

The optimal number of clusters and the comparison between modularity and k-means clustering

In this study, we conducted the k-means algorithm to specify the number of clusters and to compare the modularity clustering technique. In order to determine optimal clusters, the elbow method was used. The plotting image of the curve of the total within-cluster sum of square according to the number of clusters k was shown as follows:

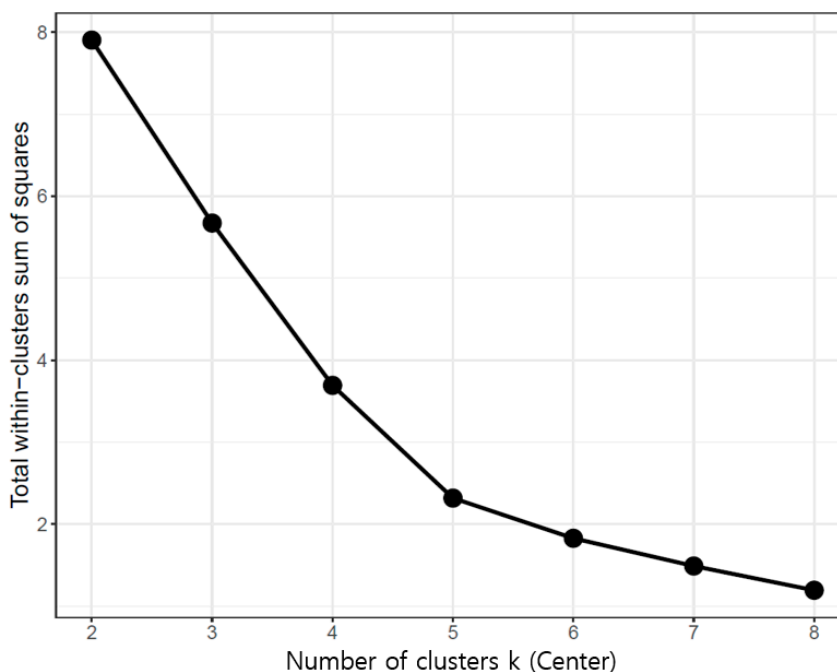


Figure S1. The curve of the total within-cluster sum of square according to the number of clusters k .

The result suggests that five or six is the optimal number of clusters as it appears to be the bend in the elbow. The results of comparison between modularity and k-means clustering as follows:

Table S1. The results of comparison between modularity and k-means clustering

| NO. | Label (ASJC) | Modularity clustering | | k-means clustering | | | | | | |
|-----|--------------|-----------------------|-----------|--------------------|----------|----------|----------|----------|----------|----------|
| | | cluster_5 | cluster_6 | center_2 | center_3 | center_4 | center_5 | center_6 | center_7 | center_8 |
| 1 | 1000 | 2 | 1 | 1 | 1 | 1 | 3 | 6 | 7 | 7 |
| 2 | 1100 | 2 | 1 | 1 | 3 | 3 | 3 | 6 | 6 | 8 |
| 4 | 1102 | 3 | 2 | 1 | 3 | 3 | 5 | 3 | 3 | 6 |
| 5 | 1103 | 2 | 1 | 1 | 3 | 3 | 5 | 5 | 5 | 5 |
| 7 | 1105 | 2 | 1 | 1 | 3 | 3 | 5 | 3 | 3 | 6 |
| 8 | 1106 | 3 | 2 | 1 | 1 | 1 | 3 | 6 | 7 | 7 |
| 9 | 1107 | 3 | 2 | 1 | 3 | 4 | 4 | 4 | 4 | 4 |
| 10 | 1108 | 3 | 2 | 1 | 3 | 4 | 4 | 4 | 4 | 4 |
| 11 | 1109 | 5 | 6 | 1 | 3 | 3 | 5 | 5 | 5 | 5 |
| 12 | 1110 | 3 | 2 | 1 | 3 | 4 | 4 | 4 | 3 | 3 |
| 13 | 1111 | 3 | 2 | 1 | 3 | 3 | 5 | 3 | 3 | 3 |
| 14 | 1300 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |

| NO. | Label (ASJC) | Modularity clustering | | k-means clustering | | | | | | | |
|-----|--------------|-----------------------|-----------|--------------------|----------|----------|----------|----------|----------|----------|--|
| | | cluster_5 | cluster_6 | center_2 | center_3 | center_4 | center_5 | center_6 | center_7 | center_8 | |
| 15 | 1301 | 3 | 2 | 1 | 3 | 3 | 5 | 5 | 5 | 6 | |
| 16 | 1302 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 17 | 1303 | 2 | 1 | 1 | 1 | 1 | 3 | 6 | 7 | 7 | |
| 18 | 1304 | 2 | 1 | 1 | 3 | 4 | 4 | 3 | 3 | 3 | |
| 19 | 1305 | 3 | 2 | 1 | 3 | 3 | 3 | 6 | 6 | 8 | |
| 20 | 1306 | 2 | 1 | 1 | 3 | 3 | 3 | 3 | 6 | 8 | |
| 21 | 1307 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 22 | 1308 | 2 | 1 | 1 | 3 | 3 | 4 | 3 | 3 | 3 | |
| 23 | 1309 | 2 | 1 | 1 | 3 | 3 | 5 | 5 | 6 | 6 | |
| 24 | 1310 | 2 | 1 | 1 | 3 | 3 | 5 | 3 | 3 | 6 | |
| 25 | 1311 | 2 | 1 | 1 | 1 | 1 | 3 | 6 | 7 | 7 | |
| 26 | 1312 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 27 | 1313 | 3 | 2 | 1 | 1 | 1 | 3 | 6 | 7 | 7 | |
| 28 | 1314 | 2 | 1 | 1 | 1 | 1 | 3 | 6 | 7 | 7 | |
| 30 | 1500 | 3 | 2 | 1 | 3 | 4 | 4 | 3 | 3 | 3 | |
| 31 | 1502 | 3 | 2 | 1 | 3 | 3 | 3 | 3 | 6 | 8 | |
| 32 | 1503 | 3 | 2 | 1 | 3 | 3 | 5 | 3 | 3 | 3 | |
| 36 | 1600 | 3 | 2 | 1 | 3 | 3 | 5 | 5 | 5 | 6 | |
| 37 | 1602 | 3 | 2 | 1 | 3 | 4 | 4 | 4 | 4 | 3 | |
| 38 | 1603 | 3 | 2 | 1 | 3 | 4 | 4 | 3 | 3 | 3 | |
| 39 | 1604 | 2 | 1 | 1 | 3 | 4 | 4 | 4 | 3 | 3 | |
| 40 | 1605 | 3 | 2 | 1 | 3 | 3 | 5 | 3 | 6 | 6 | |
| 41 | 1606 | 2 | 1 | 1 | 3 | 3 | 5 | 5 | 5 | 5 | |
| 42 | 1607 | 3 | 2 | 1 | 3 | 3 | 5 | 5 | 5 | 5 | |
| 43 | 1700 | 1 | 5 | 1 | 3 | 3 | 3 | 6 | 6 | 8 | |
| 44 | 1702 | 1 | 5 | 1 | 3 | 4 | 4 | 4 | 4 | 4 | |
| 45 | 1704 | 1 | 5 | 1 | 3 | 3 | 5 | 3 | 3 | 3 | |
| 46 | 1705 | 1 | 5 | 1 | 3 | 3 | 5 | 3 | 3 | 3 | |
| 47 | 1706 | 1 | 5 | 1 | 1 | 1 | 3 | 6 | 7 | 8 | |
| 49 | 1708 | 1 | 5 | 1 | 3 | 3 | 5 | 3 | 3 | 3 | |
| 50 | 1709 | 1 | 5 | 1 | 3 | 3 | 5 | 3 | 6 | 6 | |
| 51 | 1710 | 1 | 5 | 1 | 3 | 4 | 4 | 3 | 3 | 3 | |
| 53 | 1712 | 1 | 5 | 1 | 3 | 3 | 5 | 3 | 3 | 3 | |
| 73 | 2204 | 3 | 2 | 1 | 1 | 1 | 3 | 6 | 7 | 7 | |
| 95 | 2400 | 2 | 1 | 1 | 3 | 3 | 3 | 6 | 6 | 8 | |
| 96 | 2402 | 3 | 2 | 1 | 3 | 3 | 5 | 5 | 5 | 6 | |
| 97 | 2403 | 5 | 6 | 1 | 1 | 1 | 3 | 6 | 7 | 7 | |
| 98 | 2404 | 5 | 6 | 1 | 3 | 4 | 4 | 4 | 4 | 4 | |
| 99 | 2405 | 5 | 6 | 1 | 3 | 4 | 4 | 4 | 4 | 3 | |
| 100 | 2406 | 5 | 6 | 1 | 3 | 3 | 5 | 3 | 3 | 6 | |
| 114 | 2700 | 1 | 3 | 1 | 1 | 1 | 3 | 6 | 7 | 7 | |
| 115 | 2701 | 3 | 2 | 1 | 3 | 3 | 3 | 6 | 6 | 8 | |
| 116 | 2702 | 4 | 4 | 1 | 3 | 3 | 5 | 3 | 3 | 3 | |
| 117 | 2703 | 1 | 3 | 1 | 3 | 4 | 4 | 3 | 3 | 3 | |

