8 in germline DNA, tumor DNA and tumor RNA, respectively, indicating absence of LOH in tumor but a possible second hit causing allelic-specific expression (ASE). To further investigate ASE, we incorporated 4 germline heterozygous SNPs at the *BARD1* locus (chr2: 215590370-215674407) with  $\geq$ 5 RNA-Seq reads. These SNPs (i.e., rs2070096 [gNOMAD WGS (https://gnomad.broadinstitute.org/) population frequency for the non-reference allele: 0.2], rs2229571 [0.53], rs2070094 [0.35], and rs5020511 [0.65]) were identified by GATK HaplotypeCaller (ver. 4.0.2.1)<sup>4</sup> analysis of WES BAM files. The lack of a second hit in DNA has also been verified by exome CNV analysis<sup>5</sup>. By contrast, ASE was detected across all 4 SNPs along with the mutation site in tumor RNA-seq (main Fig. 1b). The varying population frequencies project the existence of multiple haplotypes with different allelic combinations. The human reference genome used for RNA-Seq mapping represents a haplotype consisting of major, minor, major, and minor alleles of the four SNPs. The ASE in patient RNA-Seq indicates the existence of a haplotype comprised of minor, minor, minor, and major alleles of the four SNPs. This pattern explains the retained reference allele of SNP2 (which is the minor allele of the general population) in contrast to the non-reference alleles in the other three SNPs in the index patient RNA-Seq data.

We used a binomial distribution model to evaluate the significance of ASE in S179\_Y180fs and the four SNPs assuming a DNA VAF of 0.5, which was modelled by binomial distribution:

$$\sum_{SNPs} |binom(cov, p)/cov - 0.5|, where cov is RNA coverage for each SNP and p = 0.5.$$

The observed RNA VAF deviation of the five variants was similarly calculated as follows.

$$\sum_{SNPs} |RNA \, VAF_{observed} - 0.5| = 1.264$$

We then performed a simulation by running the binomial model 1,000 times and found only VAF deviation >1.264 occurred 15 times, which gives a significant *p*-value of 0.015 for the observed ASE. Histology-based VAF adjustment with tumor purity supported the monoallelic expression of the mutant allele tumor, which was performed as:

$$VAF_{adjusted} = \{VAF_{observed} - 0.5 \cdot (1 - purity)\}/purity$$

#### **Immunohistochemical Staining**

Immunohistochemical staining (IHC) was performed using the Leica BOND RX Autostainer (Leica Biosystems, Deer Park, Illinois, USA) in the Anatomic Pathology/Neuropathology Translation Support lab in the Department of Pathology at St. Jude Children's Research Hospital. FFPE sections were heated for one hour at 68°C prior to placement on the instrument. The BOND Polymer Refine IHC Protocol F was selected. Heat induced epitope retrieval, ER1, was used for 20 minutes. 150 uL 1:20 dilution of BARD1 (E-11) (Santa Cruz Biotechnology, Inc, Dallas, Texas, USA) was applied with an incubation of 15 minutes for detection. All slides were counterstained with hematoxylin for 5 minutes. Tumor cells, which resemble differentiating ganglion cells, were identified by morphologic assessment by board-certified pediatric pathologists (i.e. co-authors S.C.K. and B.A.O.)

### Synthetic Lethality Score

The PARPi prediction pipeline<sup>6</sup> was adapted from previously published SELECT<sup>7</sup> and ENLIGHT<sup>8</sup> pipelines to predict drug response in pediatric populations based on the identification of three types of genetic interaction partners of PARP1 and PARP2, the primary targets of talazoparib. Those include synthetic lethal (SL), synthetic dosage lethal (SDL) and synthetic rescue (SR) partner genes. The pipeline begins with selecting all genes phylogenetically similar to the given *PARP* genes from > 20,000 protein coding genes. Subsequent steps prioritize the genetic partners further, analyzing the transcriptome and survival datasets from two pediatric cancer cohorts: the INdividualized therapy FOr Relapsed Malignancies in childhood (INFORM) consortium  $(n = 519)^9$  and the Therapeutically Applicable Research to Generate Effective Treatments (TARGET) consortium (n = 614). In brief, in these steps, the genetic partners are further refined to include only those that occur less frequently than a random chance by hypergeometric test, reflecting the notion that cancer cells where such pairs of genes are functionally interacting (e.g., both inactive in the case of synthetic lethal partners) would be selected against. For such pairs of genetically interacting genes, Cox-proportional hazard modelling was performed to further identify interactions that offer a survival advantage (thus reflecting the notion that they indeed decrease tumor fitness). This process results in identifying two sets of genetic interaction partners, one for PARP1 and one for PARP2. These sets then serve to create a synthetic lethality score on a zero-to-one scale for each tumor sample based on the activity state of the partner genes, as inferred from the tumor transcriptome.

### Supplementary Figure S1.



Genomic landscape of the index patient. A. Along the chromosomes (*outer track*), copy-number alterations (CNA) (*middle track*) and short mutations (*inter track*) are plotted as identified by tumor/normal-paired whole-exome sequencing. This index patient had segmental chromosome losses (3p and 4p) and gains (11q13.3 and 17q), which are recurrent in neuroblastoma. There was no MYCN amplification nor 11q loss at the ATM locus. Additionally, somatic and P/LP germline mutations were absent at the ATM locus. Somatic short mutations were also shown with variant allele frequency (bar plots along gene). The highest frequency was 0.35 for ABCA3, which is in good agreement with the histological tumor purity assessment of 60%. These ten somatic mutations (2 mutations in OBSCN) are not known drivers in neuroblastoma. **B.** Illustration of the *BARD1* germline frameshift in the 20-bp genomic region (chr2: 215,646,050–215,646,070 on GRCh37). The transcript NM 000465 is used to show the amino acid change. In this patient, the 2-bp deletion removes the adenine(A) and thymine (T) bases in codon Y180 resulting in an immediate stop codon. At the BARDI locus, there is no second hit in tumor DNA given the absence of copy-number alterations, loss-of-heterozygosity, or additional germline/somatic mutations. This suggests that epigenetic silencing is a potential mechanism for the allele-specific expression of frameshift mutation. Other deleterious germline mutations were not found in homologous recombination deficiency-related genes.

### Supplementary Figure S2.



*MYCN* expression levels of the 59 neuroblastomas profiled by St. Jude clinical genomic sequencing program during 2016-2019. The neuroblastoma of the index patient is indicated by a red arrow. *MYCN* expression level, plotted as transcript per million (TPM), was previously reported to be associated with increased replication stress and sensitivity to PARPi in neuroblastoma cell line models<sup>10</sup>.

### Supplementary Figure S3.



**Control BARD1 staining in normal tissues and other neuroblastomas.** A) testis. B) lymph node. C–E) pre-treatment neuroblastomas. F–H) post-treatment. In this control experiment. BARD1 protein was diffusely expressed in all twenty neuroblastomas with no known *BARD1* variants. Six separate representative cases are shown in images C–H.

