

## Reporting Summary

Nature Research wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Research policies, see [Authors & Referees](#) and the [Editorial Policy Checklist](#).

### Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a Confirmed

- ☐ ☒ The exact sample size ( $n$ ) for each experimental group/condition, given as a discrete number and unit of measurement
- ☐ ☒ A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
- ☒ ☐ The statistical test(s) used AND whether they are one- or two-sided  
*Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
- ☒ ☐ A description of all covariates tested
- ☐ ☒ A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
- ☐ ☒ A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
- ☒ ☐ For null hypothesis testing, the test statistic (e.g.  $F$ ,  $t$ ,  $r$ ) with confidence intervals, effect sizes, degrees of freedom and  $P$  value noted  
*Give  $P$  values as exact values whenever suitable.*
- ☒ ☐ For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
- ☒ ☐ For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
- ☒ ☐ Estimates of effect sizes (e.g. Cohen's  $d$ , Pearson's  $r$ ), indicating how they were calculated

*Our web collection on [statistics for biologists](#) contains articles on many of the points above.*

### Software and code

Policy information about [availability of computer code](#)

Data collection

All custom tools will be made available upon request

Data analysis

All custom tools will be made available upon request

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors/reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Research [guidelines for submitting code & software](#) for further information.

### Data

Policy information about [availability of data](#)

All manuscripts must include a [data availability statement](#). This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A list of figures that have associated raw data
- A description of any restrictions on data availability

All raw data and data analysis tools will be made available upon request

### Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

- ☒ Life sciences      ☐ Behavioural & social sciences      ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see [nature.com/documents/nr-reporting-summary-flat.pdf](https://www.nature.com/documents/nr-reporting-summary-flat.pdf)

# Life sciences study design

All studies must disclose on these points even when the disclosure is negative.

|                 |                                                                                                                                                                             |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sample size     | Samples were simply determined as number of separate samples on which process was run; for flow cytometry number of events collected per experiment was used as sample size |
| Data exclusions | No data was excluded                                                                                                                                                        |
| Replication     | We specifically describe number of reproducible runs out of total runs in this study                                                                                        |
| Randomization   | N/A                                                                                                                                                                         |
| Blinding        | Testing of effect on human tumors was analyzed by two blinded pathologists (did not know which treatment was given to which sample)                                         |

## Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

### Materials & experimental systems

|                                     |                                                                 |
|-------------------------------------|-----------------------------------------------------------------|
| n/a                                 | Involved in the study                                           |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> Antibodies                  |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> Eukaryotic cell lines       |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Palaeontology                          |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> Animals and other organisms |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> Human research participants |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Clinical data                          |

### Methods

|                                     |                                                    |
|-------------------------------------|----------------------------------------------------|
| n/a                                 | Involved in the study                              |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> ChIP-seq                  |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> Flow cytometry |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> MRI-based neuroimaging    |

## Antibodies

|                 |                                                                                         |
|-----------------|-----------------------------------------------------------------------------------------|
| Antibodies used | Commercial antibodies were used as described in the manuscript                          |
| Validation      | Antibodies were used according to the manufacturer's instructions and validated by FACS |

## Eukaryotic cell lines

Policy information about [cell lines](#)

|                                                                      |                                                                                                                  |
|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Cell line source(s)                                                  | Cell lines were either acquired from American Type Cell Culture, or given by a collaborating doctor as described |
| Authentication                                                       | Cell lines were not authenticated                                                                                |
| Mycoplasma contamination                                             | Samples were regularly probed for Mycoplasma contamination, found negative                                       |
| Commonly misidentified lines<br>(See <a href="#">ICLAC</a> register) | N/A                                                                                                              |

## Animals and other organisms

Policy information about [studies involving animals](#); [ARRIVE guidelines](#) recommended for reporting animal research

|                         |                                                                                                                  |
|-------------------------|------------------------------------------------------------------------------------------------------------------|
| Laboratory animals      | C57BL6 mice                                                                                                      |
| Wild animals            | N/A                                                                                                              |
| Field-collected samples | N/A                                                                                                              |
| Ethics oversight        | All animal experiments were reviewed and approved by the national committee for ethics in animal experimentation |

Note that full information on the approval of the study protocol must also be provided in the manuscript.

## Human research participants

Policy information about [studies involving human research participants](#)

|                            |                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Population characteristics | N/A                                                                                                                                                                                                                                                                                                                                               |
| Recruitment                | Human primary acute myeloblastic leukemia (AML) cells were isolated from patients by standard procedures (Institutional Review Board [IRB] approval numbers 0297-15-TLV & 4573-17-SMC). Human primary PBMCs were isolated from healthy donors by standard procedures (IRB approval number 0297-15-TLV). All participants signed informed consent. |
| Ethics oversight           | See above                                                                                                                                                                                                                                                                                                                                         |

Note that full information on the approval of the study protocol must also be provided in the manuscript.

## Flow Cytometry

### Plots

Confirm that:

- ☒ The axis labels state the marker and fluorochrome used (e.g. CD4-FITC).
- ☒ The axis scales are clearly visible. Include numbers along axes only for bottom left plot of group (a 'group' is an analysis of identical markers).
- ☒ All plots are contour plots with outliers or pseudocolor plots.
- ☒ A numerical value for number of cells or percentage (with statistics) is provided.

### Methodology

|                           |                                                                                                                                                                                                                                                                                                                                             |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sample preparation        | Target blasts were isolated by magnetic sorting using a commercial kit (Miltenyi Biotec) according to the manufacturer's instructions.                                                                                                                                                                                                      |
| Instrument                | Sorting was performed on a Becton-Dickinson FACSMelody cell sorter equipped with blue, red, and violet lasers (9 color configuration). Flow cytometry was performed on a Becton-Dickinson Accuri C6 Plus cytometer equipped with 488 nm and 630 nm lasers, and on a Beckman-Coulter Cytoflex cytometer with a B5-R3-V5 laser configuration. |
| Software                  | We used Kaluza throughout the study                                                                                                                                                                                                                                                                                                         |
| Cell population abundance | Depending on sample                                                                                                                                                                                                                                                                                                                         |
| Gating strategy           | N/A                                                                                                                                                                                                                                                                                                                                         |

- ☒ Tick this box to confirm that a figure exemplifying the gating strategy is provided in the Supplementary Information.