



Original Article

Congress report: A report of the 16th Congress of the Japanese Society for Regenerative Medicine

Masaaki Kitada*, Mari Dezawa**

Department of Stem Cell Biology and Histology, Tohoku University Graduate School of Medicine, Sendai, Miyagi, 980-8575, Japan

ARTICLE INFO

Article history:

Received 15 December 2017

Accepted 5 January 2018

Keywords:

Congress report

Regenerative medicine

Cell therapy

ABSTRACT

The 16th Congress of the Japanese Society for Regenerative Medicine was held from March 7–9, 2017, at Sendai International Center (Sendai city). The theme of this congress was “the renaissance of regenerative medicine” and it was an opportunity for information exchange between industry-leading researchers, doctors/dentists, and industry professionals. The objectives of the congress were to provide a place to promote and develop research in regenerative medicine. Numerous topics were covered in the 1 presidential lecture, 1 congress chair's lecture, 3 special lectures, the special symposia (2 sessions, 10 topics), symposia (41 sessions, 227 topics), evening symposia (3 sessions, 12 topics), joint symposium with another society (1 session, 4 topics), and presentations covering regular presentations including distinct presentations (oral presentations, 2 sessions, 8 topics), oral presentations (65 sessions, 383 topics), and poster presentations (44 sessions, 339 topics). There were co-organized seminars including 31 sessions for co-organized luncheon seminars, 2 sessions for co-organized evening seminars, and an up-to-date technology introduction corner, which hosted 153 organizations. Additionally, 4 special seminars and 3 hands-on training programs were hosted as part of the hands-on learning program for high school students during the congress. There were 3527 participants, and the event was a great success.

© 2018, The Japanese Society for Regenerative Medicine. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Objectives

We decided on “the renaissance of regenerative medicine” as the theme for this congress. The renaissance was an era during the Middle Ages wherein many cultures developed with rapidly increased prosperity. In addition to fostering cultures, the renaissance period greatly influenced art, ideals, religion, politics, and social movements. Regenerative medicine is now truly in its own renaissance; it is receiving support on an economic, industrial, and governmental level in a way that is truly bringing to bear the initial

seeds in this area of research. This congress was held to provide a forum for people from diverse professional backgrounds to think about what they should and can do to contribute to advances in regenerative medicine through exchange of information among people from many occupations, such as foundational medical researchers, clinical medical researchers, people working in the economic and industrial domains, administrators, and pharmaceutical/equipment manufacturers.

2. Participants

There were 3537 participants, from the following backgrounds: 1635 general members, 249 student members, 1035 non-members (960 general, 75 graduate students), 101 university students/high school students (including 32 participants in the hands-on learning program for high school students), 1 high school leader, 473 invitees, and 15 organizing members. In addition to participants with backgrounds in basic medicine, dentistry, clinical medicine, physicians, and dentists, participants also comprised industrial researchers and those with administrative positions.

* Corresponding author. Department of Stem Cell Biology and Histology, Tohoku University Graduate School of Medicine, 2-1, Seiryō-machi, Aoba-ku, Sendai, Miyagi 980-8575, Japan. Fax: +81 22 717 8030.

** Corresponding author. Department of Stem Cell Biology and Histology, Tohoku University Graduate School of Medicine, 2-1 Seiryō-machi, Aoba-ku, Sendai, Miyagi 980-8575, Japan. Fax: +81 22 717 8030.

E-mail addresses: Masaaki.Kitada@gmail.com (M. Kitada), mdezawa@med.tohoku.ac.jp (M. Dezawa).

Peer review under responsibility of the Japanese Society for Regenerative Medicine.

3. Lectures

One presidential lecture, 1 congress chair's lecture and 3 special lectures were delivered at this event. The president of the Japanese Society for Regenerative Medicine (JSRM), Dr. Yoshiaki Sawa (Osaka University), delivered the presidential lecture entitled, "Goal for universal evolution on regenerative medicine" (Chairperson: Dr. Tsuyoshi Takato (University of Tokyo)). The lecture covered the cooperative drafting of bills for three new acts by the Ministry of Health, Labour and Welfare, the Ministry of Education, Culture, Sports, Science and Technology (MEXT), and the Ministry of Economy, Trade and Industry. These were the "Regenerative Medicine Promotion Act", "Pharmaceuticals and Medical Devices Act", and the "Act on the Safety of Regenerative Medicine" [1–3]. JSRM established the "Standards and basic concepts for biological culture facilities," which formalized the regulations for "JSRM Board Certified Regenerative Medicine Physician/Dentist" and "JSRM Cell Processing Operator", which are meant to guarantee the quality of locations and personnel, in response to the Japanese Society for Regenerative Medicine's call for legislation to provide regulations for the foundational promotion of regenerative medicine in Japan. The initiative by JSRM has also been adopted by the Japan Agency for Medical Research and Development (AMED), meant to "Project to Build Foundation for Promoting Clinical Research of Regenerative Medicine" in the current term, and it has indicated their support for the promotion of regenerative medicine, as a society.