# Supplementary Table 1.

SINB.030076_D1     SIC-D5-1004     0.3     0.21     233.188673     23.7228777       SINB.030107_D1     SIC-D5-1004     0.48     0.21     121.2781064     41.1465867       SINB.030117_D1     SIC-D5-1004     0.45     0.37     164.8847173     31.2778856       SINB.03017_D1     SIC-D5-1004     0.45     0.37     164.8847173     31.2778856       SINB.03017_D1     SIC-D5-1004     0.45     0.26     199.1793946     42.0558056       SINB.03027_D1     SIC-D5-1004     0.43     0.26     139.073566     45.42057021       SINB.03027_D1     SIC-D5-1004     0.3     0.21     145.4419801     41.845873     37.75561       SINB.03027_D1     SIC-D5-1004     0.36     0.32     149.617893     37.75561       SINB.030342_D1     SIC-D5-1007     0.16     0.80.869933     21.6288413     SINB.030342_D1     SIC-D5-1007     0.4     0.63     143.541749     37.0228413     SINB.030513_D1     SIC-D5-1007     0.4     0.63     143.541749     37.0228413     SINB.030513_D1     SIC-D5-1007     0.4     0.63     <	Sample_name	Accession_ID	PARP1 SLscore	PARP2 SLscore	PARP1 TPM	PARP2 TPM
SINB.0302107_D1     SIC-DS-1004     0.48     0.21     122.1781086     41.1043267       SINB.030127_D1     SIC-DS-1004     0.35     0.42     10.773667     35.06433341       SINB.030157_D1     SIC-DS-1004     0.57     0.26     159.0187999     65.15500651       SINB.030177_D1     SIC-DS-1004     0.27     0.32     67.31347178     31.205505595       SINB.030274_D1     SIC-DS-1004     0.22     0.32     64.1347179     31.205505595       SINB.030307_D1     SIC-DS-1004     0.32     0.21     145.4419801     45.0421779       SINB.030307_D1     SIC-DS-1004     0.32     0.58     149.6617803     37.755601       SINB.030307_D1     SIC-DS-1004     0.38     0.58     96.0425701     37.27187703       SINB.030307_D1     SIC-DS-1007     0.44     0.74     D2.88 59303     21.0538415       SINB.030452_D1     SIC-DS-1007     0.44     0.74     D2.88 9933     27.5335631       SINB.030673_D1     SIC-DS-1007     0.42     0.32     81.86154816     27.7333563       SINB.030675_D1 <t< td=""><td>SJNBL030096 D1</td><td>SJC-DS-1004</td><td>0.3</td><td>0.21</td><td>233.1836573</td><td>23.77278777</td></t<>	SJNBL030096 D1	SJC-DS-1004	0.3	0.21	233.1836573	23.77278777
INB.030147_D1     SIC-DS-1004     0.45     0.37     16.842179     31.22788356       SINB0.030158_D1     SIC-DS-1004     0.45     0.37     16.842179     31.22788356       SINB0.030175_D1     SIC-DS-1004     0.57     0.26     199.1399946     7.078589765       SINB0.030274_D1     SIC-DS-1004     0.22     0.32     62.31342128     31.20580655       SINB0.030274_D1     SIC-DS-1004     0.3     0.21     145.419801     41.68143775       SINB0.030270_D1     SIC-DS-1004     0.36     0.22     10.5484775     46.93805971       SINB0.03032_D1     SIC-DS-1004     0.38     0.68     96.42875017     37.758401       SINB0.03034_D_D1     SIC-DS-1007     0.44     0.74     178.8834007     97.833845       SINB0.03041_D1     SIC-DS-1007     0.44     0.74     178.8834007     97.333845       SINB0.03051_D1     SIC-DS-1007     0.44     0.74     178.8834007     97.333845       SINB0.03061_D1     SIC-DS-1007     0.44     0.74     178.88440749     37.052341515       SINB0.03061_D1	SJNBL030107_D1	SJC-DS-1004	0.48	0.21	122.1781086	41.1405367
SinBlogol15_D1     SiC D5 1004     0.45     0.37     164.8842179     31.22788356       SinBlogol17_D1     SiC D5 1004     0.43     0.26     199.179399     65.15900651       SinBlogol22_D1     SiC D5 1004     0.22     0.32     62.31342128     31.20580659       SinBlogol22_D1     SiC D5 1004     0.43     0.26     139.9735664     44.41007721       SinBlogol22_D1     SiC D5 1004     0.3     0.21     145.419801     41.6143779       SinBlogol20_D1     SiC D5 1004     0.36     0.32     140.6318983     37.755601       SinBlogol20_D1     SiC D5 1004     0.36     0.32     140.63489726     40.9300531       SinBlogol20_D1     SiC D5 1007     0.46     0.53     106.63539     32.75335630       SinBlogol30_D1     SiC D5 1007     0.44     0.63     143.6514816     27.05283415       SinBlogol30_D1     SiC D5 1007     0.42     0.32     21.071638744     31.3460734       SinBlogol30_D1     SiC D5 1007     0.42     0.32     21.071638744     31.3460734       SinBlogol30_D1     <	SJNBL030147 D1	SJC-DS-1004	0.35	0.42	101.7738697	39.64633341
SINBL03015     D1     SIC D5 1004     0.67     0.26     192 (192982     72 7588765       SINBL03027.D1     SIC D5 1004     0.43     0.26     139 0775696     46 42007721       SINBL030224.D1     SIC D5 1004     0.3     0.21     145.8419801     41.6414779       SINBL030224.D1     SIC D5 1004     0.3     0.21     145.8419801     41.6414779       SINBL030320.D1     SIC D5 1004     0.52     0.58     149.6417898     47.755601       SINBL030330.D1     SIC D5 1004     0.56     0.32     140.649726     46.9380571       SINBL030342.D1     SIC D5 1007     0.4     0.53     126.653593     32.7538508       SINBL030452.D1     SIC D5 1007     0.4     0.53     105.653593     32.7533563       SINBL030513.D1     SIC D5 1007     0.4     0.53     105.655163     27.7333563       SINBL030641.D1     SIC D5 1007     0.4     0.53     107.655016     45.5944874       SINBL030641.D1     SIC D5 1007     0.4     0.73     11.873354     13.44640734       SINBL030641.D1 <t< td=""><td>SJNBL030152 D1</td><td>SJC-DS-1004</td><td>0.45</td><td>0.37</td><td>164.8842179</td><td>31.22788356</td></t<>	SJNBL030152 D1	SJC-DS-1004	0.45	0.37	164.8842179	31.22788356
SINBL02017     D1     SIC D3 1004     0.43     0.26     199.1792982     70.75582765       SINBL020024     D1     SIC-D5 1004     0.43     0.26     133.4712     31.2058059       SINBL0200259_D1     SIC-D5 1004     0.52     0.58     149.6317598     37.75501       SINBL030307_D1     SIC-D5 1004     0.52     0.58     140.5487724     46.93805971       SINBL030303_D1     SIC-D5-1004     0.56     0.32     140.548726     46.93805971       SINBL030342_D1     SIC-D5-1007     0.46     0.74     126.6364007     97.8558500       SINBL030452_D1     SIC-D5-1007     0.44     0.74     126.65933     32.05283163       SINBL030613_D2     SIC-D5-1007     0.42     0.32     81.86154616     27.31251121       SINBL030651_S1_D1     SIC-D5-1007     0.42     0.32     207.168979     41.1473954       SINBL030651_S1_D2     SIC-D5-1007     0.5     0.79     126.756016     45.5948874       SINBL030654_D1     SIC-D5-1007     0.5     0.73     127.476807     41.1473954	SJNBL030158 D1	SJC-DS-1004	0.57	0.26	152.0182999	65.15960651
INBL03203     D1     SIC-D5-1004     0.22     0.32     62.31342128     31.20550859       SINBL032259     D1     SIC-D5-1004     0.3     0.21     145.4419501     41.68143779       SINBL032059     D1     SIC-D5-1004     0.52     0.58     149.6317689     47.758601       SINBL030307     D1     SIC-D5-1004     0.36     0.32     140.5449726     46.93805971       SINBL030342     D1     SIC-D5-1007     0.46     0.63     143.5417499     37.27187703       SINBL03042     D1     SIC-D5-1007     0.44     0.74     126.653503     32.7533563       SINBL03042     D1     SIC-D5-1007     0.46     0.53     105.653593     32.75333563       SINBL030623     D1     SIC-D5-1007     0.48     0.51     126.756016     45.59488749       SINBL030642     D1     SIC-D5-1007     0.48     0.53     137.1515289     74.1467394       SINBL030673     D1     SIC-D5-1007     0.48     0.53     137.515289     74.4267047       SINBL030793     D1 <t< td=""><td>SJNBL030177 D1</td><td>SJC-DS-1004</td><td>0.43</td><td>0.26</td><td>199.1792982</td><td>70.79588765</td></t<>	SJNBL030177 D1	SJC-DS-1004	0.43	0.26	199.1792982	70.79588765
SINBU30224_D1     SIC-DS-1004     0.43     0.26     139.9735668     46.42007721       SINBU30307_D1     SIC-DS-1004     0.52     0.58     149.6317589     37.755601       SINBU30307_D1     SIC-DS-1004     0.36     0.32     140.5489726     46.93805971       SINBU30303_D1     SIC-DS-1004     0.38     0.68     96.42875017     37.757601       SINBU30342_D1     SIC-DS-1007     0.16     0     80.4890933     21.69228413       SINBU30345_D1     SIC-DS-1007     0.44     0.74     126.65933     37.0528345       SINBU30351_D1     SIC-DS-1007     0.46     0.53     105.655933     37.3528463       SINBU30351_D2     SIC-DS-1007     0.42     0.32     81.86154316     7.332512121       SINBU30641_D1     SIC-DS-1007     0.48     0.58     137.1515798     70.4487795       SINBU306721_D1     SIC-DS-1007     0.48     0.58     137.1515798     70.44287047       SINBU306738_D1     SIC-DS-1007     0.48     0.58     127.4387954     SINBU306793     11.37.34798255       SINBU30678_D	SJNBL030203 D1	SJC-DS-1004	0.22	0.32	62.31342128	31.20580859
