The ARRIVE guidelines 2.0: author checklist

The ARRIVE Essential 10

These items are the basic minimum to include in a manuscript. Without this information, readers and reviewers cannot assess the reliability of the findings.

Item		Recommendation	Section/line number, or reason for not reporting
Study design	1	For each experiment, provide brief details of study design including: a. The groups being compared, including control groups. If no control group has been used, the rationale should be stated. b. The experimental unit (e.g. a single animal, litter, or cage of animals).	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 1-9 Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 11-9
Sample size	2	a. Specify the exact number of experimental units allocated to each group, and the total number in each experiment. Also indicate the total number of animals used. b. Explain how the sample size was decided. Provide details of any *a priori* sample size calculation, if done.	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 1-9 N/A. Available funds only support to purchase these numbers of rats
Inclusion and exclusion criteria	3	a. Describe any criteria used for including and excluding animals (or experimental units) during the experiment, and data points during the analysis. Specify if these criteria were established *a priori.* If no criteria were set, state this explicitly. b. For each experimental group, report any animals, experimental units or data points not included in the analysis and explain why. If there were no exclusions, state so. c. For each analysis, report the exact value of *n* in each experimental group.	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 10-11 Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 10-11 Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 1-9
Randomisation	4	a. State whether randomisation was used to allocate experimental units to control and treatment groups. If done, provide the method used to generate the randomisation sequence. b. Describe the strategy used to minimise potential confounders such as the order of treatments and measurements, or animal/cage location. If confounders were not controlled, state this explicitly.	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 1-3 Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 1-3
Blinding	5	Describe who was aware of the group allocation at the different stages of the experiment (during the allocation, the conduct of the experiment, the outcome assessment, and the data analysis).	NA. We randomly grouped the rats by random number table and all of the experimenters were aware of the group allocation.
Outcome measures	6	a. Clearly define all outcome measures assessed (e.g. cell death, molecular markers, or behavioural changes). b. For hypothesis-testing studies, specify the primary outcome measure, i.e. the outcome measure that was used to determine the sample size.	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 10-14 Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 10-14
Statistical methods	7	a. Provide details of the statistical methods used for each analysis, including software used. b. Describe any methods used to assess whether the data met the assumptions of the statistical approach, and what was done if the assumptions were not met.	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 26-30 Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 15-19
Experimental animals	8	a. Provide species-appropriate details of the animals used, including species, strain and substrain, sex, age or developmental stage, and, if relevant, weight. b. Provide further relevant information on the provenance of animals, health/immune status, genetic modification status, genotype, and any previous procedures.	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 26-29 Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 26-29

Experimental procedures	9	For each experimental group, including controls, describe the procedures in enough detail to allow others to replicate them, including:	HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 10-14
		a. What was done, how it was done and what was used.	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 10-14
		b. When and how often.	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 10-14
		c. Where (including detail of any acclimatisation periods).	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 10-14
		d. Why (provide rationale for procedures).	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 10-14
Results	10	For each experiment conducted, including independent replications, report: a. Summary/descriptive statistics for each experimental group, with a measure of variability where applicable (e.g. mean and SD, or median and range).	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 10-14
		b. If applicable, the effect size with a confidence interval.	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 10-14

The Recommended Set

These items complement the Essential 10 and add important context to the study. Reporting the items in both sets represents best practice.

Item		Recommendation	Section/line number, or reason for not reporting
Abstract	11	Provide an accurate summary of the research objectives, animal species, strain and sex, key methods, principal findings, and study conclusions.	Abstract/LINE 25-34, LINE 1-11.
Background	12	a. Include sufficient scientific background to understand the rationale and context for the study, and explain the experimental approach.	Abstract/LINE 25-29
		b. Explain how the animal species and model used address the scientific objectives and, where appropriate, the relevance to human biology.	Abstract/LINE 25-29
Objectives	13	Clearly describe the research question, research objectives and, where appropriate, specific hypotheses being tested.	Abstract/LINE 25-34, LINE 1-4
Ethical statement	14	Provide the name of the ethical review committee or equivalent that has approved the use of animals in this study, and any relevant licence or protocol numbers (if applicable). If ethical approval was not sought or granted, provide a justification.	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 21-23
Housing and husbandry	15	Provide details of housing and husbandry conditions, including any environmental enrichment.	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 23-26
Animal care and monitoring	16	a. Describe any interventions or steps taken in the experimental protocols to reduce pain, suffering and distress.	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 23-30
		b. Report any expected or unexpected adverse events.	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 10-11
		c. Describe the humane endpoints established for the study, the signs that were monitored and the frequency of monitoring. If the study did not have humane endpoints, state this.	Methods/Repair of HA/ZrO2 combined with iPS-MSCs on rat skull defects/Line 10-11
Interpretation/ scientific implications	17	a. Interpret the results, taking into account the study objectives and hypotheses, current theory and other relevant studies in the literature.	discussion/Line 23-33
		b. Comment on the study limitations including potential sources of bias, limitations of the animal model, and imprecision associated with the results.	discussion/Line 23-33
Generalisability/ translation	18	Comment on whether, and how, the findings of this study are likely to generalise to other species or experimental conditions, including any relevance to human biology (where appropriate).	discussion/Line 23-33
Protocol registration	19	Provide a statement indicating whether a protocol (including the research question, key design features, and analysis plan) was prepared before the study, and if and where this protocol was registered.	A protocol was prepared before the study without registration.
Data access	20	Provide a statement describing if and where study data are available.	footnote/Data Sharing Statement/Line 12-14
Declaration of interests	21	a. Declare any potential conflicts of interest, including financial and non-financial. If none exist, this should be stated.	footnote/Conflicts of Interest/Line 18-20
		b. List all funding sources (including grant identifier) and the role of the funder(s) in the design, analysis and reporting of the study.	funding/Line 12-14

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*As the checklist was provided upon initial submission, the line number reported may be changed due to copyediting and may not be referable in the published version. In this case, the section may be used as an alternative reference.