The congress chair's lecture on the topic of "Muse cells as endogenous reparative stem cells; toward generalization of regenerative medicine" was delivered by Dr. Mari Dezawa (Tohoku University), the congress chair of the 16th Congress of the Japanese Society for Regenerative Medicine (Chairperson: Dr. Teruo Okano (Tokyo Women's Medical University)). Muse cells are non-tumorigenic pluripotent stem cells, which were discovered by Dr. Dezawa's research group in 2010 [4–6]. They express a pluripotent stem cell marker SSEA-3 on the surface of the cell membrane and exist in the connective tissue of various organs and circulate in the peripheral blood as well; when tissue damage occurs, they are mobilized from the bone marrow to the peripheral blood, and the cells have receptors for signals released by the damaged tissue, which allows them to home into the damaged tissue. The pluripotency of muse cells allows them to differentiate into tissue-specific cell types after incorporating into the damaged tissue, and contribute to the restoration of tissue function.

The special lectures included the following. Dr. Amit N. Patel (University of Miami, USA) delivered a lecture entitled "Biological synergy for the treatment for advanced heart disease" (Chairperson: Dr. Teruo Okano (Tokyo Women's Medical University)). The lecture encompassed the usefulness of synergistic biological approaches, which he advocated as a new treatment method for advanced heart disease that implement various tissue engineering techniques using stem cell transplants [7]. Dr. Eric N. Olson (UT Southwestern Medical Center, USA) delivered a lecture entitled, "Regenerative strategies for heart and muscle disease" (Chairperson: Dr. Mari Dezawa (Tohoku University)). He discussed the development of new treatment methods for heart disease, using cardiomyocytes induced from fibroblasts through direct reprogramming [8,9], and new treatment methods for Duchenne muscular dystrophy, using CRISPR/Cas9-mediated genome editing [10,11]. Dr. Katarina Le Blanc (Karolinska Institutet, Sweden) delivered a lecture entitled, "Bringing mesenchymal stem cells into the clinic" (Chairperson: Dr. Mari Dezawa (Tohoku University)). The lecture covered the fact that mesenchymal stem cells (MSCs) have immunomodulatory properties, and transplanting them is useful in repairing damaged tissue, but the transplanted cells are only incorporated into the tissue for a limited time; this is because they

undergo an innate immune-attack called an "instant blood-mediated inflammatory reaction (IBMIR)" [12,13]. IBMIRs compromise the survival, engraftment, and function of transplanted cells; however, this problem may be avoided by using MSCs straight after isolating them from the body, or after culturing them for short periods. Based on this, currently doses of low-passage clinical grade MSCs are considered safe, but we should exercise caution with higher cell doses, and particularly higher passage cells that may be used in the future. All of these lectures were well attended; the audience could not fit into one room, so the organizers needed to set up a relay to a separate room to accommodate everyone.

4. Special symposia

Two sessions of special symposia were held. Special symposium 1 was titled, "Challenge to the potential of regenerative medicine." Five lectures were delivered, including one by Dr. Makoto Suematsu, the president of AMED, who discussed the promotion of research in regenerative medicine and the mission of the AMED, and Dr. Tatsuya Kondo, the president of the Pharmaceuticals and Medical Devices Agency (PMDA), who discussed the role of the PMDA based on regenerative medicine products and regulatory science. The organizers of the symposium were Dr. Seiichi Kiso (Life Science Institute Inc., LSII) and Dr. Masaaki Mizuno (Nagoya University Hospital). The title of special symposium 2 was "Current status and future of stem cell treatment on CNS diseases." Five lectures were delivered, including one by Dr. Shinn-Zong Lin (Bio-innovation Center, Tzu Chi Foundation, Taiwan) on the stabilization of motor function in Amyotrophic lateral sclerosis (ALS) model mice and ALS patients, using adipose-derived stem cell transplants [14], and one by Dr. Cesario V. Borlongan (University of Southern Florida Morsani College of Medicine, USA) on 2 methods to suppress neuroinflammation as a secondary injury following traumatic brain injury [15,16]. The symposium organizers were Dr. Teiji Tominaga (Tohoku University), and Dr. Shinn-Zong Lin. Both sessions were especially engaging and successful, and the presenters fielded many questions from the audience.

5. Symposia

Forty-one symposium sessions (227 topics), 3 evening symposium sessions (12 topics), and 1 joint symposium with Japan Research Association for Immunotherapeutics (4 topics) were held. The titles, organizers, and members of these symposia are listed in Table 1. The symposia were vastly interdisciplinary by nature, including sessions on research in regenerative medicine using various stem cells and biomaterials, their clinical applications, tissue engineering, aiming to merge stem cell science and tissue engineering, extremely fundamental regenerative biology and regenerative medicine in animals, administration and the implementation of regenerative medicine from a business point of view, and regenerative medicine education.

6. Regular presentations (distinct presentations, oral presentations, and poster presentations)

The regular presentations comprised 8 distinct presentations carried out in 2 sessions, 383 oral presentations in 65 sessions, and 339 poster presentations in 44 sessions. The regular presentation abstracts were evaluated by the organizing committee and either selected or rejected on the basis of their evaluation. Furthermore, 8 abstracts that were deemed exemplary were presented in 2 distinct presentation sessions, which were separate from the standard oral presentations. The selected distinct presenters were Dr. Ryohei Matsuura (Osaka University), Dr. Kazuya Hashimoto (Kyoto

Table 1
The summary of the symposia.