SINE 1030259     D1     SIC D5 1004     0.3     0.21     145,413891     41,63143779       SINE 1030309_D1     SIC D5-1004     0.36     0.58     140,5489726     46,93805971       SINE 1030309_D1     SIC D5-1004     0.36     0.68     96,42875017     37,27187703       SINE 1030412_D1     SIC D5-1007     0.44     0.74     126,864007     97,8558008       SINE 103042_D1     SIC D5-1007     0.4     0.63     143,5417499     37,755801       SINE 1030513_D1     SIC D5-1007     0.4     0.63     143,5417499     37,755801       SINE 1030513_D1     SIC D5-1007     0.43     0.11     280,872444     31,34640734       SINE 1030641_D1     SIC D5-1007     0.5     0.79     126,756016     45,9488749       SINE 1030641_D1     SIC D5-1007     0.48     0.58     137,151529     74,4428747       SINE 1030641_D1     SIC D5-1007     0.42     119,0720945     17,3479925     SINE 1030749     11,47839341     1,76523868       SINE 1030749_D1     SIC D5-1007     0.57     0.37     112,7208757	SJNBL030224 D1	SJC-DS-1004	0.43	0.26	139.9735696	46.42007721
SINR 103037_01     SIC D5 1004     0.52     0.58     144 613788     37,755601       SINR 1030339_01     SIC D5 1004     0.36     0.32     140,5489776     64,63905971       SINR 1030334_01     SIC D5 1007     0.16     0     80,4890333     21,69289413       SINR 1030342_01     SIC D5-1007     0.44     0.74     126,8634007     97,85585008       SINR 1030452_01     SIC D5-1007     0.44     0.74     126,8634007     97,85585008       SINR 1030513_01     SIC D5-1007     0.46     0.53     105,653393     32,75333563       SINR 103052_01     SIC D5-1007     0.43     0.11     280,8878444     31,34640734       SINR 103052_01     SIC D5-1007     0.48     0.58     137,151529     70,4428704       SINR 103072_01     SIC D5-1007     0.48     0.58     137,151529     70,4428704       SINR 103073_01     SIC D5-1007     0.47     0.42     119,0720945     17,3479825       SINR 103073_01     SIC D5-1007     0.37     0.37     112,7420875     22,61276694       SINR 103078_01     <	SJNBL030259 D1	SJC-DS-1004	0.3	0.21	145.4419801	41.68143779
SINBL030209     D1     SLC DS 1004     0.36     0.32     140.5487017     37.27187703       SINBL030334_D1     SLC DS 1007     0.16     0     80.489033     21.6928413       SINBL030342_D1     SLC DS 1007     0.44     0.74     126.8834007     97.8558008       SINBL030513_D1     SLC DS 1007     0.4     0.63     143.5417499     37.05283415       SINBL030551_D1     SLC DS 1007     0.4     0.63     143.5417499     37.05283415       SINBL030555_D1     SLC DS 1007     0.43     0.11     280.8874444     31.34640734       SINBL030641_D1     SLC DS 1007     0.43     0.58     137.151538     70.44287047       SINBL030641_D1     SLC DS 1007     0.48     0.58     137.151538     70.44287047       SINBL030742_D1     SLC DS 1007     0.42     110.720948     11.4873954       SINBL030745_D1     SLC DS 1007     0.47     0.42     110.720945     72.61276694       SINBL03073_D1     SLC DS 1007     0.37     0.37     113.7420875     22.61276694       SINBL03073_D1     SLC DS 100	SJNBL030307 D1	SJC-DS-1004	0.52	0.58	149.6317898	37.755601
SINE 1020339     D1     SIC-DS-1004     0.48     0.68     96.42875017     37.27187703       SINE 1030412_D1     SIC-DS-1007     0.16     0     80.4890933     71.6928413       SINE 1030412_D1     SIC-DS-1007     0.44     0.63     143.5417499     37.05283415       SINE 1030513_D1     SIC-DS-1007     0.46     0.53     105.653993     32.7533563       SINE 1030513_D1     SIC-DS-1007     0.43     0.11     28.08878444     31.34640734       SINE 103063_D1     SIC-DS-1007     0.43     0.11     28.08878444     31.34640734       SINE 1030694_D1     SIC-DS-1007     0.41     0.32     207.1638979     41.14873954       SINE 1030694_D1     SIC-DS-1007     0.48     0.58     137.1515298     70.44287047       SINE 1030749_D1     SIC-DS-1007     0.47     0.42     119.0720945     17.38479875       SINE 103078_D1     SIC-DS-1007     0.37     0.37     112.7420875     22.2177654       SINE 103078_D1     SIC-DS-1007     0.37     0.37     105.247652     22.12786646     23.9925144	SJNBL030309_D1	SJC-DS-1004	0.36	0.32	140.5489726	46.93805971
SINEL03042     D1     SIC-DS-1007     0.16     0     80.480333     21.69229413       SINEL030412     D1     SIC-DS-1007     0.44     0.74     126.8634007     97.85585008       SINEL030412     D1     SIC-DS-1007     0.46     0.53     105.655393     32.75333563       SINEL03055     D1     SIC-DS-1007     0.46     0.53     105.655393     32.75333563       SINEL03055     D1     SIC-DS-1007     0.43     0.11     20.887444     31.34640734       SINEL03055     D1     SIC-DS-1007     0.48     0.58     137.151528     70.44287047       SINEL030694     D1     SIC-DS-1007     0.48     0.58     137.151528     70.44287047       SINEL03074     D1     SIC-DS-1007     0.16     0.16     91.7633381     17.58293668       SINEL030745     D1     SIC-DS-1007     0.37     112.742075     22.61276694       SINEL03079     J1     SIC-DS-1007     0.37     0.37     112.842047     31.84466973       SINEL03079.0     SIC-DS-1007     0.33	SJNBL030339 D1	SJC-DS-1004	0.38	0.68	96.42875017	37.27187703
SINE D30412_D1     SIC D5 1007     0.4     0.74     126 8634007     97 85885008       SINE D30452_D1     SIC-D5 1007     0.4     0.63     143 5417499     37 05283415       SINB D30513_D1     SIC-D5 1007     0.22     0.32     81 86154816     27 31251121       SINB D30555_D1     SIC-D5 1007     0.43     0.11     280 8878444     31 3460734       SINB D30565_D1     SIC-D5 1007     0.43     0.11     280 887844     31 3460734       SINB D30641_D1     SIC-D5 1007     0.48     0.58     137.1515798     70.44287047       SINB D30740_D1     SIC-D5 1007     0.29     0     54.79336148     6.668919256       SINB D30752_D1     SIC-D5 1007     0.27     0.42     119.072045     17.38479825       SINB D30793_D1     SIC-D5 1007     0.37     0.37     112.7420875     22.81276694       SINB D30810_D2     SIC-D5 1007     0.33     0     63.47596732     31.44466973       SINB D30810_D2     SIC-D5 1007     0.37     0.37     135.002027     36.07917189       SINB D30820_D1     SI	SJNBL030342 D1	SJC-DS-1007	0.16	0	80.4890933	21.69289413
SINRU03045_D1     SIC-DS-1007     0.4     0.63     143.5417499     37.05283415       SINRU030513_D2     SIC-DS-1007     0.46     0.53     105.653593     32.75333563       SINRU030555_D1     SIC-DS-1007     0.43     0.11     280.887444     31.34640734       SINRU030555_D1     SIC-DS-1007     0.5     0.79     126.756016     45.59488749       SINRU030664_D1     SIC-DS-1007     0.48     0.58     137.1515298     70.44287047       SINRU030672_D1     SIC-DS-1007     0.46     0.16     91.753343181     17.55298     70.44287047       SINRU03073_D1     SIC-DS-1007     0.16     0.16     91.753343181     17.3529866     17.33479825       SINRU03073_D1     SIC-DS-1007     0.37     0.37     112.7420875     22.61276694       SINRU030793_D1     SIC-DS-1007     0.33     0     6.347596232     31.44466973       SINRU03081_D 1     SIC-DS-1007     0.37     0.37     135.0020327     36.0791189       SINRU03081_D 1     SIC-DS-1007     0.37     0.37     135.0020327     36.0791199     <	SJNBL030412 D1	SJC-DS-1007	0.44	0.74	126.8634007	97.85585008
SiNBL020512     D1     SIC-DS-1007     0.46     0.53     105.6539.3     32.7533363       SINBL020513     D1     SIC-DS-1007     0.22     0.32     81.86154816     27.31251121       SINBL030552     D1     SIC-DS-1007     0.43     0.11     280.8878444     31.34640734       SINBL030641     D1     SIC-DS-1007     0.5     0.79     126.755016     45.59488749       SINBL030641     D1     SIC-DS-1007     0.48     0.58     137.1515298     70.44287047       SINBL030749     D1     SIC-DS-1007     0.16     0.16     91.763433811     17.65529686       SINBL030758     D1     SIC-DS-1007     0.37     0.37     112.7420875     22.61276694       SINBL030793     D1     SIC-DS-1007     0.33     0     63.47596232     31.44466973       SINBL030810     D2     SIC-DS-1007     0.37     0.37     135.002327     36.07911189       SINBL030810     D2     SIC-DS-1007     0.37     0.37     135.002327     36.07911189       SINBL030820     D1	SJNBL030452 D1	SJC-DS-1007	0.4	0.63	143.5417499	37.05283415
