

Reporting Summary

Nature Portfolio 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 Portfolio policies, see our [Editorial Policies](#) 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 (<i>n</i>) 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 <i>Only common tests should be described solely by name; describe more complex techniques in the Methods section.</i>
☐	☒ 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. <i>F</i> , <i>t</i> , <i>r</i>) with confidence intervals, effect sizes, degrees of freedom and <i>P</i> value noted <i>Give P values as exact values whenever suitable.</i>
☒	☐ 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 <i>d</i> , Pearson's <i>r</i>), 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	We used the following software and versions for data analysis: Cell Ranger software, Seurat v4.0, CellPhone DB database v2.0.0, Signac v1.4.0, chromVAR v3.14, spaceranger v1.3 and human pwms v2.
Data analysis	We used the following software and versions for data analysis: Cell Ranger software, Seurat v4.0, CellPhone DB database v2.0.0, Signac v1.4.0, chromVAR v3.14, spaceranger v1.3 and human pwms v2.

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 and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio [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 description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our [policy](#)

The scRNA-seq and ATAC-seq data generated in this study have been deposited in the European Genome-Phenome Archive (EGA) database under accession code EGAS00001006780. The raw data are protected and are not available due to data privacy laws. The processed scRNA-seq data are available at CELLxGENE.

Research involving human participants, their data, or biological material

Policy information about studies with [human participants or human data](#). See also policy information about [sex, gender \(identity/presentation\), and sexual orientation](#) and [race, ethnicity and racism](#).

Reporting on sex and gender	All study participants were females since the goal of this study is to better understand the biology of tubal diseases and ovarian cancer throughout the female menstrual cycle and menopause.
Reporting on race, ethnicity, or other socially relevant groupings	The ethnicity of all study participants was extracted from their medical records. Information of participant ethnicity can be found in Table S1.
Population characteristics	Study participant characteristics including age (years), ethnicity, menopausal age (years), history of gynecologic associated infections, body mass index and menstrual cycle phase can be found in Table S1. All participant characteristics were extracted from the medical records.
Recruitment	Healthy women under the age of 50 undergoing surgery for fibroids, prolapse or elective sterilization were approached for study participation. All eligible women were approached regardless of socioeconomic factors, race or ethnicity. Participants were not compensated for partaking in this study.
Ethics oversight	All research complies with all relevant ethical regulations and procedures described herein were conducted under the approval of the Institutional Review Board at the University of Chicago. We obtained informed consent, including consent to data from this study being used in medical publications or presentations from all study participants prior to their surgery.

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

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

Life sciences study design

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

Sample size	No statistical methods were used to predetermine sample sizes, but our cohort sizes are similar or larger to those reported in previous publications.
Data exclusions	No data was excluded in this study unless indicated otherwise.
Replication	To ensure reproducibility all experiment were performed using at least 3 biological replicates. Where appropriate positive and negative controls were used.
Randomization	No Randomization was performed for this study. Participants were allocated into groups (pre- vs post-menopausal and secretory vs proliferative phase) based on their menopause status or menstrual cycle phase. Menopause and menstrual cycle phase were determined based on age, chart or pathology review.
Blinding	No blinding was performed for this study. Since our study aims to better understand the biology of tubal diseases and ovarian cancer throughout the female menstrual cycle and menopause it is detrimental to know the menopause status and menstrual cycle phase of each patient.

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
☐	☒ Antibodies
☐	☒ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Antibodies

Antibodies used	OVGP1 at 1:500 (ThermoFisher Scientific, PA5-64007), IGF1 (1:200, OriGene Technologies, TA805748S) and IGF2 (1:200, ThermoFisher scientific, MA532485), secondary antibodies (1:200, Alexa Fluor 488 and 568, Invitrogen) and Hoechst 33258 (1:200, Molecular probes, H-3569).
Validation	All antibodies used in the study are commercially available and the supplier and clone numbers/ catalog numbers are listed. The links are as follow: IGF2: https://www.thermofisher.com/antibody/product/IGF2-Antibody-clone-JJ092-3-Recombinant-Monoclonal/MA5-32485 , OVGP1: https://www.thermofisher.com/antibody/product/OVGP1-Antibody-Polyclonal/PA5-64007 , IGF1: https://www.origene.com/catalog/antibodies/primary-antibodies/ta805748s/igf1-mouse-monoclonal-antibody-clone-id-oti4b12 .

Eukaryotic cell lines

Policy information about [cell lines and Sex and Gender in Research](#)

Cell line source(s)	Fallopian tube epithelial and stromal cells were isolated from pre-menopausal female fallopian tubes using established and previously described protocols.
Authentication	N/A
Mycoplasma contamination	N/A
Commonly misidentified lines (See ICLAC register)	N/A

Plants

Seed stocks	N/A
Novel plant genotypes	N/A
Authentication	N/A