| NO. | Label (ASJC) | Modularity clustering | | k-means clustering | | | | | | | |
|-----|-----------------|--------------------------|-----------|--------------------|----------|----------|----------|----------|----------|----------|--|
| | | cluster_5 | cluster_6 | center_2 | center_3 | center_4 | center_5 | center_6 | center_7 | center_8 | |
| 118 | 2705 | 2 | 1 | 1 | 1 | 1 | 3 | 6 | 7 | 8 | |
| 119 | 2706 | 1 | 3 | 1 | 3 | 4 | 4 | 4 | 4 | 4 | |
| 120 | 2707 | 3 | 2 | 1 | 3 | 4 | 4 | 3 | 3 | 3 | |
| 121 | 2708 | 3 | 2 | 1 | 3 | 4 | 3 | 6 | 6 | 8 | |
| 122 | 2711 | 1 | 3 | 1 | 3 | 3 | 5 | 3 | 3 | 6 | |
| 123 | 2712 | 2 | 1 | 1 | 3 | 3 | 3 | 6 | 6 | 8 | |
| 124 | 2713 | 1 | 3 | 1 | 3 | 1 | 3 | 6 | 6 | 8 | |
| 125 | 2714 | 1 | 3 | 1 | 3 | 3 | 5 | 5 | 5 | 6 | |
| 126 | 2715 | 2 | 1 | 1 | 3 | 4 | 4 | 4 | 3 | 3 | |
| 127 | 2716 | 2 | 1 | 1 | 3 | 4 | 3 | 6 | 6 | 8 | |
| 128 | 2717 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | |
| 129 | 2718 | 1 | 3 | 1 | 3 | 4 | 3 | 3 | 6 | 8 | |
| 130 | 2719 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 131 | 2720 | 2 | 1 | 1 | 3 | 4 | 4 | 3 | 3 | 3 | |
| 132 | 2721 | 2 | 1 | 1 | 3 | 4 | 4 | 4 | 3 | 3 | |
| 133 | 2722 | 3 | 2 | 1 | 3 | 4 | 4 | 4 | 4 | 4 | |
| 134 | 2723 | 5 | 6 | 1 | 3 | 3 | 3 | 6 | 6 | 8 | |
| 135 | 2724 | 1 | 3 | 1 | 3 | 4 | 4 | 4 | 3 | 3 | |
| 136 | 2725 | 5 | 6 | 1 | 3 | 3 | 3 | 6 | 6 | 8 | |
| 137 | 2726 | 5 | 6 | 1 | 3 | 3 | 5 | 5 | 5 | 5 | |
| 138 | 2727 | 2 | 1 | 1 | 3 | 3 | 5 | 3 | 6 | 6 | |
| 139 | 2728 | 4 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 140 | 2729 | 2 | 1 | 1 | 3 | 3 | 5 | 3 | 5 | 6 | |
| 141 | 2730 | 2 | 1 | 1 | 3 | 3 | 3 | 3 | 6 | 8 | |
| 142 | 2731 | 4 | 4 | 1 | 3 | 3 | 5 | 5 | 5 | 6 | |
| 143 | 2732 | 1 | 5 | 1 | 3 | 3 | 5 | 5 | 5 | 6 | |
| 144 | 2733 | 4 | 4 | 1 | 3 | 3 | 5 | 5 | 5 | 5 | |
| 145 | 2734 | 3 | 2 | 1 | 3 | 4 | 4 | 4 | 3 | 3 | |
| 146 | 2735 | 1 | 3 | 1 | 3 | 4 | 4 | 4 | 4 | 4 | |
| 147 | 2736 | 3 | 2 | 1 | 1 | 1 | 3 | 6 | 7 | 7 | |
| 148 | 2737 | 2 | 1 | 1 | 3 | 3 | 3 | 6 | 6 | 8 | |
| 149 | 2738 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 150 | 2739 | 1 | 3 | 1 | 1 | 1 | 3 | 6 | 7 | 7 | |
| 151 | 2740 | 5 | 6 | 1 | 3 | 3 | 5 | 3 | 3 | 3 | |
| 152 | 2741 | 4 | 4 | 1 | 3 | 3 | 3 | 6 | 6 | 8 | |
| 153 | 2742 | 1 | 5 | 1 | 3 | 3 | 5 | 3 | 6 | 6 | |
| 154 | 2743 | 2 | 1 | 1 | 3 | 3 | 5 | 5 | 5 | 5 | |
| 155 | 2745 | 5 | 6 | 1 | 3 | 4 | 4 | 4 | 3 | 3 | |
| 156 | 2746 | 1 | 3 | 1 | 3 | 3 | 5 | 3 | 3 | 6 | |
| 157 | 2747 | 5 | 6 | 1 | 3 | 3 | 5 | 3 | 3 | 6 | |
| 158 | 2748 | 2 | 1 | 1 | 3 | 3 | 5 | 3 | 3 | 6 | |
| 159 | 2800 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | |
| 161 | 2802 | 4 | 4 | 1 | 3 | 3 | 5 | 3 | 3 | 6 | |
| 162 | 2803 | 1 | 3 | 1 | 3 | 3 | 5 | 5 | 5 | 5 | |