SINEL030513 D2     SIC-D5-1007     0.42     0.32     81.86154816     27.31251121       SINEL030555 D1     SIC-D5-1007     0.43     0.11     280.8878444     31.34640734       SINEL030552 D1     SIC-D5-1007     0.5     0.79     126.756016     45.59488749       SINEL030623 D1     SIC-D5-1007     0.31     0.32     207.1538979     41.14873954       SINEL03064D1     SIC-D5-1007     0.48     0.58     17.1515298     70.44287047       SINEL030758 D1     SIC-D5-1007     0.57     0.37     112.7420875     22.61276694       SINEL03078 D1     SIC-D5-1007     0.57     0.37     112.524004     21.2990114       SINEL030793 D2     SIC-D5-1007     0.33     0     63.47596232     31.44466973       SINEL030810 D1     SIC-D5-1007     0.37     0.37     135.002037     36.0711189       SINEL030842 D1     SIC-D5-1007     0.37     0.37     135.002073     36.0711189       SINEL030842 D1     SIC-D5-1007     0.26     0.11     37.98724479     18.90605652       SINEL030842 D1     SIC-	SJNBL030513 D1	SJC-DS-1007	0.46	0.53	105.653593	32.75333563
SINE030555     D1     SIC-D5:1007     0.43     0.11     280.8878444     31.34440734       SINE030621_D1     SIC-D5:1007     0.5     0.79     126.756016     45.59488749       SINE0306241_D1     SIC-D5:1007     0.48     0.58     137.1515298     70.44287047       SINE030721_D1     SIC-D5:1007     0.29     0     54.79336148     6.668019256       SINE030749_D1     SIC-D5:1007     0.29     0     54.79336148     6.668019256       SINE030758_D1     SIC-D5:1007     0.27     0.42     119.7020945     17.38479825       SINE030793_D2     SIC-D5:1007     0.33     0     63.3796232     31.44466973       SINE030301_D2     SIC-D5:1007     0.37     0.37     135.0020327     36.07917189       SINE030820_D1     SIC-D5:1007     0.37     0.37     108.843015     30.68664561       SINE030842_D1     SIC-D5:1007     0.26     0.11     37.98724479     18.9060552       SINE030842_D1     SIC-D5:1007     0.26     0.11     37.98724479     18.9060552       SINE030842_D1 <t< td=""><td>SJNBL030513 D2</td><td>SJC-DS-1007</td><td>0.22</td><td>0.32</td><td>81.86154816</td><td>27.31251121</td></t<>	SJNBL030513 D2	SJC-DS-1007	0.22	0.32	81.86154816	27.31251121
SINEL030623     D1     SIC-DS-1007     0.5     0.79     126.756016     45.59488749       SINEL030641     D1     SIC-DS-1007     0.31     0.32     207.1638979     41.14873954       SINEL030641     D1     SIC-DS-1007     0.29     0     54.73336148     6.668919256       SINEL030740     D1     SIC-DS-1007     0.27     0.42     119.0720945     17.38479825       SINEL030758     D1     SIC-DS-1007     0.57     0.37     112.7420875     22.61276694       SINEL030793     D1     SIC-DS-1007     0.33     0.42     93.12528406     21.2598014       SINEL030810     D1     SIC-DS-1007     0.33     0     63.47596323     31.44466973       SINEL030820     D1     SIC-DS-1007     0.37     0.37     135.0020327     36.07917189       SINEL030842     D1     SIC-DS-1007     0.44     0.58     202.067511     24.2656686       SINEL030842     D1     SIC-DS-1007     0.26     0.11     37.98724479     18.9060552       SINEL030875     D1	SJNBL030555 D1	SJC-DS-1007	0.43	0.11	280.8878444	31.34640734
SINEL030641     D1     SIC-DS-1007     0.31     0.32     207.1638979     41.14873954       SINBL030694_D1     SIC-DS-1007     0.48     0.58     137.151529     70.44287047       SINBL030721_D1     SIC-DS-1007     0.29     0     54.79336148     6668919256       SINBL030739_D1     SIC-DS-1007     0.27     0.42     119.76343381     17.65829868       SINBL030793_D1     SIC-DS-1007     0.37     0.37     112.7420875     22.61276694       SINBL030793_D2     SIC-DS-1007     0.33     0     63.4759622     31.44466973       SINBL030810_D1     SIC-DS-1007     0.37     0.37     113.7420875     23.617917189       SINBL030810_D1     SIC-DS-1007     0.54     0.58     202.3067511     24.2656688       SINBL030842_D1     SIC-DS-1007     0.26     0.11     37.98724479     18.90605652       SINBL030842_D1     SIC-DS-1007     0.14     0.42     121.8328436     23.05116498       SINBL03087_D1     SIC-DS-1007     0.14     0.42     121.8328436     23.05116498       SINBL030895_D	SJNBL030623 D1	SJC-DS-1007	0.5	0.79	126.756016	45.59488749
SINBL030694_D1     SIC-DS-1007     0.48     0.58     137.1515298     70.44287047       SINBL030721_D1     SIC-DS-1007     0.29     0     54.79336148     6.66919256       SINBL030749_D1     SIC-DS-1007     0.27     0.42     119.0720945     17.38479825       SINBL030793_D1     SIC-DS-1007     0.57     0.37     112.7420875     22.61276694       SINBL030793_D2     SIC-DS-1007     0.3     0.42     93.12528406     21.29980114       SINBL030810_D1     SIC-DS-1007     0.33     0     63.47596232     31.44466973       SINBL030810_D1     SIC-DS-1007     0.37     0.37     135.0020327     36.07917189       SINBL030820_D1     SIC-DS-1007     0.54     0.58     20.23067511     24.26566686       SINBL030842_D1     SIC-DS-1007     0.21     0.37     108.1843015     30.68664561       SINBL030842_D1     SIC-DS-1007     0.11     0.37     108.1843015     30.68664561       SINBL030842_D1     SIC-DS-1007     0.1     0.16     69.741437     12.94898744       SINBL030393_D1	SJNBL030641_D1	SJC-DS-1007	0.31	0.32	207.1638979	41.14873954
SINBL030721_D1     SIC-D5-1007     0.29     0     \$4.79336148     6.668919256       SINBL030749_D1     SIC-D5-1007     0.16     0.16     91.76343381     17.65829868       SINBL030793_D1     SIC-D5-1007     0.57     0.37     112.7420875     22.61276694       SINBL030793_D2     SIC-D5-1007     0.3     0.42     93.12528406     21.29980114       SINBL030810_D1     SIC-D5-1007     0.33     0     63.47596232     31.44466973       SINBL030810_D1     SIC-D5-1007     0.37     0.37     135.002327     36.07917189       SINBL030820_D1     SIC-D5-1007     0.76     0.11     37.98724479     18.90605552       SINBL030824_D1     SIC-D5-1007     0.76     0.11     37.98724479     18.90605552       SINBL030882_D1     SIC-D5-1007     0.71     0.71     0.8664561     SINBL030825_D1     SIC-D5-1007     0.1     0.16     69.71415437     12.94898744     SINBL030925_D1     SIC-D5-1007     0.34     0.63     94.99877614     44.86933486     SINBL030935_D1     SIC-D5-1007     0.34     0.26     107.990973 <td>SJNBL030694 D1</td> <td>SJC-DS-1007</td> <td>0.48</td> <td>0.58</td> <td>137.1515298</td> <td>70.44287047</td>	SJNBL030694 D1	SJC-DS-1007	0.48	0.58	137.1515298	70.44287047
SINBL030749_01     SIC-DS-1007     0.16     0.16     91.76343381     17.65829868       SINRU30758_D1     SIC-DS-1007     0.27     0.42     119.0720945     17.38479825       SINRU30793_D1     SIC-DS-1007     0.37     112.7420875     22.61276694       SINRU303010_D1     SIC-DS-1007     0.33     0     63.47596232     31.44466973       SINRU303010_D2     SIC-DS-1007     0.37     0.37     135.0020327     36.0791189       SINRU303820_D1     SIC-DS-1007     0.54     0.58     202.3067511     24.26566686       SINRU303824_D1     SIC-DS-1007     0.26     0.11     37.98724479     18.90605522       SINRU303824_D1     SIC-DS-1007     0.26     0.11     37.98724479     18.90605652       SINRU30382_D1     SIC-DS-1007     0.36     0.42     121.8328436     23.05116498       SINRU30382_D1     SIC-DS-1007     0.16     69.71415437     12.94898744       SINRU303925_D2     SIC-DS-1007     0.18     0.26     107.99073     30.07915036       SINRU303955_D1     SIC-DS-1007     0.24	SJNBL030721 D1	SJC-DS-1007	0.29	0	54.79336148	6.668919256
SINBL030758     D1     SIC-DS-1007     0.27     0.42     119.0720945     17.38479825       SINBL030793     D1     SIC-DS-1007     0.57     0.37     112.7420875     22.61276694       SINBL030793     D2     SIC-DS-1007     0.33     0     63.47596232     31.44466973       SINBL030810     D1     SIC-DS-1007     0.19     0.32     68.95845554     23.72555844       SINBL030820     D1     SIC-DS-1007     0.54     0.58     202.3067511     24.26566686       SINBL030820     D1     SIC-DS-1007     0.26     0.11     37.98724479     18.90605552       SINBL030875     D1     SIC-DS-1007     0.26     0.11     37.98724479     18.90695562       SINBL030875     D1     SIC-DS-1007     0.36     0.42     121.8328436     23.05116498       SINBL030917_D1     SIC-DS-1007     0.31     0.16     69.71415437     12.94898744       SINBL030925_D2     SIC-DS-1007     0.34     0.63     94.99877614     44.86933486       SINBL030955_D1     SIC-DS-1007     0.34	SJNBL030749 D1	SJC-DS-1007	0.16	0.16	91.76343381	17.65829868
SINBL030793_D1     SIC-DS-1007     0.57     0.37     112.7420875     22.61276694       SINBL030793_D2     SIC-DS-1007     0.3     0.42     93.12528406     21.29980114       SINBL030810_D1     SIC-DS-1007     0.33     0     63.47596232     31.44466973       SINBL030810_D2     SIC-DS-1007     0.37     0.37     135.002027     36.07917189       SINBL030820_D1     SIC-DS-1007     0.26     0.11     37.98724479     18.90605652       SINBL030820_D1     SIC-DS-1007     0.26     0.11     37.98724479     18.90605652       SINBL03082_D1     SIC-DS-1007     0.26     0.42     121.8328436     23.05116498       SINBL03082_D1     SIC-DS-1007     0.36     0.42     121.8328436     23.05116498       SINBL030925_D1     SIC-DS-1007     0.34     0.63     94.99877614     44.86933486       SINBL030925_D1     SIC-DS-1007     0.34     0.26     107.990973     30.07915036       SINBL03095_D1     SIC-DS-1007     0.34     0.26     19.9986315     18.92320605       SINBL03046_D2	SJNBL030758_D1	SJC-DS-1007	0.27	0.42	119.0720945	17.38479825
