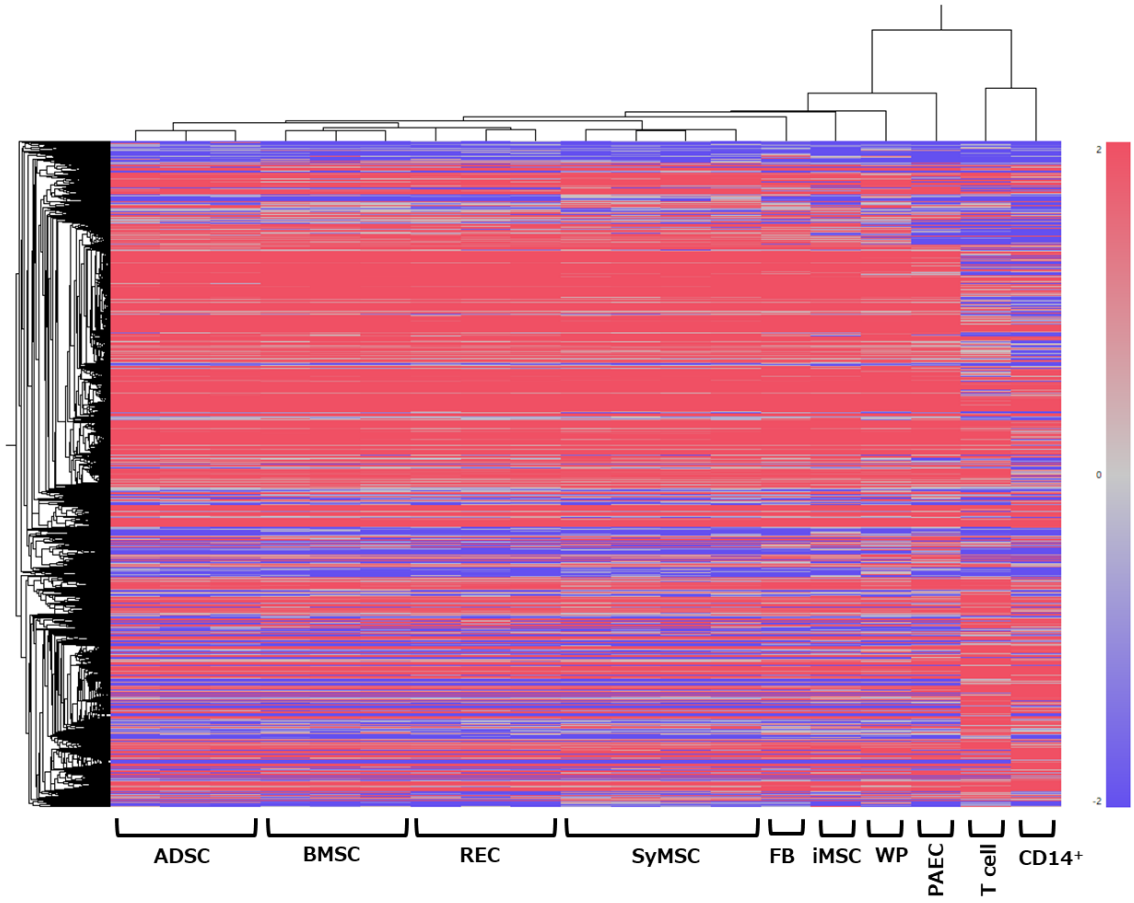
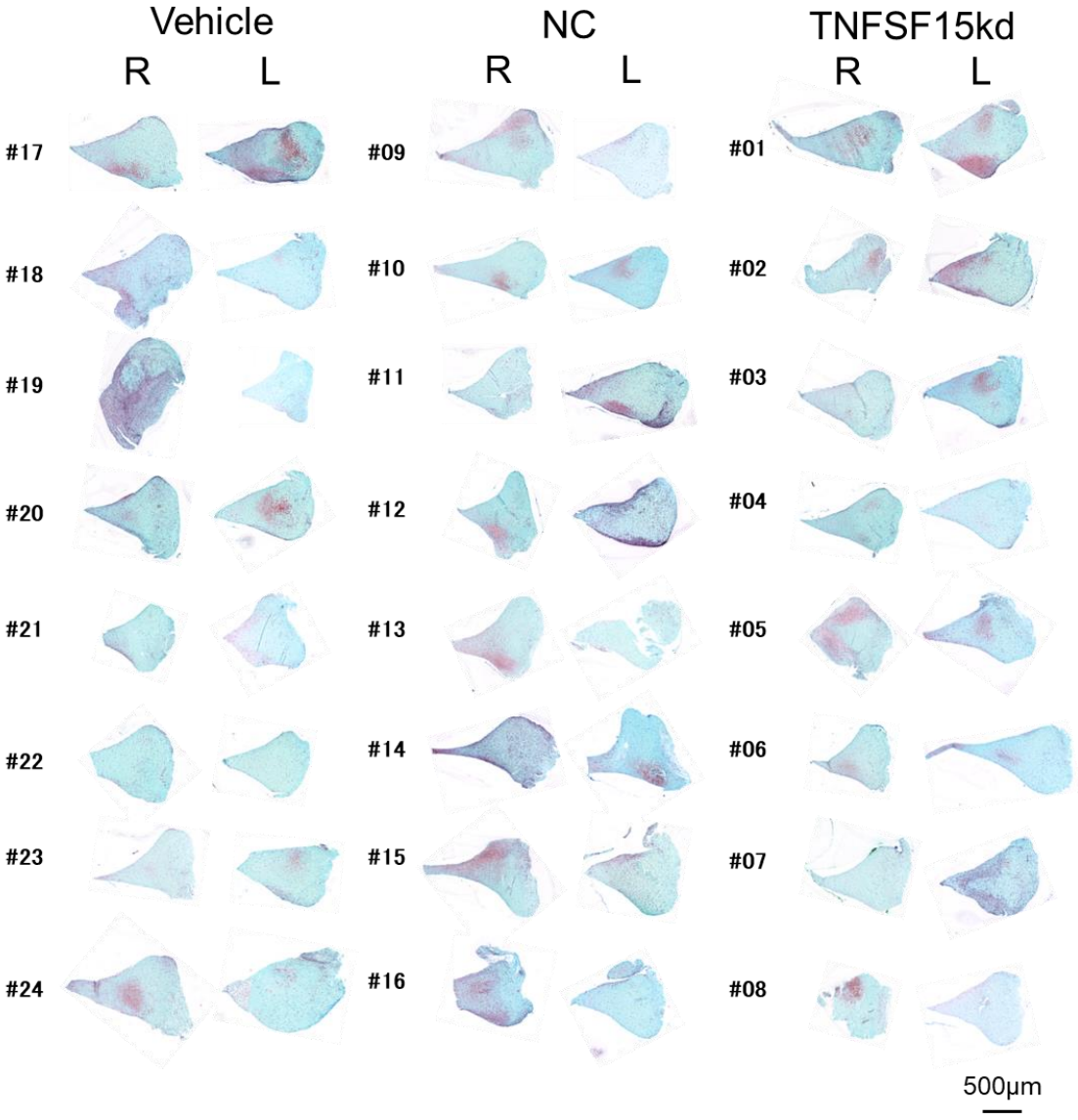
Supplemental Figure S1. Clustering by the expression of 25,193 genes

