Fall 11-8-2015

Towards accelerated medical innovation

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Recommended Citation

1. Ankrum JA, Ong JF, Karp JM. Mesenchymal stem cells: immune evasive, not immune privileged. Nature Biotechnology. 2014, Feb 23. 2. O'Cearbhaill ED, Ng KS, Karp JM. Emerging medical devices for minimally invasive cell therapy. Mayo Clin Proc. 2014 Feb;89(2):259-73. 3. A Blood-Resistant Surgical Glue for Minimally Invasive. Repair of Vessels and Heart Defects. Lang, N. Pereira MJ, Lee Y, Friehs I,Vasilyev NV, Feins EN, Ablasser K, O'Cearbhaill E, Xu C, Fabozzo A, Padera R, Wasserman S, Freudenthal F, Ferreira LS, Langer R, Karp JM*, del Nido PJ*. Science Translational Medicine. 2014 Jan 8;6(218):218 4. Engineering cells with intracellular agent-loaded microparticles to control cell phenotype. Ankrum JA, Miranda OR, Ng KS, Sarkar D, Xu C, Karp JM. Nature Protocols. Feb;9(2):233-45. 5. Niche-independent high-purity cultures of Lgr5+ intestinal stem cells and their progeny. Yin X, Farin XF, van Es JH, Clevers H, Langer R, Karp JM. Nature Methods, 2013, Dec 1st. 6. Levy O, Zhao W, Mortensen LJ, Leblanc S, Tsang K, Fu M, Phillips JA, Sagar V, Anandakumaran P, Ngai J, Cui CH, Eimon P, Angel M, Lin CP, Yanik MF*, Karp JM*. mRNA-engineered mesenchymal stem cells for targeted delivery of interleukin-10 to sites of inflammation. Blood. 2013 Aug 26. [Epub ahead of print] 7. Yang SY, O'Cearbhaill ED, Sisk GC, Park KM, Cho WK, Villiger M, Bouma BE, Pomahac B, Karp JM. A bio-inspired swellable microneedle adhesive for mechanical interlocking with tissue. Nature Communications 2013 Apr 16;4:1702 8. Pereira MJ, Ouyang B, Sundback CA , Lang N, Friehs I, Mureli S, Pomerantseva I, McFadden J, Mochel MC, Mwizerwa O, del Nido P, Sarkar D, Masiakos PT,

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This talk will explore platform technologies that are currently being developed in the KarpLab at the Brigham and Women's Hospital, Harvard Medical School, to tackle medical problems. Namely, minimally invasive sealing of tissues and wounds including blood vessels and heart tissue, achieving long term local immunosuppression for treatment of vascularized composite allografts, and engineered stem cell therapy for treatment of diseases such as multiple sclerosis and prostate cancer. Many of the technologies developed in the Karplab harness lessons from nature for inspiration, as evolution represents millions and millions of years of research and development and thus nature truly is the best problem solver (creatures used for inspiration include geckos, spider webs, jellyfish, porcupine quills, snails, and spiny headed worms). This talk will also highlight a new research model for accelerated medical innovation. Some of the technologies that will be described are rapidly advancing to the clinic and some are already on the market helping patients.

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