SINBL030793_D2     SIC-DS-1007     0.3     0.42     93.12528406     21.29980114       SINBL030810_D1     SIC-DS-1007     0.33     0     63.47596232     31.44466973       SINBL030810_D2     SIC-DS-1007     0.37     0.37     135.0020327     36.07917189       SINBL030820_D1     SIC-DS-1007     0.54     0.58     202.3067511     24.26566866       SINBL030842_D1     SIC-DS-1007     0.26     0.11     37.98724479     18.90605652       SINBL030842_D1     SIC-DS-1007     0.26     0.37     108.1843015     30.68664561       SINBL030875_D1     SIC-DS-1007     0.36     0.42     12.18328436     23.05116498       SINBL030917_D1     SIC-DS-1007     0.1     0.16     69.71415437     12.9498744       SINBL030925_D1     SIC-DS-1007     0.34     0.63     94.99877614     44.86933486       SINBL030935_D1     SIC-DS-1007     0.21     85.20199645     15.46453976       SINBL030955_D1     SIC-DS-1007     0.24     0.21     85.20199645     15.46453976       SINBL030406_D2     SIC-DS-1007	SJNBL030793_D1	SJC-DS-1007	0.57	0.37	112.7420875	22.61276694
SJNBL030810_D1     SIC-DS-1007     0.33     0     63.47596232     31.44466973       SJNBL030810_D2     SIC-DS-1007     0.19     0.32     68.9584554     23.7255844       SJNBL030820_D1     SIC-DS-1007     0.57     0.37     135.0020327     36.07917189       SJNBL030824_D1     SIC-DS-1007     0.54     0.58     202.3067511     24.26566686       SJNBL030824_D1     SIC-DS-1007     0.26     0.11     37.98724479     18.90605552       SJNBL03082_D1     SIC-DS-1007     0.26     0.42     121.8328436     23.05116498       SJNBL03082_D1     SIC-DS-1007     0.36     0.42     121.8328436     23.05116498       SJNBL030925_D2     SIC-DS-1007     0.34     0.66     94.9877614     44.8693486       SJNBL030939_D1     SIC-DS-1007     0.18     0.26     107.990973     30.07915036       SJNBL03095_D1     SIC-DS-1007     0.24     0.23     1.1455028     51.84643976       SJNBL03095_D1     SIC-DS-1007     0.24     0.23     1.145151     37.9476927       SJNBL031046_D2     SIC-DS-	SJNBL030793_D2	SJC-DS-1007	0.3	0.42	93.12528406	21.29980114
SINBL030810_D2     SIC-DS-1007     0.19     0.32     68.95845554     23.72555844       SINBL030820_D1     SIC-DS-1007     0.37     0.37     135.0020327     36.07917189       SINBL030824_D1     SIC-DS-1007     0.26     0.11     37.98724479     18.90605652       SINBL030842_D1     SIC-DS-1007     0.26     0.11     37.98724479     18.90605652       SINBL030842_D1     SIC-DS-1007     0.21     0.37     108.1843015     30.68664561       SINBL030817_D1     SIC-DS-1007     0.36     0.42     121.8328436     23.05116498       SINBL030917_D1     SIC-DS-1007     0.1     0.16     69.71415437     12.94898744       SINBL030925_D2     SIC-DS-1007     0.34     0.63     94.99877614     44.8693486       SINBL030939_D1     SIC-DS-1007     0.18     0.26     107.99073     30.07915036       SINBL03095_D1     SIC-DS-1007     0.24     0.58     89.31954843     21.14450286       SINBL031046_D2     SIC-DS-1007     0.36     0.26     174.2151551     13.6947627       SINBL031046_D2	SJNBL030810_D1	SJC-DS-1007	0.33	0	63.47596232	31.44466973
SINBL030820_D1     SIC-DS-1007     0.37     0.37     135.0020327     36.07917189       SINBL030824_D1     SIC-DS-1007     0.54     0.58     202.3067511     24.26566686       SINBL030842_D1     SIC-DS-1007     0.26     0.11     37.98724479     18.90605652       SINBL030875_D1     SIC-DS-1007     0.36     0.42     121.8328436     23.05116498       SINBL03082_D1     SIC-DS-1007     0.1     0.16     69.71415437     12.94898744       SINBL030925_D1     SIC-DS-1007     0.10     0.16     59.44528111     17.67373534       SINBL030925_D1     SIC-DS-1007     0.34     0.63     94.99877614     44.86933486       SINBL030935_D1     SIC-DS-1007     0.18     0.26     107.990973     30.07915036       SINBL030955_D1     SIC-DS-1007     0.23     0.26     89.98636315     18.92320605       SINBL031046_D2     SIC-DS-1007     0.34     0.21     124.3643155     40.05044107       SINBL031070_D1     SIC-DS-1007     0.34     0.26     174.215155     13.6925267       SINBL031070_D1	SJNBL030810_D2	SJC-DS-1007	0.19	0.32	68.95845554	23.72555844
SINBL030824_D1     SIC-DS-1007     0.54     0.58     202.3067511     24.26566686       SINBL030842_D1     SIC-DS-1007     0.26     0.11     37.98724479     18.90605652       SINBL030882_D1     SIC-DS-1007     0.21     0.37     108.1843015     30.68664561       SINBL030882_D1     SIC-DS-1007     0.36     0.42     121.8328436     23.05116498       SINBL030917_D1     SIC-DS-1007     0.09     0.11     55.44528111     17.67373534       SINBL030925_D2     SIC-DS-1007     0.34     0.63     94.99877614     44.86933486       SINBL030935_D1     SIC-DS-1007     0.18     0.26     107.990973     30.07915036       SINBL030955_D1     SIC-DS-1007     0.24     0.58     89.31954843     21.14450286       SINBL031046_D2     SIC-DS-1007     0.36     0.26     174.215151     37.9476927       SINBL031046_D3     SIC-DS-1007     0.46     0.42     124.3634155     40.05044107       SINBL031053_D1     SIC-DS-1007     0.24     0.32     111.2539335     20.29404496       SINBL031159_D2	SJNBL030820_D1	SJC-DS-1007	0.37	0.37	135.0020327	36.07917189
SINBL030842_D1     SIC-DS-1007     0.26     0.11     37.98724479     18.90605652       SINBL030875_D1     SIC-DS-1007     0.21     0.37     108.1843015     30.68664561       SINBL030882_D1     SIC-DS-1007     0.36     0.42     121.8328436     23.05116498       SINBL030917_D1     SIC-DS-1007     0.1     0.16     69.71415437     12.94898744       SINBL030925_D2     SIC-DS-1007     0.34     0.63     94.99877614     44.86933486       SINBL030935_D1     SIC-DS-1007     0.34     0.63     94.99877614     44.86933486       SINBL030955_D1     SIC-DS-1007     0.34     0.26     107.990973     30.07915036       SINBL030955_D1     SIC-DS-1007     0.23     0.26     89.2019645     15.46453976       SINBL031046_D2     SIC-DS-1007     0.34     0.21     85.20199645     15.46453976       SINBL031053_D1     SIC-DS-1007     0.36     0.26     174.211551     37.9476927       SINBL031070_D1     SIC-DS-1007     0.34     0.32     111.2539935     20.29404496       SINBL031159_D2	SJNBL030824_D1	SJC-DS-1007	0.54	0.58	202.3067511	24.26566686
SINBL030875_D1   SIC-DS-1007   0.21   0.37   108.1843015   30.68664561     SINBL030882_D1   SIC-DS-1007   0.36   0.42   121.8328436   23.05116498     SINBL030917_D1   SIC-DS-1007   0.1   0.16   69.71415437   12.94898744     SINBL030925_D2   SIC-DS-1007   0.09   0.11   55.44528111   17.67373534     SINBL030925_D1   SIC-DS-1007   0.18   0.26   107.990973   30.07915036     SINBL030955_D1   SIC-DS-1007   0.24   0.58   89.31954843   21.14450286     SINBL030955_D1   SIC-DS-1007   0.34   0.21   85.20199645   15.46453976     SINBL031046_D2   SIC-DS-1007   0.36   0.26   174.2151551   37.9476927     SINBL031046_D3   SIC-DS-1007   0.46   0.42   124.3634155   40.05044107     SINBL031053_D1   SIC-DS-1007   0.24   0.32   111.2539935   20.29404496     SINBL031145_D1   SIC-DS-1007   0.24   0.32   112.539935   20.29404496     SINBL031145_D1   SIC-DS-1007   0.24   0.32   124.3634155   40.0504107	SJNBL030842_D1	SJC-DS-1007	0.26	0.11	37.98724479	18.90605652
SINBL030882_D1   SIC-DS-1007   0.36   0.42   121.8328436   23.05116498     SINBL030917_D1   SIC-DS-1007   0.1   0.16   69.71415437   12.94898744     SINBL030925_D1   SIC-DS-1007   0.09   0.11   55.44528111   17.6737534     SINBL030925_D2   SIC-DS-1007   0.34   0.63   94.99877614   44.86933486     SINBL030935_D1   SIC-DS-1007   0.18   0.26   107.990973   30.07915036     SINBL030955_D1   SIC-DS-1007   0.34   0.21   85.20199645   15.46453976     SINBL031046_D2   SIC-DS-1007   0.34   0.26   89.398636315   18.92320605     SINBL031046_D3   SIC-DS-1007   0.36   0.26   174.2151551   37.9476927     SINBL031053_D1   SIC-DS-1007   0.46   0.42   124.3634155   40.05044107     SINBL03107_D1   SIC-DS-1007   0.24   0.32   111.2539935   20.2940496     SINBL031145_D1   SIC-DS-1007   0.15   0   65.6113555   13.69252567     SINBL031128_D1   SIC-DS-1007   0.26   74.84050536   26.06356635     SINB	SJNBL030875_D1	SJC-DS-1007	0.21	0.37	108.1843015	30.68664561
