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Life Sciences Reporting Summary

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Please do not complete any field with "not applicable" or n/a. Refer to the help text for what text to use if an item is not relevant to your study.

For final submission: please carefully check your responses for accuracy; you will not be able to make changes later.

Experimental design

1. Sample size

   Describe how sample size was determined.

   We have based all our sample sizes (in vitro and in vivo) on previous experience in our laboratory and other published work. For the in vitro experiments we utilised n=3 different human fetal cortical samples for each experiment. For the in vivo experiments we analsyed a minimum of three animals per group and up to 5 in some cases, all of which are clearly outlined in the manuscript (see legend to figure 5). We have also considered the guidelines of the nc3Rs (http://www.3rs-reduction.co.uk/html/6_power_and_sample_size.html)

2. Data exclusions

   Describe any data exclusions.

   No data points/groups were excluded.

3. Replication

   Describe the measures taken to verify the reproducibility of the experimental findings.

   All in vitro experiments were repeated three times on different days.
   All in vivo experiments were repeated on a minimun of 3 animals per group.

4. Randomization

   Describe how samples/organisms/participants were allocated into experimental groups.

   In vitro experiments: sufficient numbers of cells were plated into single wells of a 24 well plate. The wells were randomly divided into equal size groups and an appropriate treatment was given.
   In vivo experiments: pregnant females were randomly selected for administration of CoCr nanoparticles or saline as a control; this in now stated on page 16 of the manuscript, line 402.

5. Blinding

   Describe whether the investigators were blinded to group allocation during data collection and/or analysis.

   The person counting cells for both in vitro and in vivo counts were blinded to the treatment group. In addition, the person carrying out the qPCR was also blinded to the treatment groups.

Note: all in vivo studies must report how sample size was determined and whether blinding and randomization were used.

6. Statistical parameters

For all figures and tables that use statistical methods, confirm that the following items are present in relevant figure legends (or in the Methods section if additional space is needed).

n/a	Confirmed
☐	☒ The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement (animals, litters, cultures, etc.)
☐	☒ A description of how samples were collected, noting whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☐	☒ A statement indicating how many times each experiment was replicated
☐	☒ 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 any assumptions or corrections, such as an adjustment for multiple comparisons
☐	☒ Test values indicating whether an effect is present *Provide confidence intervals or give results of significance tests (e.g. P values) as exact values whenever appropriate and with effect sizes noted.*
☐	☒ A clear description of statistics including central tendency (e.g. median, mean) and variation (e.g. standard deviation, interquartile range)
☐	☒ Clearly defined error bars in all relevant figure captions (with explicit mention of central tendency and variation)

See the web collection on statistics for biologists for further resources and guidance.

Software

Policy information about availability of computer code

7. Software

Describe the software used to analyze the data in this study.	We used standard software to analyse our data. EXCEL and GRAPHPAD PRISM version 6.

For manuscripts utilizing custom algorithms or software that are central to the paper but not yet described in the published literature, software must be made available to editors and reviewers upon request. We strongly encourage code deposition in a community repository (e.g. GitHub). *Nature Methods* guidance for providing algorithms and software for publication provides further information on this topic.

Materials and reagents

Policy information about availability of materials

8. Materials availability

Indicate whether there are restrictions on availability of unique materials or if these materials are only available for distribution by a third party.	No unique materials were used.

9. Antibodies

Describe the antibodies used and how they were validated for use in the system under study (i.e. assay and species).	We utilised only commercial antibodies in these studies. We have included details of their supplier, their catalogue number and lot number where they were available. The antibodies used here are all widely utilised in the literature by ourselves and many others and all antibodies utilised are approved by Antibodypedia.

10. Eukaryotic cell lines

a. State the source of each eukaryotic cell line used.	The BeWo cell line utilised to model the human placenta was kindly provided by Dr Margaret Saunders (University Hospitals Bristol NHS Foundation Trust, Bristol, UK) with permission from Dr Alan Schwartz (Washington University St. Louis, MO).
b. Describe the method of cell line authentication used.	This BeWo cell lineage has been authenticated by the European Cell and Culture Collection. (Jones HN et al., 2006, Am J Physiol Endocrinol Metab 291 (3) E596-E603).
c. Report whether the cell lines were tested for mycoplasma contamination.	Yes, this cell line was tested routinely for mycoplasma and that has been stated on page 13 line 327 of the manuscript.
d. If any of the cell lines used are listed in the database of commonly misidentified cell lines maintained by ICLAC, provide a scientific rationale for their use.	No commonly mis-identified cell lines were used.

Animals and human research participants

Policy information about studies involving animals; when reporting animal research, follow the ARRIVE guidelines

11. Description of research animals

Provide all relevant details on animals and/or animal-derived materials used in the study.

These were 12 week old female mice. This information has been added to the manuscript on Page 16.
Whilst pregnant they were treated with CoCr nanoparticles or saline (as a control), the brains of their offspring were then analysed by immunofluorescence or qPCR.

Policy information about studies involving human research participants

12. Description of human research participants

Describe the covariate-relevant population characteristics of the human research participants.

We utilised human fetal brain tissue from elective abortions between gestation ages of 8-12 weeks. We utilised a total of 9 samples and used a minimum of three independent samples for every experiment. This tissue was collected under appropriate Department of Health guidelines with full ethical approval from Cardiff University and also under the Cardiff University Human Tissue Act 2004 research licence. This information has been added on pages 14 - 15, lines 362 to 366.