| NO. | Label (ASJC) | Modularity clustering | | k-means clustering | | | | | | | |
|-----|--------------|-----------------------|-----------|--------------------|----------|----------|----------|----------|----------|----------|--|
| | | cluster_5 | cluster_6 | center_2 | center_3 | center_4 | center_5 | center_6 | center_7 | center_8 | |
| 163 | 2804 | 4 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 164 | 2805 | 4 | 4 | 1 | 1 | 1 | 3 | 6 | 7 | 8 | |
| 165 | 2806 | 4 | 4 | 1 | 3 | 4 | 4 | 4 | 3 | 3 | |
| 167 | 2808 | 4 | 4 | 2 | 1 | 1 | 1 | 1 | 7 | 7 | |
| 168 | 2809 | 4 | 4 | 1 | 3 | 3 | 5 | 5 | 5 | 6 | |
| 169 | 2900 | 1 | 3 | 1 | 3 | 3 | 3 | 6 | 6 | 8 | |
| 170 | 2902 | 1 | 3 | 1 | 3 | 3 | 5 | 3 | 5 | 6 | |
| 171 | 2905 | 1 | 3 | 1 | 3 | 4 | 4 | 4 | 4 | 3 | |
| 172 | 2906 | 1 | 3 | 1 | 3 | 4 | 4 | 3 | 3 | 3 | |
| 173 | 2907 | 1 | 3 | 1 | 3 | 3 | 5 | 5 | 5 | 5 | |
| 174 | 2909 | 1 | 3 | 1 | 1 | 1 | 3 | 6 | 7 | 7 | |
| 175 | 2910 | 1 | 3 | 1 | 3 | 4 | 4 | 4 | 4 | 4 | |
| 176 | 2911 | 1 | 3 | 1 | 3 | 3 | 5 | 5 | 5 | 5 | |
| 177 | 2912 | 4 | 4 | 1 | 3 | 4 | 4 | 4 | 4 | 4 | |
| 178 | 2914 | 1 | 3 | 1 | 3 | 3 | 5 | 5 | 5 | 5 | |
| 179 | 2916 | 3 | 2 | 1 | 3 | 3 | 3 | 6 | 6 | 8 | |
| 180 | 2917 | 2 | 3 | 1 | 3 | 4 | 4 | 4 | 3 | 3 | |
| 182 | 2921 | 1 | 3 | 1 | 3 | 3 | 5 | 3 | 3 | 6 | |
| 183 | 3000 | 3 | 2 | 1 | 3 | 4 | 4 | 4 | 3 | 3 | |
| 184 | 3001 | 4 | 4 | 1 | 3 | 4 | 4 | 4 | 4 | 4 | |
| 185 | 3002 | 3 | 2 | 1 | 3 | 3 | 3 | 6 | 6 | 8 | |
| 186 | 3003 | 3 | 2 | 1 | 3 | 3 | 3 | 6 | 6 | 8 | |
| 187 | 3004 | 3 | 2 | 1 | 1 | 1 | 3 | 6 | 7 | 7 | |
| 188 | 3005 | 4 | 4 | 1 | 3 | 3 | 5 | 3 | 3 | 3 | |
| 204 | 3601 | 3 | 2 | 1 | 3 | 3 | 5 | 5 | 5 | 5 | |
| 206 | 3611 | 1 | 3 | 1 | 3 | 4 | 4 | 4 | 3 | 3 | |
| 207 | 3612 | 1 | 5 | 1 | 3 | 3 | 5 | 3 | 6 | 6 | |
| 208 | 3614 | 4 | 4 | 1 | 3 | 3 | 5 | 5 | 5 | 6 | |
| 209 | 3616 | 4 | 4 | 1 | 3 | 3 | 5 | 3 | 3 | 6 | |

Table S2. Cellular and molecular mechanisms of aging (Cluster 1)

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|--|--|---|------------|------------|-----------------------|
| USA | University of Pennsylvania | Consortium for Alzheimer's sequence analysis casa | 12,639 | 2014-06-15 | 2019-05-31 | 1311;2716;1312 |
| USA | University of California San Diego | Neurocognitive aging, MCI, and Alzheimer's disease DNA methylation among diverse Latinos | 6,630 | 2019-03-15 | 2024-02-29 | 1302 |
| USA | California Pacific Med Ctr Res Institute | Study of muscle mobility and aging (somma) | 6,138 | 2018-06-15 | 2023-05-31 | 1302 |

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|--|---|---|------------|------------|-----------------------|
| USA | University of California Davis | Vascular inflammation and exosomes as mediators in aging and dementia | 2,992 | 2018-03-15 | 2023-02-28 | 1302;1307;1312 |
| USA | Henry Ford Health System | Glymphatic and cognitive impairment of aging and diabetes | 2,859 | 2017-09-15 | 2022-06-30 | 1302 |
| USA | The Johns Hopkins University | Mechanisms of synaptic aging mediating cognitive and behavioral symptoms of ad | 2,046 | 2017-05-01 | 2022-04-30 | 1302 |
| USA | Stanford University | Regulation of immune cell metabolism in aging and Alzheimer's disease role of the kynurenine pathway | 2,043 | 2017-09-15 | 2022-06-30 | 1307;1302 |
| USA | University of Arizona | Thymic and peripheral aspects of t cell aging and rejuvenation | 1,987 | 2017-09-15 | 2022-05-31 | 1302 |
| USA | Tulane University of Louisiana | Mentoring research excellence in aging and regenerative medicine | 2,136 | 2012-08-01 | 2017-05-31 | 1302;2308 |
| EU | Institut National De La Sante Et De La Recherche Medicale (Inserm) | Heart omics in ageing | 20,026 | 2013-02-01 | 2019-01-31 | 2705 |
| EU | Eberhard Karls Universitaet Tuebingen | Integrated European omics research project for diagnosis and therapy in rare neuromuscular and neurodegenerative diseases | 19,088 | 2012-10-01 | 2017-09-30 | 1303;1311;1312 |
| EU | Karolinska Institutet | Health and the understanding of metabolism aging and nutrition | 18,306 | 2013-10-01 | 2018-09-30 | 1311;2716;1307 |
| EU | Universitätsklinikum Heidelberg | Biomarker research alliance for diagnosing heart disease in the ageing European population | 17,205 | 2013-02-01 | 2017-01-31 | 2705 |
| EU | Institut National De La Sante Et De La Recherche Medicale | Well aging and the tancytic control of health | 11,179 | 2019-03-01 | 2025-02-28 | 1312;1314;1300 |
| UK | University of Oxford | UKDP: integrated dementia research environment idea (IDEA) | 8,975 | 2015-04-01 | 2015-08-14 | 1300;1100 |
| UK | University of Birmingham | Centre for musculoskeletal ageing research | 2,584 | 2012-08-01 | 2017-09-30 | 1314 |