SINBL030917_D1   SIC-DS-1007   0.1   0.16   69.71415437   12.94898744     SINBL030925_D1   SIC-DS-1007   0.09   0.11   55.44528111   17.67373534     SINBL030935_D2   SIC-DS-1007   0.34   0.63   94.99877614   44.86933486     SINBL030935_D1   SIC-DS-1007   0.18   0.26   107.990973   30.07915036     SINBL030995_D1   SIC-DS-1007   0.21   85.20199645   15.46453976     SINBL031046_D2   SIC-DS-1007   0.34   0.21   85.20199645   15.46453976     SINBL031046_D3   SIC-DS-1007   0.36   0.26   174.2151551   37.9476927     SINBL031053_D1   SIC-DS-1007   0.36   0.42   124.3634155   40.05044107     SINBL03107_D1   SIC-DS-1007   0.24   0.32   111.2539935   20.29404496     SINBL031159_D2   SIC-DS-1007   0.15   0   65.6113555   13.6925667     SINBL031128_D1   SIC-DS-1007   0.16   0.05   76.2308794   13.25079077     SINBL031228_D1   SIC-DS-1007   0.23   0.26   74.86050536   26.06356635     SINBL	SJNBL030882_D1	SJC-DS-1007	0.36	0.42	121.8328436	23.05116498
SINBL030925_D1   SIC-DS-1007   0.09   0.11   55.44528111   17.67373534     SINBL030925_D2   SIC-DS-1007   0.34   0.63   94.99877614   44.86933486     SINBL030939_D1   SIC-DS-1007   0.18   0.26   107.990973   30.07915036     SINBL030995_D1   SIC-DS-1007   0.2   0.58   89.31954843   21.14450286     SINBL030995_D1   SIC-DS-1007   0.23   0.26   89.98636315   18.92320605     SINBL031046_D2   SIC-DS-1007   0.36   0.26   174.2151551   37.9476927     SINBL031053_D1   SIC-DS-1007   0.46   0.42   124.3634155   40.05044107     SINBL031070_D1   SIC-DS-1007   0.24   0.32   111.2539935   20.29404496     SINBL031145_D1   SIC-DS-1007   0.15   0   65.6113555   13.6925267     SINBL031145_D2   SIC-DS-1007   0.16   0.05   76.23088794   13.25079077     SINBL031232_D1   SIC-DS-1007   0.23   0.26   74.8605536   26.0665635     SINBL031232_D1   SIC-DS-1007   0.23   0.26   74.8605536   26.0665635 <t< td=""><td>SJNBL030917_D1</td><td>SJC-DS-1007</td><td>0.1</td><td>0.16</td><td>69.71415437</td><td>12.94898744</td></t<>	SJNBL030917_D1	SJC-DS-1007	0.1	0.16	69.71415437	12.94898744
SINBL030925_D2   SIC-DS-1007   0.34   0.63   94.99877614   44.86933486     SINBL030935_D1   SIC-DS-1007   0.18   0.26   107.990973   30.07915036     SINBL030995_D1   SIC-DS-1007   0.2   0.58   89.31954843   21.14450286     SINBL030995_D1   SIC-DS-1007   0.23   0.26   89.98636315   18.92320605     SINBL031046_D2   SIC-DS-1007   0.36   0.26   174.2151551   37.9476927     SINBL031070_D1   SIC-DS-1007   0.46   0.42   124.3634155   40.05044107     SINBL031070_D1   SIC-DS-1007   0.24   0.32   111.2539935   20.2940496     SINBL031159_D2   SIC-DS-1007   0.15   0   65.6113555   13.69252667     SINBL031159_D3   SIC-DS-1007   0.16   0.05   76.23088794   13.25079077     SINBL031232_D1   SIC-DS-1007   0.23   0.26   74.840050536   26.06356635     SINBL031232_D1   SIC-DS-1007   0.23   0.26   74.86050536   26.06356635     SINBL031232_D1   SIC-DS-1007   0.23   0.26   74.86050536   26.06356635	SJNBL030925_D1	SJC-DS-1007	0.09	0.11	55.44528111	17.67373534
SINBL030939_D1     SIC-DS-1007     0.18     0.26     107.990973     30.07915036       SINBL030955_D1     SIC-DS-1007     0.2     0.58     89.31954843     21.14450286       SINBL030995_D1     SIC-DS-1007     0.23     0.26     89.98636315     18.92320605       SINBL031046_D2     SIC-DS-1007     0.36     0.26     174.2151551     37.9476927       SINBL031053_D1     SIC-DS-1007     0.46     0.42     124.3634155     40.05044107       SINBL031070_D1     SIC-DS-1007     0.33     0.53     74.84102568     29.24807902       SINBL031145_D1     SIC-DS-1007     0.15     0     65.6113555     13.69252567       SINBL031159_D2     SIC-DS-1007     0.15     0     65.6113555     13.69252567       SINBL031128_D1     SIC-DS-1007     0.16     0.05     76.2308794     13.25079077       SINBL031232_D1     SIC-DS-1007     0.23     0.26     74.86050536     26.06356635       SINBL031239_D1     SIC-DS-1007     0.23     0.26     74.86050536     26.06356635       SINBL031246_D1     S	SJNBL030925_D2	SJC-DS-1007	0.34	0.63	94.99877614	44.86933486
SINBL030955_D1   SIC-DS-1007   0.2   0.58   89.31954843   21.14450286     SINBL030995_D1   SIC-DS-1007   0.34   0.21   85.20199645   15.46453976     SINBL031046_D2   SIC-DS-1007   0.23   0.26   89.98636315   18.92320605     SINBL031046_D3   SIC-DS-1007   0.36   0.26   174.2151551   37.9476927     SINBL031053_D1   SIC-DS-1007   0.46   0.42   124.3634155   40.05044107     SINBL031070_D1   SIC-DS-1007   0.24   0.32   111.2539935   20.29404496     SINBL031159_D2   SIC-DS-1007   0.15   0   65.6113555   13.69252567     SINBL031128_D1   SIC-DS-1007   0.15   0   65.6113555   13.69252567     SINBL031228_D1   SIC-DS-1007   0.23   0.26   74.84102568   29.24807902     SINBL031232_D1   SIC-DS-1007   0.23   0.26   74.84050536   26.0635635     SINBL031232_D1   SIC-DS-1007   0.23   0.26   74.86050536   26.06356635     SINBL031246_D1   SIC-DS-1007   0.25   0.32   87.94461051   16.81549931  <	SJNBL030939_D1	SJC-DS-1007	0.18	0.26	107.990973	30.07915036
SINBL030995_D1   SIC-DS-1007   0.34   0.21   85.20199645   15.46453976     SINBL031046_D2   SIC-DS-1007   0.23   0.26   89.98636315   18.92320605     SINBL031046_D3   SIC-DS-1007   0.36   0.26   174.2151551   37.9476927     SINBL031053_D1   SIC-DS-1007   0.46   0.42   124.3634155   40.05044107     SINBL031070_D1   SIC-DS-1007   0.24   0.32   111.2539935   20.29404496     SINBL031145_D1   SIC-DS-1007   0.33   0.53   74.84102568   29.24807902     SINBL031159_D2   SIC-DS-1007   0.15   0   65.6113555   13.69252567     SINBL031228_D1   SIC-DS-1007   0.16   0.05   76.23088794   13.25079077     SINBL031232_D1   SIC-DS-1007   0.23   0.26   74.86050536   26.06356635     SINBL031232_D1   SIC-DS-1007   0.48   0.16   170.29715   32.76057733     SINBL031246_D1   SIC-DS-1007   0.25   0.32   87.94461051   16.81549931     SINBL031277_D1   SIC-DS-1007   0.25   0.32   157.2678658   28.39156342	SJNBL030955_D1	SJC-DS-1007	0.2	0.58	89.31954843	21.14450286
SJNBL031046_D2   SJC-DS-1007   0.23   0.26   89.98636315   18.92320605     SJNBL031046_D3   SJC-DS-1007   0.36   0.26   174.2151551   37.9476927     SJNBL031053_D1   SJC-DS-1007   0.46   0.42   124.3634155   40.05044107     SJNBL031070_D1   SJC-DS-1007   0.24   0.32   111.2539935   20.29404496     SJNBL031145_D1   SJC-DS-1007   0.33   0.53   74.84102568   29.24807902     SJNBL031159_D2   SJC-DS-1007   0.15   0   65.6113555   13.69252567     SJNBL031159_D3   SJC-DS-1007   0.16   0.05   76.2308794   13.25079077     SJNBL031232_D1   SJC-DS-1007   0.16   0.05   76.2308794   13.25079077     SJNBL031232_D1   SJC-DS-1007   0.48   0.16   170.29715   32.76057733     SJNBL031246_D1   SJC-DS-1007   0.25   0.32   87.94461051   16.81549931     SJNBL031277_D1   SJC-DS-1007   0.25   0.42   79.60864964   32.18767881     SJNBL031277_D1   SJC-DS-1007   0.38   0.21   157.2678658   28.39156342	SJNBL030995_D1	SJC-DS-1007	0.34	0.21	85.20199645	15.46453976
SJNBL031046_D3SJC-DS-10070.360.26174.215155137.9476927SJNBL031053_D1SJC-DS-10070.460.42124.363415540.05044107SJNBL031070_D1SJC-DS-10070.240.32111.253993520.29404496SJNBL031145_D1SJC-DS-10070.330.5374.8410256829.24807902SJNBL031159_D2SJC-DS-10070.15065.611355513.69252567SJNBL031159_D3SJC-DS-10070.20.2662.3362169319.43688514SJNBL031228_D1SJC-DS-10070.160.0576.2308879413.25079077SJNBL031232_D1SJC-DS-10070.230.2674.8605053626.06356635SJNBL031232_D1SJC-DS-10070.480.16170.2971532.76057733SJNBL031246_D1SJC-DS-10070.250.4279.6086496432.18767881SJNBL031277_D1SJC-DS-10070.380.21157.267865828.39156342SJNBL031338_D1SJC-DS-10070.320.32192.006863234.35725902SJNBL031338_D1SJC-DS-10070.520.68140.030090954.12025623SJNBL031559_D1SJC-DS-10070.320.42145.865165718.20733535SJNBL031585_D1SJC-DS-10070.320.42145.865165718.20733535SJNBL031598_D1SJC-DS-10070.340.8464.1416873639.61718932SJNBL031595SJC-DS-10070.440.32126.192091950.82745144SJNBL031598_D1SJC-DS-1007<	SJNBL031046_D2	SJC-DS-1007	0.23	0.26	89.98636315	18.92320605
SINBL031053_D1SIC-DS-10070.460.42124.363415540.05044107SINBL031070_D1SIC-DS-10070.240.32111.253993520.29404496SINBL031145_D1SIC-DS-10070.330.5374.8410256829.24807902SINBL031159_D2SIC-DS-10070.15065.611355513.69252567SINBL031159_D3SIC-DS-10070.20.2662.3362169319.43688514SINBL031228_D1SIC-DS-10070.160.0576.2308879413.25079077SINBL031232_D1SIC-DS-10070.230.2674.8605053626.06356635SINBL031239_D1SIC-DS-10070.480.16170.2971532.76057733SINBL031261_D1SIC-DS-10070.250.3287.9446105116.81549931SINBL031261_D1SIC-DS-10070.250.4279.6086496432.18767881SINBL031277_D1SIC-DS-10070.380.21157.267865828.39156342SINBL031338_D1SIC-DS-10070.390.32192.006863234.35725902SINBL031497_D1SIC-DS-10070.520.68140.030090954.12025623SINBL031585_D1SIC-DS-10070.320.42145.865165718.20733535SINBL031585_D1SIC-DS-10070.410.32126.192091950.82745144SINBL031598_D1SIC-DS-10070.4464.1416873639.61718932SINBL031591SIC-DS-10070.340.4664.1416873639.61718932	SJNBL031046_D3	SJC-DS-1007	0.36	0.26	174.2151551	37.9476927
