**Functional olfactory impairment and fatigue in post-COVID-19 syndrome including ME/CFS – a longitudinal prospective observational study**

**Supplementary Material**

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**Supplementary Tables**

**Age-matched normative cut-offs for hyposmia based on the extended Sniffin' Sticks Test**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Age (years)** | **Identification** | **Discrimination** | **Threshold** | **Total** |
| 21-30 | 11.00 | 11.00 | 6.25 | 30.75 |
| 31-40 | 12.00 | 10.00 | 5.50 | 30.50 |
| 41-50 | 11.00 | 9.00 | 5.35 | 28.25 |
| 51-60 | 10.00 | 9.00 | 4.25 | 27.20 |
| 61-70 | 10.00 | 8.00 | 3.58 | 25.00 |
| 71-80 | 7.00 | 6.00 | 1.25 | 17.25 |

**Supplementary Table 1: Age-specific TDI Cut-off Values for Hyposmia Based on TDI Scores.** Values in columns 2-5 represent the thresholds below which hyposmia is defined for each subtest (Identification, Discrimination, Threshold) and for the total TDI score, as determined for each age group listed in the first column (Hummel et al., 2007).

(Separate data file)

**Supplementary Table 2: Effect Sizes for All Longitudinal Group Analyses.** Column A represents the olfactory outcome analyzed, column B represents the group categorized for, and column C the assessment period. Column D indicates the number of observations analyzed, column E the effect sizes for each analysis, and column F (lower) and G (upper) their 95% confidence intervals. The underlying effect measure is an adaption of the well-known Wilcoxon-Mann-Whitney effect for longitudinal data.

**Supplementary Figures**

**A**

**A chart of a vaccination test

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**BA diagram of different types of covid-19

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**C**

**A group of graphs showing different levels of results

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**Supplementary Figure 1: Olfactory Outcomes Following COVID-19 Vaccination.** (A)Percentage of unvaccinated participants before COVID-19 (yellow) and vaccinated participants before COVID-19 (blue) patients (depicted on the y-axis) categorized by normosmia (left bar) and hyposmia/anosmia (right bar), with absolute patient numbers per vaccination group (shown on the x-axis) during the first assessment period. (B) Distribution of olfactory TDI testing outcome scores as depicted on the y-axis ((a) Discrimination, (b) Identification, (c) Threshold, and (d) Total TDI Score) in unvaccinated participants before COVID-19 (yellow) and vaccinated participants before COVID-19 (blue) during the first assessment period. Bars show group medians and boxes depict where 50% of data lies. (C) Individual plots for (a) Discrimination, (b) Identification, (c) Threshold, and (d) Total TDI Score as defined by the TDI Test, with absolute test scores on the left y-axis. Blue dots represent unvaccinated participants before the first assessment, red dots represent vaccinated participants before the first assessment, as shown on the color legends below the plots. Bars show group medians. Lines (blue for unvaccinated before 1st assessment, red for vaccinated before 1st assessment) represent the change in relative effects over three timepoints as quantified on the right y-axis, with the colored surfaces indicating their 95% confidence intervals. Assessment periods and absolute participant numbers per diagnosis group are indicated on the x-axis. p ≤ 0.05 = \*, p ≤ 0.01 = \*\*, p ≤ 0.001 = \*\*\*.

Abbreviation: Threshold-Discrimination-Identification Test (TDI)

**A diagram of different stages of growth

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**Supplementary Figure 2: Frequency of Hyposmia/Anosmia Linked to Assumed Virus Variant.** Percentage of wildtype SARS-CoV-2 (orange) and later SARS-CoV-2 (blue) variants (depicted on the y-axis) categorized by normosmia (left bar) and hyposmia/anosmia (right bar), with absolute patient numbers per virus variant group (shown on the x-axis) during the first assessment period.

**A diagram of a number of different types of diseases

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**Supplementary Figure 3: Effect of Olfactory Impairment During Acute COVID-19 on Long-term Olfactory Performance.** (A) Discrimination, (B) Identification, (C) Threshold, (D) Total TDI Score, and (E) hyposmia/anosmia (as defined by the TDI Test), with absolute test scores on the left y-axis. Green dots represent participants who reported hyposmia or anosmia during acute COVID-19, purple dots represent participants who reported normosmia during acute COVID-19, as shown on the color legends below the plots. Bars show group medians. Lines (green for hyposmia/anosmia during COVID-19, purple for normosmia during COVID-19) represent the change in relative effects over three timepoints as quantified on the right y-axis, with the colored surfaces indicating their 95% confidence intervals. Assessment periods and absolute participant numbers per diagnosis group are indicated on the x-axis. p ≤ 0.05 = \*, p ≤ 0.01 = \*\*, p ≤ 0.001 = \*\*\*. Abbreviation: Threshold-Discrimination-Identification Test (TDI)

**Supplementary References**

[Hummel T, Kobal G, Gudziol H, Mackay-Sim A. Normative data for the “Sniffin’ Sticks” including tests of odor identification, odor discrimination, and olfactory thresholds: an upgrade based on a group of more than 3,000 subjects. Eur Arch Oto-Rhino-Laryngol Off J Eur Fed Oto-Rhino-Laryngol Soc EUFOS Affil Ger Soc Oto-Rhino-Laryngol - Head Neck Surg. 2007 Mar;264(3):237–43.](https://www.zotero.org/google-docs/?4cDQEx)