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|--|---|---|------------|------------|-----------------------|
| UK | University of Leicester | Telomere length measurement in UK biobank: advancing understanding of biological ageing and age-related diseases | 2,720 | 2015-04-15 | 2020-04-14 | 1300;1000;1100 |
| UK | King's College London | Multiscale analysis of b cell responses in ageing | 2,351 | 2014-05-01 | 2016-04-30 | 1300 |
| UK | University of Manchester | Response to mechanical stress in ageing tissue | 1,514 | 2014-09-22 | 2019-09-21 | 1307;1312;2737 |
| Japan | Kyoto University | Altered function and structure of immune system in ageing and diseases | 1,455 | 2012-06-28 | 2017-03-31 | 1000 |
| Japan | Nagoya University | Brain protein aging and dementia control | 1,436 | 2014-07-10 | 2019-03-31 | 1302 |
| Japan | The University of Tokyo | Elucidation of mechanisms of the development of auditory and balance disorders associated with aging and establishment of the treatment strategy against them | 389 | 2014-04-01 | 2017-03-31 | 1314;1312;1307 |
| Japan | The University of Tokyo | Elucidation of the molecular mechanisms of aging using mice with extended longevity | 376 | 2017-04-01 | 2020-03-31 | 1302;1307 |
| Japan | J. F. Oberlin University | Mechanisms and regulation of socioeconomic disparities in health among the elderly | 280 | 2018-04-01 | 2023-03-31 | 2307 |
| Japan | Keio University | Motor and cognitive function measurement system for prevention of falls in the elderly | 212 | 2013-04-01 | 2016-03-31 | 3105;2208 |
| Japan | Kyoto University | Developing happy aging community by integrated health data | 168 | 2017-07-18 | 2020-03-31 | 1302 |
| Korea | Korea Basic Science Institute | Older animals facilities improve growth and aging research facility environment | 1,845 | 2016-01-01 | 2017-12-31 | 1302 |
| Korea | Gwangju Institute of Science and Technology (GIST) | Biological aging characterization study | 1,289 | 2015-01-01 | 2024-12-31 | 1302 |
| Korea | Korea Research Institute of Bioscience and Biotechnology | Age-related chronic diseases aging corresponding source control technology | 1,463 | 2012-01-01 | 2014-12-31 | 1303;1312 |
| Korea | Gyeongsang National University | Antiaging biomedical science research center | 1,038 | 2015-10-01 | 2022-02-28 | 1302;1307;1312 |

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|--|---|---|------------|------------|-----------------------|
| Korea | Korea Research Institute of Bioscience and Biotechnology | Bio-based materials derived from reverse aging effect aging control core technology development | 692 | 2019-01-01 | 2023-12-31 | 1302 |
| Korea | Yonsei University | Stem cells derived from specific midbrain dopaminergic neurons of Parkinson's disease using cell therapy research commercialization | 576 | 2012-06-01 | 2020-05-31 | 1307;2400 |
| Korea | Korea Research Institute of Bioscience and Biotechnology | Musculoskeletal aging factor discovery and control technology development | 1,271 | 2015-01-01 | 2018-12-31 | 1302;1312 |

※ Research field: 1311- Genetics; 1302-Aging; 1307-Cell Biology; 2705-Cardiology and Cardiovascular Medicine; 1303-Biochemistry; 1311-Genetics; 1312-Molecular Biology; 1300-General Biochemistry, Genetics and Molecular Biology; 1314-Physiology; 1000-Multidisciplinary; 2307-Health, Toxicology and Mutagenesis; 3105-Instrumentation; 2716-Genetics (clinical); 2308-Management, Monitoring, Policy and Law; 1100-General Agricultural and Biological Sciences; 2208-Electrical and Electronic Engineering; 2400-General Immunology and Microbiology; 2737-Physiology (medical)

Table S3. Anti-aging medicine and substances (Cluster 2).

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|--|---|---|------------|------------|-----------------------|
| USA | Emory University | Open drug discovery center for Alzheimer's disease(Open-AD) | 7,499 | 2019-09-30 | 2024-08-31 | 3002;1313;3004 |
| USA | Indiana Univ-Purdue Univ At Indianapolis | ISUM Alzheimer's disease drug discovery center | 5,774 | 2019-09-30 | 2024-08-31 | 1313;3002 |
| USA | University of California San Diego | A Seamless Phase 2A-B Randomized Double Blind Placebo Controlled Trial to Evaluate the Efficacy and Safety of PQ 912 in Patients with Early Alzheimer's Disease | 5,279 | 2019-04-01 | 2023-06-30 | 2736 |
| USA | Yale University | Fyn inhibition by azd0530 for Alzheimer's disease | 3,794 | 2013-06-18 | 2014-07-31 | 3004 |
| USA | Cognition Therapeutics Inc | Phase 1b first inpatient safety trial for ct1812 a novel Alzheimer's synaptic protection therapeutic | 2,411 | 2016-08-15 | 2018-07-31 | 3004;1313;2736 |
| EU | Newron Sweden Ab | Phase II clinical trial of PDGF-BB for the neurological | 9,152 | 2012-01-01 | 2015-12-31 | 3004 |

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|--|--|---|------------|------------|-----------------------|
| | | regeneration and recovery in Parkinson's disease | | | | |
| EU | Universite Du Luxembourg | Systems medicine of mitochondrial Parkinson's disease | 6,799 | 2015-12-01 | 2019-11-30 | 1313 |
| EU | Institut National De La Recherche Agronomique | Optimised food products for elderly populations | 5,041 | 2013-09-01 | 2017-02-28 | 1106;2916;3601 |
| EU | Biozoon Gmbh | Development of personalised food using rapid manufacturing for the nutrition of elderly consumers | 4,561 | 2012-11-01 | 2015-10-31 | 1106 |
| EU | Netherlands Cancer Institute (Stichting Het Nederlands Kanker Instituut-Antoni Van Leeuwenhoek Ziekenhuis) | Senescence therapy for cancer | 2,809 | 2018-10-01 | 2023-09-30 | 1313;3004 |
| UK | Newcastle University | Centre for ageing and vitality | 3,339 | 2014-07-01 | 2019-06-30 | 2916 |
| UK | Chronos Therapeutics Limited | An integrated nonvertebrate drug discovery platform for neurodegenerative disease | 789 | 2016-03-01 | 2019-02-28 | 3004;2736 |
| UK | University College London | Gene therapy for childhood parkinsonism: dopamine transporter deficiency syndrome | 652 | 2018-07-01 | 2020-12-31 | 1313 |
| UK | Queen Mary, University of London | The mechanics of the collagen fibrillar network in ageing cartilage | 487 | 2017-10-01 | 2020-09-30 | 2204;2502 |
| UK | Cardiff University | Determination of optimal medication to support efficacy of hESC-derived transplants for Parkinson's disease and assessment of side effect risk | 272 | 2017-12-01 | 2019-11-30 | 2736 |
| UK | Sentinel Oncology Limited | Validating a new therapeutic opportunity for the treatment of Alzheimer's disease | 180 | 2017-08-01 | 2018-07-31 | 3004 |
| UK | Myodopa Limited | Myodopa: Treating Parkinsons diease by transducing constant peripheral secretion of l-dopa | 138 | 2017-12-01 | 2019-02-28 | 2736 |
| Japan | The University of Tokyo | Development of a novel antiaging strategy by | 1,819 | 2015-05-29 | 2020-03-31 | 1305 |