SJNBL031070_D1SJC-DS-10070.240.32111.253993520.29404496SJNBL031145_D1SJC-DS-10070.330.5374.8410256829.24807902SJNBL031159_D2SJC-DS-10070.15065.611355513.69252567SJNBL031159_D3SJC-DS-10070.20.2662.3362169319.43688514SJNBL031228_D1SJC-DS-10070.160.0576.2308879413.25079077SJNBL031232_D1SJC-DS-10070.230.2674.8605053626.06356635SJNBL031239_D1SJC-DS-10070.480.16170.2971532.76057733SJNBL031246_D1SJC-DS-10070.250.3287.9446105116.81549931SJNBL031261_D1SJC-DS-10070.250.4279.6086496432.18767881SJNBL031277_D1SJC-DS-10070.390.32192.006863234.35725902SJNBL031338_D1SJC-DS-10070.230.32102.950299231.35949758SJNBL031559_D1SJC-DS-10070.320.42145.865165718.20733535SJNBL031585_D1SJC-DS-10070.320.42145.865165718.20733535SJNBL031598_D1SJC-DS-10070.340.8464.1416873639.61718932SUNBL031647_D1SJC-DS-10070.340.8464.1416873639.61718932	SJNBL031053_D1	SJC-DS-1007	0.46	0.42	124.3634155	40.05044107
SJNBL031145_D1SIC-DS-10070.330.53/4.8410256829.2480/902SJNBL031159_D2SJC-DS-10070.15065.611355513.69252567SJNBL031159_D3SJC-DS-10070.20.2662.3362169319.43688514SJNBL031228_D1SJC-DS-10070.160.0576.2308879413.25079077SJNBL031232_D1SJC-DS-10070.230.2674.8605053626.06356635SJNBL031239_D1SJC-DS-10070.480.16170.2971532.76057733SJNBL031261_D1SJC-DS-10070.250.3287.9446105116.81549931SJNBL031261_D1SJC-DS-10070.250.4279.6086496432.18767881SJNBL031277_D1SJC-DS-10070.380.21157.267865828.39156342SJNBL031338_D1SJC-DS-10070.230.32192.006863234.35725902SJNBL031497_D1SJC-DS-10070.520.68140.030090954.12025623SJNBL031559_D1SJC-DS-10070.320.42145.865165718.20733535SJNBL031588_D1SJC-DS-10070.320.42145.865165718.20733535SJNBL031598_D1SJC-DS-10070.340.8464.1416873639.6171892	SJNBL031070_D1	SJC-DS-1007	0.24	0.32	111.2539935	20.29404496
SJNBL031159_D2SIC-DS-10070.15065.611355513.69252567SJNBL031159_D3SJC-DS-10070.20.2662.3362169319.43688514SJNBL031228_D1SJC-DS-10070.160.0576.2308879413.25079077SJNBL031232_D1SJC-DS-10070.230.2674.8605053626.06356635SJNBL031239_D1SJC-DS-10070.480.16170.2971532.76057733SJNBL031246_D1SJC-DS-10070.250.3287.9446105116.81549931SJNBL031261_D1SJC-DS-10070.380.21157.267865828.39156342SJNBL031338_D1SJC-DS-10070.390.32192.006863234.35725902SJNBL031497_D1SJC-DS-10070.520.68140.030090954.12025623SJNBL031559_D1SJC-DS-10070.320.42145.865165718.20733535SJNBL031588_D1SJC-DS-10070.340.8464.1416873639.6171892	SJNBL031145_D1	SJC-DS-1007	0.33	0.53	/4.84102568	29.2480/902
SJNBL031159_D3SIC-D5-10070.20.2662.3362169319.43688514SJNBL031228_D1SJC-D5-10070.160.0576.2308879413.25079077SJNBL031232_D1SJC-D5-10070.230.2674.8605053626.06356635SJNBL031239_D1SJC-D5-10070.480.16170.2971532.76057733SJNBL031246_D1SJC-D5-10070.250.3287.9446105116.81549931SJNBL031261_D1SJC-D5-10070.250.4279.6086496432.18767881SJNBL031277_D1SJC-D5-10070.380.21157.267865828.39156342SJNBL031338_D1SJC-D5-10070.390.32192.006863234.35725902SJNBL031497_D1SJC-D5-10070.520.68140.030090954.12025623SJNBL031559_D1SJC-D5-10070.320.42145.865165718.20733535SJNBL031588_D1SJC-D5-10070.340.8464.1416873639.61718920	SJNBL031159_D2	SJC-DS-1007	0.15	0	65.6113555	13.69252567
SJNBL031228_D1SIC-DS-10070.160.0576.2308879413.25079077SJNBL031232_D1SJC-DS-10070.230.2674.8605053626.06356635SJNBL031239_D1SJC-DS-10070.480.16170.2971532.76057733SJNBL031246_D1SJC-DS-10070.250.3287.9446105116.81549931SJNBL031261_D1SJC-DS-10070.250.4279.6086496432.18767881SJNBL031277_D1SJC-DS-10070.380.21157.267865828.39156342SJNBL031338_D1SJC-DS-10070.390.32192.006863234.35725902SJNBL031497_D1SJC-DS-10070.520.68140.030090954.12025623SJNBL031559_D1SJC-DS-10070.320.42145.865165718.20733535SJNBL031588_D1SJC-DS-10070.410.32126.192091950.82745144SJNBL031647_D1SJC-DS-10070.340.8464.1416873639.6171892	SJNBL031159_D3	SJC-DS-1007	0.2	0.26	62.33621693	19.43688514
SJNBL031232_D1SIC-D5-10070.230.2674.8605053626.06356635SJNBL031239_D1SJC-D5-10070.480.16170.2971532.76057733SJNBL031246_D1SJC-D5-10070.250.3287.9446105116.81549931SJNBL031261_D1SJC-D5-10070.250.4279.6086496432.18767881SJNBL031277_D1SJC-D5-10070.380.21157.267865828.39156342SJNBL031338_D1SJC-D5-10070.390.32192.006863234.35725902SJNBL031497_D1SJC-D5-10070.520.68140.030090954.12025623SJNBL031559_D1SJC-D5-10070.320.42145.865165718.20733535SJNBL031588_D1SJC-D5-10070.410.32126.192091950.82745144SJNBL031647_D1SJC-D5-10070.340.8464.1416873639.61718922	SJNBL031228_D1	SJC-DS-1007	0.16	0.05	76.23088794	13.250/90//
SJNBL031239_D1SIC-D5-10070.480.16170.2971532.76057733SJNBL031246_D1SJC-D5-10070.250.3287.9446105116.81549931SJNBL031261_D1SJC-D5-10070.250.4279.6086496432.18767881SJNBL031277_D1SJC-D5-10070.380.21157.267865828.39156342SJNBL03138_D1SJC-D5-10070.390.32192.006863234.35725902SJNBL031497_D1SJC-D5-10070.520.68140.030090954.12025623SJNBL031559_D1SJC-D5-10070.320.42145.865165718.20733535SJNBL031585_D1SJC-D5-10070.410.32126.192091950.82745144SJNBL031647_D1SJC-D5-10070.340.8464.1416873639.6171892	SJNBL031232_D1	SJC-DS-1007	0.23	0.26	/4.86050536	26.06356635
SJNBL031246_D1SIC-D5-10070.250.3287.9446105116.81549951SJNBL031261_D1SJC-D5-10070.250.4279.6086496432.18767881SJNBL031277_D1SJC-D5-10070.380.21157.267865828.39156342SJNBL031338_D1SJC-D5-10070.390.32192.006863234.35725902SJNBL031497_D1SJC-D5-10070.230.32102.950299231.35949758SJNBL031559_D1SJC-D5-10070.520.68140.030090954.12025623SJNBL031585_D1SJC-D5-10070.320.42145.865165718.20733535SJNBL031598_D1SJC-D5-10070.410.32126.192091950.82745144SJNBL031647_D1SJC-D5-10070.340.8464.1416873639.6171892	SJNBL031239_D1	SJC-DS-1007	0.48	0.16	170.29715	32.76057733
SJNBL031261_D1SIC-D5-10070.250.4279.6086496432.18767881SJNBL031277_D1SJC-D5-10070.380.21157.267865828.39156342SJNBL031338_D1SJC-D5-10070.390.32192.006863234.35725902SJNBL031497_D1SJC-D5-10070.230.32102.950299231.35949758SJNBL031559_D1SJC-D5-10070.520.68140.030090954.12025623SJNBL031585_D1SJC-D5-10070.320.42145.865165718.20733535SJNBL031598_D1SJC-D5-10070.410.32126.192091950.82745144SJNBL031647_D1SJC-D5-10070.340.8464.1416873639.6171892	SJNBL031246_D1	SJC-DS-1007	0.25	0.32	87.94461051	16.81549931
SJNBL031277_D1   SIC-DS-1007   0.38   0.21   157.2678658   28.39156342     SJNBL031338_D1   SIC-DS-1007   0.39   0.32   192.0068632   34.35725902     SJNBL031497_D1   SIC-DS-1007   0.23   0.32   102.9502992   31.35949758     SJNBL031559_D1   SIC-DS-1007   0.52   0.68   140.0300909   54.12025623     SJNBL031585_D1   SIC-DS-1007   0.32   0.42   145.8651657   18.20733535     SJNBL031598_D1   SIC-DS-1007   0.41   0.32   126.1920919   50.82745144     SJNBL031647_D1   SIC-DS-1007   0.34   0.84   64.14168736   39.6171892	SJINBL031261_D1	SJC-DS-1007	0.25	0.42	157 2678659	32.18/0/881
SJNBL03158_D1   SIC-DS-1007   0.39   0.32   192.0068652   34.35723902     SJNBL031497_D1   SJC-DS-1007   0.23   0.32   102.9502992   31.35949758     SJNBL031559_D1   SJC-DS-1007   0.52   0.68   140.0300909   54.12025623     SJNBL031585_D1   SJC-DS-1007   0.32   0.42   145.8651657   18.20733535     SJNBL031598_D1   SJC-DS-1007   0.41   0.32   126.1920919   50.82745144     SJNBL031647_D1   SJC-DS-1007   0.34   0.84   64.14168736   39.61718932		SIC DS 1007	0.30	0.21	102.0069622	20.39130342
SJNBL031559_D1   SJC-DS-1007   0.52   0.68   140.0300909   54.12025623     SJNBL031558_D1   SJC-DS-1007   0.32   0.42   145.8651657   18.20733535     SJNBL031598_D1   SJC-DS-1007   0.41   0.32   126.1920919   50.82745144     SJNBL031647_D1   SJC-DS-1007   0.34   0.84   64.14168736   39.6171892		SIC DS 1007	0.59	0.52	102.0008032	21 250/0750
SJNBL031585_D1     SJC-DS-1007     0.32     0.42     140.0500909     54.12023023       SJNBL031585_D1     SJC-DS-1007     0.32     0.42     145.8651657     18.20733535       SJNBL031598_D1     SJC-DS-1007     0.41     0.32     126.1920919     50.82745144       SJNBL031647_D1     SJC-DS-1007     0.34     0.84     64.14168736     39.61718932	SINBL031457_D1	SIC-DS-1007	0.23	0.52	140 0300000	51.55545756
SINEL031595_D1     SIC-D5-1007     0.32     0.42     143.8051037     18.20753535       SJNBL031598_D1     SJC-DS-1007     0.41     0.32     126.1920919     50.82745144       SJNBL031647_D1     SJC-DS-1007     0.34     0.84     64.14168736     39.61718932	SINBL031595_D1	SIC-DS-1007	0.32	0.00	140.0300909	18 20722525
SINBL031647_D1     SIC-DS-1007     0.34     0.84     64.14168736     39.61718932	SINBL031508 D1	SIC-DS-1007	0.32	0.42	126 192091037	50.827/51//
	SINBL031647 D1	SIC-DS-1007	0.34	0.84	64 14168736	39 61718932
SJNBL031668 D1 SJC-DS-100/ 0.29 0.05 36.83239218 15.25959351	SJNBL031668 D1	SJC-DS-1007	0.29	0.05	36.83239218	15.25959351