SyMSCs, ADSCs, BMSCs, RECs, FB, iMSC, WP, PAEC, T cell and $CD14^{+}$ were clustered by the expression of 25,193 genes. iMSC was clustered closer to FB than the tissue-derived native MSCs.



Supplemental Figure S2. Images of the regenerated meniscus in a rat meniscectomy model.




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Supplemental Document S1. Supplemental experimental procedures

Used gene panels and databases for Amp1200 were listed here.

Qiagen,

PAHS-049Z, Osteogenesis PCR Array

PAHS-026Z, Adipogenesis PCR Array

PAHS-052Z, Innate & Adaptive Immune Response PCR Array

PAHS-011Z, Inflammatory Cytokines & Receptors PCR Array

PAHS-3803Z, Inflammatory Response and Autoimmunity 384H

PAHS-024Z, Angiogenesis PCR Array

PAHS-072Z, Angiogenic Growth Factors PCR Array

PAHS-404Z, Neurogenesis PCR Array

PAHS-031Z, Neurotrophin and Receptors PCR Array

PAHS-026Z, Fibrosis PCR Array

PAHS-128Z, Cell Motility PCR Array

PAHS-178Z, Aging PCR Array

PAHS-050Z, Cellular Senescence PCR Array

PAHS-082Z, Mesenchymal Stem Cell PCR Array

PAHS-055Z, Cell Surface Markers PCR Array

PAHS-041Z, Growth Factor PCR Array

PAHS-150Z, Cytokines and Chemokines PCR Array

Thermo Fisher Scientific,

#4414073, TaqMan™ Array Human Immune Response

EPX200-12185-901, Inflammation 20-Plex Human ProcartaPlex™ Panel

#4414071, TaqMan™ Array Human Angiogenesis

#4414094, TaqMan™ Array Human Neurotransmitters

#4418778, TaqMan™ Array, Human Extracellular Matrix & Adhesion Molecules

Illumina,

#20019169, AmpliSeq for Illumina Immune Response Panel

#20020496, AmpliSeq for Illumina RNA Inflammation Response Research Panel

BIO-RAD,

#171AL001M, Bio-Plex Pro™ Human Inflammation Panel 1, 37-Plex

#12007283, Bio-Plex Pro™ Human Cytokine Screening Panel, 48-Plex

Ontology database (http://www.informatics.jax.org/vocab/gene_ontology/)

Osteogenesis (GO:0001503), adipogenesis (GO:0045444), chondrogenesis (GO:0051216), inflammatory response (GO:0006954), angiogenesis (GO:0001525), collagen metabolic process (GO:0032963), fibroblast proliferation (GO:0048144), connective tissue replacement (GO:0097709), fibroblast migration (GO:0010761), negative regulation of cell migration (GO:0030336), positive regulation of cell migration (GO:0030335), regulation of cell migration (GO:0030334), mesenchymal stem cell migration (GO:1905319), nerve development (GO:0021675), cell adhesion mediated by integrin (GO:0033627), negative regulation of cell adhesion (GO:0007162), positive regulation of cell adhesion (GO:0045785), regulation of cell adhesion (GO:0030155), and cell aging (GO:0007569).

The 240 articles used for Amp1200 selection were referred here[1-240].

(Abdallah and Ali, 2019; Abdi et al., 2008; Ahasan et al., 2012; Alajez et al., 2018; Amable et al., 2014; Ankrum et al., 2014; Astori et al., 2007; Atasoy-Zeybek et al., 2019; Augustyniak et al., 2017; Baek et al., 2011; Baksh et al., 2004; Ball et al., 2007; Banno et al., 2016; Bartosh et al., 2010; Bellayr, 2014; Bernardo and Fibbe, 2013; Bilgen et al., 2009; Blaber et al., 2012; Boomsma and Geenen, 2012; Boxall and Jones, 2012; Burand et al., 2020; Casella et al., 2019; Chang et al., 2018; Chen et al., 2019; Chen et al., 2018; Chen et al., 2009; Churchman et al., 2017; Cieslik et al., 2014; De Bari et al., 2008;

De Becker and Riet, 2016; Deuse et al., 2011; Dexheimer et al., 2016; Diaz-Alonso et al., 2016; Djouad et al., 2007; Dong et al., 2019; E et al., 2010; EC et al., 2018; English et al., 2010; Eom et al., 2015; Eskildsen et al., 2011; Eslani et al., 2017; Fabre et al., 2019; Fan et al., 2019; Fan et al., 2020; Foppiani et al., 2019; Fracaro et al., 2020; Fu et al., 2019; Gao et al., 2016; Garcia et al., 2020; Ge et al., 2018; Ge et al., 2016; Gibson et al., 2017; Golchin et al., 2020; Gomez-Aristizabal et al., 2017; Gong et al., 2018; Guerrouahen et al., 2019; Herlofsen et al., 2013; Herlofsen et al., 2011; Hmadcha et al., 2020; Hong et al., 2020; Horita et al., 2006; Horton et al., 2013; Hostettler et al., 2017; Hsu et al., 2018; Hu et al., 2017; Hu et al., 2019; Huang et al., 2020; Huang et al., 2011; Huang et al., 2017; I et al., 2002; Idriss et al., 2018; Ip et al., 2007; Isakova et al., 2007; Islam et al., 2019a; Islam et al., 2019b; Jang et al., 2017; JH et al., 2005; Jia et al., 2019; Jiang and Xu, 2020; Joo et al., 2018; Jung et al., 2019; K and T, 2011; Kalodimou, 2016; Kanawa et al., 2018; Kanawa et al., 2019; Karagianni et al., 2013; Kehl et al., 2019; Khalilifar et al., 2019; Kim et al., 2018; Kim et al., 2012; Kokkalas et al., 2020; Kolar et al., 2017; Kolf et al., 2015; Kot et al., 2019; Kota et al., 2017; Kouroupis et al., 2019; Kulterer et al., 2007; Kuroda and Dezawa, 2014; Kurth et al., 2007; Lamichane et al., 2019; Lee et al., 2019; Lee et al., 2020; Lee et al., 2009; Lee et al., 2014; Lee et al., 2015; Leng et al., 2020; Leuning et al., 2018; Li et al., 2012; Li et al., 2014; Li et al., 2019; Li et al., 2017; Lin et al., 2017; Liu et al., 2019; Liu et al., 2006; Liu et al., 2017; Lo Surdo and Bauer, 2012; Loebel et al., 2015; Lowe et al., 2011; Luo et al., 2019; Lv et al., 2014; Lv et al., 2020; M et al., 2008; Ma et al., 2014; Maacha et al., 2020;