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|--|--|---|------------|------------|-----------------------|
| | | elucidating the mechanisms regulating aging through a muscle centric organ network | | | | |
| Japan | Japan Women's University | Association between functional alkaline phosphatase gene expression and aging and/or nutritional factors | 167 | 2012-04-01 | 2016-03-31 | 2916;2701 |
| Japan | Tokyo Metropolitan Geriatric Hospital and Institute of Gerontology | Effect of vitamin c deficiency on the fetal growth and aging | 163 | 2012-04-01 | 2015-03-31 | 2701 |
| Japan | The University of Tokyo | Investigation into functional mechanisms of herbal medicines with attention to sex hormonal effects towards the development of anti-ageing drugs | 161 | 2012-04-01 | 2015-03-31 | 3002;2707 |
| Japan | Institute of Physical and Chemical Research | Development of novel glycan-based drug for cancer, COPD and Alzheimer's disease. | 159 | 2015-04-01 | 2018-03-31 | 3002;3004 |
| Korea | MEDIPOST Co., Ltd. | Allogeneic cord blood-derived Alzheimer's disease and preterm institutions using mesenchymal stem cell dysplasia drug development | 4,230 | 2012-12-18 | 2017-12-17 | 3004;2736 |
| Korea | Dong-A ST | Natural cure Parkinson's disease da9805 us phase completed and foreign technology transfer | 2,018 | 2015-06-01 | 2019-05-31 | 2736;3004 |
| Korea | Korea Food Research Institute | Elderly friendly special purpose foods silver foods development | 1,601 | 2014-01-01 | 2018-12-31 | 1106;2916;3601 |
| Korea | INIST Corporation | Alzheimer's dementia drug development with immune control proteins | 1,778 | 2017-12-01 | 2021-12-31 | 3004;2736;3000 |
| Korea | Korea Research Institute of Bioscience and Biotechnology | Age-related chronic diseases aging corresponding source control technology | 1,463 | 2012-01-01 | 2014-12-31 | 3002 |
| Korea | Korea Research Institute of Bioscience and Biotechnology | Agricultural biological micro-biome based material well-aging innovation development and commercialization | 1,377 | 2019-01-01 | 2023-12-31 | 2200;2207 |
| Korea | Ildong Pharmaceutical Co.,Ltd | Efficacy and safety study in patients with mild Alzheimer's id1201 | 1,296 | 2015-07-20 | 2018-07-19 | 3004;2736;1313 |

※ Research fields: 3002-Drug Discovery; 1313-Molecular Medicine; 2736-Pharmacology (medical); 3004-Pharmacology; 1106-Food Science; 2916-Nutrition and Dietetics; 2204-Biomedical Engineering; 1305-Biotechnology; 2701-Medicine (miscellaneous); 2502-Biomaterials; 2707-Complementary and Alternative Medicine; 3601-Health Professions (miscellaneous); 3000-General Pharmacology, Toxicology and Pharmaceutics

Table S4. Clinical-based research on aging-related diseases, medical services, and policies (Cluster 3)

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Discipline |
|--------|---|---|---|------------|------------|----------------|
| USA | Banner Alzheimer's Institute | Alzheimer's prevention initiative | 15,253 | 2012-05-18 | 2017-04-30 | 2719;2738;2713 |
| USA | Kaiser Foundation Research Institute | Life course health cerebral pathology and ethnic disparities in dementia | 13,079 | 2016-06-01 | 2021-05-31 | 2717;2738 |
| USA | University of California Davis | Epidemiology of age-related dementia, mild cognitive impairment, and brain pathology in a multiethnic cohort of oldest-old | 12,173 | 2017-09-15 | 2022-06-30 | 2717;2738 |
| USA | Washington University | Dominantly inherited Alzheimer's network trials unit adaptive prevention trial | 5,313 | 2014-08-01 | 2020-12-31 | 2717;2738 |
| USA | University of Southern California | Global Alzheimer's platform trial-ready cohort for preclinical/prodromal Alzheimer's disease | 4,985 | 2017-05-01 | 2022-04-30 | 2713;2738;2719 |
| USA | University of Michigan At Ann Arbor | Rehabilitation research and training center (RRTC) on promoting healthy aging for people with long-term physical Disabilities | 4,375 | 2018-09-30 | 2023-09-29 | 2717;2909 |
| EU | Universitaet Zuerich | VitaminD3-omega3-home exercise-healthy aging and longevity trial (DO-HEALTH), | 14,807 | 2012-01-01 | 2017-06-30 | 2700;2719;2739 |
| EU | The Foundation for Medical Research infrastructural Development And Health Services Next To The Medical Center Tel Aviv | Virtual reality treadmill combined intervention for enhancing mobility and reducing falls in the elderly | 8,473 | 2012-01-01 | 2015-12-31 | 2717 |
| EU | Karolinska Institutet | Stress and the aging brain the interplay between genetic susceptibility aging and psychosocial stress on early symptoms of dementia | 154 | 2012-05-01 | 2013-10-31 | 2717;2738 |

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Discipline |
|--------|--|--|---|------------|------------|----------------|
| EU | Bar Ilan University | Discovery of drugs for the treatment and prevention of Alzheimer's disease | 113 | 2012-08-01 | 2016-07-31 | 2738 |
| EU | Migal Galilee Research Institute Ltd | Centre of excellence for research on environment health and aging | 6,151 | 2012-10-01 | 2016-03-31 | 2308 |
| UK | Bangor University | Living well with dementia | 5,462 | 2014-01-01 | 2015-02-28 | 2717;2738;2909 |
| UK | University of Manchester | Neighbourhoods and dementia a mixed methods study | 5,387 | 2014-05-01 | 2019-10-31 | 2717;2719;2909 |
| UK | University College London | The apple tree programme active prevention in people at risk of dementia through lifestyle behaviour change and technology to build resilience | 5,114 | 2019-01-01 | 2023-12-31 | 2717;2738;2719 |
| UK | University of Sussex | Determinants of quality of life, care and costs, and consequences of inequalities in people with dementia and their carers (DETERMIND) | 4,986 | 2019-01-01 | 2023-12-31 | 2717;2909;2900 |
| UK | University College London | Empowering better end of life dementia care | 4,897 | 2019-01-01 | 2023-12-31 | 2900;2717;2719 |
| Japan | Kyoto University | Novel preventive strategy for Alzheimer's disease based on the toxic conformation theory of amyloid beta | 1,496 | 2014-05-30 | 2019-03-31 | 2717 |
| Japan | Kyoto University | Lifestyle and brain function inquiry in psychological science into successful aging | 1,204 | 2016-05-31 | 2021-03-31 | 2909;2717 |
| Japan | Kyoto Gakuen University | Formulation and evaluation of physical activity criteria for the prevention of sarcopenia/long-term care applicable to a wide range of elderly | 432 | 2012-04-01 | 2016-03-31 | 2739;2900 |
| Japan | National Center For Geriatrics And Gerontology | Development of risk detection system at the early stage of dementia using brain MRI and construction of brain MRI databank in the older adults | 414 | 2019-04-01 | 2022-03-31 | 2717;2909;2900 |
| Japan | Saitama University | Techno-sociological research on systems for supporting the daily lives and co-presence of the elderly and migrants with their hometowns | 413 | 2019-04-01 | 2023-03-31 | 2717 |