**Synthetic lethality scores in neuroblastoma cohort.** Synthetic lethality scores (SL core) against *PARP1/2* inhibition are shown for the index sample (SJNBL031647\_D1 in bold) and other 58 neuroblastoma patient samples profiled by St. Jude clinical sequencing program during 2016-2019. Accession ID: dataset accession to the sequencing data on St. Jude Cloud. TPM: transcript per million

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### **Author contributions**

S.F. developed the treatment of the patient. K.H. performed the genomic analysis and discovered the bi-allelic loss of *BARD1*. M.C., K.H., J.Z. and S.F. prepared the first draft of the manuscript. M.N. and E.R. analyzed the synthetic lethality score. S.C.K., B.A.O, and J.E. performed immunohistochemistry staining and histological annotation. J.Z. designed the genomic analysis, planned result validation, and supervised the analysis. All authors contributed to the writing and revision of the manuscript.

### Acknowledgments

This work was supported in part by National Cancer Institute (NCI) grant R01CA216391 to JZ and a Cancer Center Support (CORE) Grant (P30 CA21765) to St. Jude Children's Research Hospital. All authors received support from American Lebanese Syrian Associated Charities (ALSAC). We thank the St Jude Clinical Genomics program for generating the genomic data used in this study. We also thank Mahsa Khanlari, MD, for providing photographs of the patient's bone marrow histology and Heather Mulder for helping with sample processing. We thank the Anatomic Pathology/Neuropathology Translation Support lab in the Department of Pathology at St. Jude Children's Research Hospital for developing and performing the BARD1 immunohistochemical staining protocol. We would like to appreciate Mr. Michael N. Edmonson for proofreading the manuscript.