Madrigal et al., 2014; Mao et al., 2018; Marin-Acevedo et al., 2018; Maroni et al., 2017; Marquez-Curtis and Janowska-Wieczorek, 2013; McCully et al., 2018; McHugh and Gil, 2018; Menssen et al., 2011; Mias et al., 2009; Miceli et al., 2019; Mizukami et al., 2019; Mizuno et al., 2018; Mochizuki et al., 2006; Mueller and Tuan, 2008; Mussano et al., 2017; Mwale et al., 2006; Nakagawa et al., 2016; Nakanishi et al., 2011; Nemeth et al., 2009; Neri and Borzi, 2020; Newman et al., 2009; Nishizawa and Seki, 2016; Nitzsche et al., 2017; Noiseux et al., 2012; Oberbauer et al., 2016; Ogata et al., 2015; Oh et al., 2012; Oskowitz et al., 2011; Ozeki et al., 2016; P et al., 2006; P et al., 2011; Pardoll, 2012; Park et al., 2009; Park et al., 2019; Pittenger et al., 2019; Pleumeekers et al., 2018; Poggi and Giuliani, 2016; Pokrovskaya et al., 2020; Pokrywczynska et al., 2020; Ponte et al., 2007; Popov et al., 2011; Prockop and Oh, 2012; Qi et al., 2016; Qiong et al., 2020; Rahbarghazi, 2019; Rakic et al., 2018; Ratushnyy et al., 2020; Reinders and Hoogduijn, 2014; Ren et al., 2008; Ren et al., 2010; Rengasamy et al., 2017; Ribeiro et al., 2019; Riekstina et al., 2009; RK et al., 2000; Roddy et al., 2011; Rogers et al., 2020; Romieu-Mourez et al., 2009; Rossi et al., 2019; Sakaguchi et al., 2005; Salama et al., 2014; Sanchez et al., 2017; Sane et al., 2018; Sasaki et al., 2009; Schallmoser et al., 2010; Schutze et al., 2005; Segers et al., 2006; Sekiya et al., 2012; Shibata et al., 2007; Sofia et al., 2019; Sohni and Verfaillie, 2013; Somaiah et al., 2015; Song et al., 2020; Sordi et al., 2005; Spees et al., 2016; Studle et al., 2019; Sun et al., 2020; Sung et al., 2015; Tao et al., 2016; Tebebi et al., 2017; Teixeira et al., 2017; Terunuma et al., 2019; Tofino-Vian et al., 2018; Tsai et al., 2009; Tucker et al., 2020; Turinetto

et al., 2016; Ullah et al., 2019; Usunier et al., 2014; van Buul et al., 2012; Vanden Berg-Foels, 2014; W et al., 2010; Wagner et al., 2008; Wang et al., 2019; Wang et al., 2018; Watt et al., 2013; Weiss and Dahlke, 2019; Weiss et al., 2006; Wiese et al., 2019; Wu et al., 2018; Wu et al., 2019; Wykes and Lewin, 2018; Xu et al., 2018; Xu et al., 2008; YA et al., 2005; Yagi et al., 2010; Yang et al., 2011; Yang et al., 2018; Yao et al., 2016; Yoshida et al., 2018; Yu and Kang, 2013; Yu et al., 2016; Z and HW, 2019; Zhang et al., 2018; Zhang et al., 2013; Zhou et al., 2008; Zhu et al., 2020; Zwolanek et al., 2015)

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