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Discipline |
|--------|---|---|---|------------|------------|----------------|
| Japan | Kobe University | Assisting self care and mutual aid of elderly people with dementia at home based on mind externalization | 412 | 2019-04-01 | 2023-03-31 | 2717;2909;2900 |
| Japan | Nagoya Institute of Technology | A cross-sectional study on disease and regional diversity of cognitive impairment in elderly using speech analysis and cerebral blood flow activation | 412 | 2019-04-01 | 2024-03-31 | 2717 |
| Japan | Kyoto Institute of Technology | The system for sharing the memory between elderly and care staffs to build a desirable human relationship | 394 | 2015-04-01 | 2018-03-31 | 2717;2909 |
| Korea | Korea Basic Science Institute | Older animals facilities improve growth and aging research facility environment | 1,845 | 2016-01-01 | 2017-12-31 | 2717;2909 |
| Korea | Korea Institute of Science and Technology | The elderly disabled target daily disability prevention and overcoming technological development | 2,117 | 2019-01-01 | 2027-04-30 | 3105 |
| Korea | Ewha Womans University | Development of robot technology for the enhancement of cognitive function and emotional behavior stable mild cognitive impairment and dementia | 1,619 | 2016-05-01 | 2020-04-30 | 2738;2719;2717 |
| Korea | Electronics and Telecommunications Research Institute | Noncontact screening of dementia and cognitive sensory function enhancement technology content | 1,304 | 2019-04-01 | 2021-12-31 | 2738 |
| Korea | Asan Medical Center | Clinical dementia rating networking | 1,080 | 2012-11-01 | 2018-10-31 | 2738 |

※ Research field: 2719-Health Policy; 2717-Geriatrics and Gerontology; 2713-Epidemiology; 2700-General Medicine; 2738-Psychiatry and Mental Health; 2308-Management, Monitoring, Policy and Law; 2900-General Nursing; 2909-Gerontology; 2739-Public Health, Environmental and Occupational Health; 3105-Instrumentation

Table S5. Aging-related impairment of the brain and cognition (Cluster 4)

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|------------------------------|---|---|------------|------------|-----------------------|
| USA | Banner Alzheimer's Institute | Alzheimer's prevention initiative apoe4 trial | 33,260 | 2013-09-20 | 2018-06-30 | 2728 |

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|--|--|---|------------|------------|-----------------------|
| USA | Kaiser Foundation Research Institute | Life course health cerebral pathology and ethnic disparities in dementia | 13,079 | 2016-06-01 | 2021-05-31 | 2800 |
| USA | Mayo Clinic | Prevention of Alzheimer's disease in women: risks and benefits of hormone therapy | 10,639 | 2017-09-15 | 2022-06-30 | 2800 |
| USA | University of Southern California | Combination anti-amyloid therapy for preclinical Alzheimer's disease | 9,022 | 2018-09-30 | 2023-05-31 | 2800 |
| USA | University of Arizona | Allopregnanolone as regenerative therapeutic for Alzheimer's phase clinical trial | 8,411 | 2019-08-15 | 2024-04-30 | 2800;2808 |
| USA | Indiana Univ-Purdue Univ At Indianapolis | Early onset Alzheimer's disease consortium | 7,654 | 2017-09-15 | 2018-08-31 | 2800;2808 |
| EU | Stichting VUmc | Amyloid imaging to prevent Alzheimer's disease(AMYPAD) | 30,967 | 2016-10-01 | 2021-09-30 | 2800 |
| EU | Westfaelische Wilhelms-Universitaet Muenster | Imaging of neuroinflammation in neurodegenerative diseases | 28,224 | 2012-03-01 | 2017-02-28 | 2808;2728 |
| EU | The Chancellor, Masters And Scholars of The University of Oxford | Inhibiting misfolded protein propagation in neurodegenerative diseases | 12,876 | 2017-03-01 | 2021-02-28 | 2800;2804 |
| EU | Helsingin Yliopisto | Clinical study in Parkinson's disease with two unique goals: 1) Proof-of-concept of CDNF protein for disease modification; 2) Validation of clinically tested device for intracerebral drug delivery | 9,864 | 2017-01-01 | 2019-12-31 | 2728 |
| EU | Institut National De La Sante Et De La Recherche Medicale (Inserm) | Systems biology of pathways involving brain ageing | 9,317 | 2013-01-01 | 2016-12-31 | 2800 |
| EU | Newron Sweden Ab | Phase II clinical trial of PDGF-BB for the neurological regeneration and recovery in Parkinson's disease | 9,152 | 2012-01-01 | 2015-12-31 | 2808;2728 |
| UK | University of Oxford | UKDP integrated dementia research environment idea (IDEA) | 8,975 | 2015-04-01 | 2015-08-14 | 2800 |
| UK | University of Edinburgh | Centre for cognitive ageing amp cognitive epidemiology | 4,014 | 2013-09-01 | 2019-08-31 | 2728 |

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|---|--|---|------------|------------|-----------------------|
| UK | Cardiff University | Further defining the genetic architecture of Alzheimer's disease | 3,606 | 2013-08-29 | 2019-01-31 | 2800 |
| UK | University College London | The UK genetic frontotemporal dementia initiative (GENFI) | 3,441 | 2015-05-01 | 2020-04-30 | 2800 |
| Japan | Kyoto University | Novel preventive strategy for Alzheimer's disease based on the toxic conformation theory of amyloid beta | 1,496 | 2014-05-30 | 2019-03-31 | 2805;2800 |
| Japan | Juntendo University | Development of autophagy enhancing chemicals based on Parkinson's disease pathogenesis | 959 | 2013-06-28 | 2018-03-31 | 2804;2728 |
| Japan | Kyushu University | Epidemiological study of stroke, dementia, and depression based on brain MRI in an elderly population: the Hisayama Study Research Project | 428 | 2013-04-01 | 2016-03-31 | 2808;2728 |
| Japan | Niigata University | Approach to neurodegenerative disorders by elucidation of the excretion pathway of the brain | 414 | 2019-04-01 | 2022-03-31 | 2808;2728 |
| Japan | Juntendo University | Elucidation of the mechanisms of the Parkinson's disease genes and Lewy Body formation and alpha-synuclein propagation mechanisms | 407 | 2018-04-01 | 2021-03-31 | 2728;2804 |
| Japan | Kyoto University | Very early diagnosis of Alzheimer's disease by the toxic oligomer specific antibody of amyloid beta | 407 | 2019-04-01 | 2024-03-31 | 2805;2800 |
| Japan | Okayama University | Investigation of the brain function network of the cognitive memory and development of an early detection system for dementia | 406 | 2013-05-31 | 2017-03-31 | 2728;2808 |
| Korea | Korea Institute of Science and Technology | Older generations predict Alzheimer's early treatments and patient care technology | 4,975 | 2015-12-01 | 2021-11-30 | 2728 |
| Korea | Dong-A ST | Natural cure Parkinson's disease da9805 us phase completed and foreign technology transfer | 2,018 | 2015-06-01 | 2019-05-31 | 2728 |
| Korea | Korea Institute of Science and Technology | Alzheimer's beta amyloid based diagnostic system development | 2,234 | 2013-04-01 | 2016-03-31 | 2800 |

