

**Supplementary Figure 1.** Characterization of hBM‐MSCs. A) Representative image of hBM‐MSCs in the third passage. B) Immunophenotyping of hBM‐MSCs by flow cytometryshowed that the cells at passage 3 were negative for CD45, while expressed mesenchymal markers (CD73, CD90, and CD105) more than 90%.

Supplementary Table 1. Details of clinical diagnosis and sample size obtained from the donors.

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| --- | --- | --- | --- | --- |
| **Code No.** | **Age (Year)** | **Surgery** | **Diagnosis** | **Tissue dimensions** |
| 1 | 20 | Total Abdominal hysterectomy | Trans Sexual (FTM) | 1$×$ total ovary |
| 2 | 18 | Total Abdominal hysterectomy | Trans Sexual (FTM) | 1$×$ total ovary |
| 3 | 40 | Total Abdominal hysterectomy | Endometrial Cancer | 3$×$4 $cm^{2}$ |
| 4 | 42 | Total Abdominal hysterectomy | Endometrial Cancer | 1$×$ total ovary |

**Supplementary Table 2.** The impact of co-culturing of hBM-MSCs on follicular reserve and their early development of cryopreserved human OCTs. Initially, the ovarian follicles in mono-culture and co-culture groups on day 2 were compared to non-cultured ones (Day 0), and the statistically significant differences (*p*˂0.05) are shown by #. Furthermore, \* is considered to be statistically significant (*p*˂0.05) when co-culture group compared to the mono-culture group at the same time point.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Groups** | **Total follicle No.** | **Normal follicles****No. (% Mean ± SD)** | **Primordial follicles****No. (% Mean ± SD)** | **Transitional follicles****No. (% Mean ± SD)** | **Primary follicles****No. (% Mean ± SD)** | **Secondary follicles****No. (% Mean ± SD)** |
| **Day 0** | Non-cultured | 188 | 168 (87.34±5.18) | 92 (54.16±6.72) | 56 (32.52±6.12) | 19 (13.08±4.61) | 1 (0.22±0.44) |
| **Day 2** | Mono-culture | 72 | 54 (75.84±7.31) | 8 (14.36±3.66) # | 18 (32.79±7.51) | 25 (46.78±6.82) # | 3 (6.08±4.29) |
| Co-culture | 72 | 59 (79.49±5.83) | 4 (5.73±3.86) \*# | 21(37.79±4.69) | 27 (49.38±7.90) # | 8 (9.17±8.55) |
| **Day 4** | Mono-culture | 56 | 41 (71.87±8.27) | 4 (11.2±4.49) | 16 (37.73±4.37) | 19 (47.30±3.19) | 2 (3.38±4.57) |
| Co-culture | 69 | 49 (69.34±4.7) | 0 \* | 3 (5.83±6.87) \* | 37 (76.10±3.33) \* | 9 (18.05±7.71) \* |
| **Day 8** | Mono-culture | 83 | 61 (71.27±7.1) | 9 (15.55±4.16) | 21 (29.78±9.63) | 25 (46.20±10.97) | 6 (8.45±6.19) |
| Co-culture | 72 | 48 (66.71±4.88) | 0 \* | 1(2.28±4.16) \* | 38 (76.78±9.98)  | 9 (18.86±5.96)  |