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|---|--|---|------------|------------|-----------------------|
| Korea | Korea Institute of Science and Technology | Older generations predict Alzheimer's early treatments and patient care technology development | 1,593 | 2016-01-01 | 2021-12-31 | 2500;2211;2210 |
| Korea | Electronics and Telecommunications Research Institute | Noncontact screening of dementia and cognitive sensory function enhancement technology content | 1,304 | 2019-04-01 | 2021-12-31 | 2800 |
| Korea | Asan Medical Center | Clinical dementia rating networking | 1,080 | 2012-11-01 | 2018-10-31 | 2728;2800 |

※ Research field: 2728-Neurology (clinical); 2800-General Neuroscience; 2808-Neurology; 2805-Cognitive Neuroscience; 2804-Cellular and Molecular Neuroscience; 2500-General Materials Science; 2210-Mechanical Engineering; 2211-Mechanics of Materials

Table S6. Smart care for older adults (Cluster 5)

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|--|---|---|------------|------------|-----------------------|
| USA | University of Michigan At Ann Arbor | Rehabilitation research and training center (RRTC) on promoting healthy aging for people with long-term physical disabilities | 4,375 | 2018-09-30 | 2023-09-29 | 2742 |
| USA | University of Illinois At Urbana-Champaign | Nri:collaborative research aspire automation supporting prolonged independent residence for the elderly | 1,296 | 2015-09-01 | 2019-08-31 | 1709;1706;2207 |
| USA | University of Pennsylvania | PFI: BIC Affordable and mobile assistive robots for elderly care | 802 | 2014-08-01 | 2018-07-31 | 1700;2207;2200 |
| USA | University of Michigan At Ann Arbor | Factors in aging best practices in archiving and sharing longitudinal data resources on aging | 561 | 2017-09-01 | 2022-03-31 | 1706 |
| USA | Zansors Llc | Wireless sensor and telemedicine to screen for sleep apnea in elderly adults | 746 | 2014-09-04 | 2019-03-31 | 2200 |
| USA | William D Shannon Consulting Llc | Software Platform for Analyzing Alzheimer's and Parkinson's fMRI Connectomes | 552 | 2016-05-15 | 2018-08-31 | 1706 |
| USA | Charles River Analytics Inc | Socially assistive robots for Alzheimer's (SARA) | 535 | 2019-09-15 | 2021-08-31 | 1709 |

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|--|---|---|------------|------------|-----------------------|
| EU | Medtronic Iberica Sa | Activating Innovative IoT smart living environments for ageing well | 29,203 | 2017-01-01 | 2020-06-30 | 1706;1710;3105 |
| EU | Scuola Superiore Di Studi Universitari E Di Perfezionamento S Anna | Pilots for healthy and active ageing | 24,157 | 2019-12-01 | 2023-11-30 | 1710;1706;1700 |
| EU | Charité – Universitätsmedizin Berlin | Personalized recommendations for neurodegenerative disease | 17,015 | 2018-12-01 | 2022-11-30 | 1706;1712 |
| EU | Scuola Superiore Di Studi Universitari E Di Perfezionamento Sant'Anna | Implementation and integration of advanced robotic systems and intelligent environments in real scenarios for the ageing population | 9,567 | 2012-01-01 | 2015-12-31 | 2606;2207;1702 |
| EU | The Foundation For Medical Researchinfrastructural Development And Health Services Next To The Medical Center Tel Aviv | Virtual reality treadmill combined intervention for enhancing mobility and reducing falls in the elderly | 8,473 | 2012-01-01 | 2015-12-31 | 2742;3612 |
| EU | Universita Degli Studi Di Milano | Multiple-actors Virtual Empathic Caregivers for the Elderly | 6,723 | 2017-01-01 | 2019-12-31 | 1705;1706;1712 |
| EU | Politecnico Di Torino | Active aGeIng and Osteoporosis: The next challenge for smarT nanobiOmaterials and 3D technologies | 6,413 | 2019-01-01 | 2023-02-28 | 2732;2500 |
| EU | Ethniko Kentro Erevnas Kai Technologikis Anaptyxis | Virtual physiological and computational neuromuscular models for the predictive treatment of Parkinson's/nDisease | 4,738 | 2014-01-01 | 2016-12-31 | 2611;1712 |
| UK | Heriot-Watt University | Ageing well in urban environments: developing age friendly cities and communities | 471 | 2018-05-15 | 2020-05-14 | 2301 |
| UK | Keele University | Recognition of the ageing face | 310 | 2018-06-25 | 2021-06-24 | 2216;1702 |
| UK | University of Manchester | Urban ageing and social exclusion | 295 | 2016-03-01 | 2020-02-29 | 2105;2301 |
| UK | Gingersnap Studios Limited | Elderberry platform prototype | 284 | 2014-02-01 | 2015-01-31 | 1706;1709 |
| UK | Dolphin Computer Access Limited | Ables accessibility brought to low vision and elderly sectors | 130 | 2013-08-01 | 2014-01-31 | 1705;1706;2208 |

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|---|---|---|------------|------------|-----------------------|
| UK | University of Brighton | Electrochemical sensor for monitoring levels of oxygen and nitrogen reactive species to benefit ageing research | 124 | 2013-09-23 | 2014-09-22 | 3105 |
| Japan | The University of Tokushima | Development of the method of nursing as caring for the elderly by collaborating with humanoid interactive robot | 382 | 2017-04-01 | 2022-03-31 | 1709 |
| Japan | Kyushu University | A study of game design through the development of locomotive syndrome measures game for elderly | 370 | 2013-04-01 | 2016-03-31 | 3612;2732 |
| Japan | Keio University | Motor and cognitive function measurement system for prevention of falls in the elderly | 212 | 2013-04-01 | 2016-03-31 | 3105;2208;1706 |
| Japan | Keio University | Living space supporting solitary elderly who lives by oneself using supporting robot | 156 | 2015-04-01 | 2018-03-31 | 1709;2207;1706 |
| Japan | Shinshu University | Application of robotic wear curara for intractable neurodegenerative diseases | 151 | 2015-04-01 | 2018-03-31 | 2742 |
| Korea | Pusan National University | Infrastructure and product development for the antiaging industry support | 5,719 | 2012-12-01 | 2015-11-30 | 2216;1700;2200 |
| Korea | Korea Institute of Science and Technology | Connected active space cas technology development projects for the elderly life support | 4,188 | 2015-01-01 | 2023-12-31 | 1709;1706;1705 |
| Korea | Electronics and Telecommunications Research Institute | Room environment human care robotic technology to cope with aging society | 5,022 | 2017-04-01 | 2021-12-31 | 1709;1706;2208 |
| Korea | Korea Institute of Construction Technology | Slope surveyed and inspected improving and reinforcing the aging facility corresponding technology | 2,009 | 2019-04-08 | 2021-12-31 | 2205;1909;2208 |
| Korea | Soongsil University | Big databased service robot developed to provide an aging generation of individual specific social services | 994 | 2014-07-01 | 2018-06-30 | 1705;1700;1708 |
| Korea | Neo Crema Ltd | Elderly-friendly customized functional materials developed by local agricultural resources | 1,048 | 2015-05-01 | 2018-04-30 | 2200 |
| Korea | Korea Electronics Technology Institute | Web objects web objects-based self paced smart aging ageing service development | 1,068 | 2015-09-01 | 2018-08-31 | 1710;1700;3105 |

※ Research field: 2742-Rehabilitation; 1709-Human-Computer Interaction; 1700-General Computer Science; 1706-Computer Science Applications; 2200-General Engineering; 1710-Information Systems; 2606-Control and Optimization; 1705-Computer Networks and Communications; 2732-Orthopedics and Sports Medicine; 2611-Modeling and Simulation; 2301-Environmental Science (miscellaneous); 2216-Architecture; 2105-Renewable Energy, Sustainability and the Environment; 3105-Instrumentation; 3612-Physical Therapy, Sports Therapy and Rehabilitation; 2205-Civil and Structural Engineering; 2207-Control and Systems Engineering; 1712-Software; 2500-General Materials Science; 1702-Artificial Intelligence; 2208-Electrical and Electronic Engineering; 1909-Geotechnical Engineering and Engineering Geology; 1708-Hardware and Architecture

Table S7. Aging of the immune system (Cluster 6):

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|--|---|---|------------|------------|-----------------------|
| USA | The Regents of University of California | Establishment to senescence: plant-microbe and microbe-microbe interactions mediate switchgrass sustainability | 7,375 | 2015-08-15 | 2020-08-14 | 2303 |
| USA | Mount Sinai School of Medicine | Systematic drug repurposing targeting immune activation networks in Alzheimer's disease | 4,186 | 2018-07-15 | 2023-06-30 | 2403 |
| USA | Baylor College of Medicine | Interrogating the interferon pathway in aging and Alzheimer's disease | 2,881 | 2018-06-01 | 2023-05-31 | 2403 |
| USA | Agricultural Research Service | Immunity inflammation and nutrition in aging | 1,528 | 2014-10-01 | 2019-09-30 | 2403 |
| USA | Stanford University | Effects of aging on primary and secondary vaccine responses in a 15year longitudinal cohort | 873 | 2017-04-01 | 2022-03-31 | 2403;2723 |
| EU | Universitair Medisch Centrum Utrecht | Vaccines and infectious diseases in the ageing population | 14,081 | 2019-01-01 | 2023-12-31 | 2403;2725 |
| EU | Consiglio Nazionale Delle Ricerche | An integrated approach to dissect determinants risk factors and pathways of ageing of the immune system | 6,629 | 2015-05-01 | 2019-04-30 | 2403 |
| EU | The Babraham Institute | ToWards Immunisations that Last: the Immunology and Gerontology of Helper T cells | 1,700 | 2015-06-01 | 2020-05-31 | 2403;2723 |
| EU | Ecole Polytechnique Federale De Lausanne | Exploring the link between innate immunity and cellular aging | 1,688 | 2019-01-01 | 2023-12-31 | 2403 |
| EU | Kobenhavns Universitet | Age-associated signatures in the composition and proinflammatory status of the gut microbiome in humans and mice and the impact of a periodic fasting intervention to promote healthy aging | 227 | 2016-03-01 | 2018-02-28 | 2404 |

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|--|--|---|------------|------------|-----------------------|
| EU | Centre National De La Recherche Scientifique Cnrs | Control of central nervous system inflammation by meningeal macrophages and its impairment upon aging | 209 | 2019-05-01 | 2021-04-30 | 2403 |
| UK | King's College London | Multi-scale analysis of B cell responses in ageing (MABRA) | 2,351 | 2014-05-01 | 2016-04-30 | 2403;2723 |
| UK | University College London | The integration of human t cell senescence and function at the molecular level | 768 | 2016-10-10 | 2020-04-15 | 2403 |
| UK | Liverpool School of Tropical Medicine | Epidemiological consequences of reproductive senescence in a long-lived vector | 509 | 2017-09-01 | 2020-08-31 | 1109;2405;2725 |
| UK | Babraham Institute | Immunity in health and ageing dissecting the role of the noncanonical autophagy pathway | 480 | 2018-11-05 | 2021-11-04 | 2403;2723 |
| UK | Royal Veterinary College | Immunosenescence in geriatric dogs and impact on vaccination | 132 | 2012-10-01 | 2016-09-30 | 3400 |
| Japan | Kyoto University | Altered function and structure of immune system in ageing and diseases | 1,455 | 2012-06-28 | 2017-03-31 | 2403;2723 |
| Japan | Juntendo University | Development of autophagy enhancing chemicals based on Parkinson's disease pathogenesis | 959 | 2013-06-28 | 2018-03-31 | 2403 |
| Japan | Niigata University | Signalling Mechanism of Autophagy Regulation by Nutrients and Food Components : Its Diversity and Anti-aging | 153 | 2014-04-01 | 2017-03-31 | 2404 |
| Japan | Keio University | Elucidation of molecular basis common to cardiovascular disorders associated with aging and metabolic syndrome | 161 | 2015-04-01 | 2018-03-31 | 2403 |
| Japan | Osaka University | Epidemiological analyses for the impact of bacterial and virus infection to the occurrence of dementia by long-term cohort studies | 400 | 2018-04-01 | 2022-03-31 | 2725;2404 |
| Korea | Korea Research Institute of Bioscience and Biotechnology | Aging immune modulators excavation and immunotherapy technology development | 1,053 | 2015-01-01 | 2018-12-31 | 2403;2723 |
| Korea | Genechem Co., Ltd. | Global functional materials development and commercialization of immune enhancing material sialyl lactose | 647 | 2018-07-01 | 2020-12-31 | 2745 |

| Region | Organization | Project Title | Estimated Average Fund/Year (US\$1,000) | Start Date | End Date | Research field (ASJC) |
|--------|-------------------------|--|---|------------|------------|-----------------------|
| | | to improve the quality of life for an aging society | | | | |
| Korea | Yonsei University | Aging cohort of inflammatory immune mechanism and researchers | 338 | 2019-09-01 | 2022-02-28 | 2723;2403 |
| Korea | Korea University | Geriatric treatment target excavation of severe respiratory inflammation and control research | 270 | 2017-06-30 | 2022-06-29 | 2740;2403;2723 |
| Korea | Heath Balance Co., Ltd. | Grain formula development and commercialization for the elderly nutrition and immune enhancement | 177 | 2014-11-28 | 2016-11-27 | 2209;2200 |

※ Research field: 2303-Ecology; 2403-Immunology; 2404-Microbiology; 1109-Insect Science; 3400-General Veterinary; 2725-Infectious Diseases; 2745-Rheumatology; 2723-Immunology and Allergy; 2740-Pulmonary and Respiratory Medicine; 2209-Industrial and Manufacturing Engineering; 2405-Parasitology; 2200-General Engineering;