Session	No. of presentation	Theme	Organizer #1	Organizer #2
Symposium	4	Novel technologies for regenerative medicine brought by the collaboration between different research fields	Kohji Nishida (Osaka University)	Kenichiro Hata (Japan Tissue Engineering Co., Ltd.)
Symposium	7	Current status and future tasks of regenerative medicine with allogenic stem cells	Shuji Terai (Niigata University)	Shigeru Miyagawa (Osaka University)
Symposium	4	Regenerative medicine for overcoming intractable diseases	Akifumi Matsuyama (National Institute of Biomedical Innovation, Health and Nutrition)	Takashi Aoi (Kobe University)
Symposium	5	Manufactured cell products: How to evaluate the tumorigenicity and establish the testing methods for multi-institution study including industrial and governmental institutes	Yoji Sato (National Institute of Health Sciences)	Keiji Yamamoto (Takeda Pharmaceutical Co., Ltd.)
Symposium	5	Promotion of adaptive functions with understanding brain plasticity on body representations	Shin-ichi Izumi (Tohoku University)	Arito Yozu (University of Tokyo)
Symposium	6	3D Bio Printer: Advancement on regenerative medicine	Tsuyoshi Takato (University of Tokyo)	Ung-il Chung (University of Tokyo)
Symposium	7	Evaluation methods for the effects of regenerative therapies on locomotor diseases	Masato Sato (Tokai University)	Taku Saito (University of Tokyo)
Symposium	6	Current status and future tasks for clinical application of the regenerative dentistry	Masahiro Saito (Tohoku University)	Akihiro Umezawa (National Center for Child Health and Development)
Symposium	5	Communication between clinician and society on regenerative medicine -The Program for Developing Models of Risk Communication in Science and Technology by MEXT	Yoshimi Yashiro (Kyoto University)	Hideyuki Okano (Keio University)
Symposium	6	Development and current tasks for the marketing authorization of cellular and tissue-based products in Japan.	Teruo Okano (Tokyo Women's Medical University)	Kazuhiro Takekita (Pharmaceuticals and Medical Devices Agency)
Symposium	5	The renaissance of regenerative medicine: from the view of administrative authorities	Mikimoto Kanazashi (Kanagawa Dental University)	Teruo Kusaka (Ministry of Economy, Trade and Industry)
Symposium	5	Breakthrough in the practical use of somatic stem cells: From the experiences of clinical trials	Tomohiro Morio (Tokyo Medical and Dental University)	Hiroshi Mizuno (Juntendo University)
Symposium	6	Three dimensional tissue/organ models fabricated with the integrative knowledge of tissue engineering and stem cell biology	Shoji Takeuchi (University of Tokyo)	Jun Yamashita (Kyoto University)
Symposium	5	Regenerative medicine for respiratory organs	Koichi Omori (Kyoto University)	Takeshi Nagayasu (Nagasaki University)
Symposium	6	Symposium of consortium for advancement of animal regenerative medicine -Industry-government-academia collaboration for animal regenerative medicine-	Tadayoshi Ueda (DS Pharma Biomedical Co., Ltd.)	Nobuo Sasaki (University of Tokyo)
Symposium	6	Launching and surveying of the Network Consortium to Promote Regenerative Dentistry	Misako Nakashima (National Center for Geriatrics and Gerontology)	Hayato Ohshima (Niigata University)
Symposium	5	Updates on Muse cell researches	Mari Dezawa (Tohoku University)	Shinya Minatoguchi (Gifu University)
Symposium	6	Technical innovation of regenerative medicine for diabetes mellitus	Toshinori Ito (Osaka University)	Masafumi Goto (Tohoku University)
Symposium	5	Research updates and future tasks of regenerative medicine for the periodontal tissue and jaw bone	Masaki Honda (Aichi Gakuin University)	Morikuni Tobita (Juntendo University)
Symposium	4	Application of the stem cell culture supernatant to regenerative medicine	Minoru Ueda (Nagoya University)	Akihito Yamamoto (Tokushima University)
Symposium	6	The challenge from regenerative biology -Novel approaches for regenerative medicine-	Masaaki Kitada (Tohoku University)	Hitoshi Yokoyama (Hirosaki University)
Symposium	7	Designing the guideline of regenerative medicine product development on the promotion project of the Practical Use of Innovative Drugs, Pharmaceutical Medical Devices, and Regenerative Medicine Products	Kiyohiro Houkin (Hokkaido University)	Akihiro Umezawa (National Center for Child Health and Development)
Symposium	5	Regenerative medicine for CNS diseases -tasks from the bench toward clinical trials and practical medicine-	Satoshi Kuroda (University of Toyama)	Masaya Nakamura (Keio University)
Symposium	6	Exosome research and regenerative medicine	Takahiro Ochiya (National Cancer Center)	Akihiro Umezawa (National Center for Child Health and Development)
Symposium	5	Usability of amnion and amnionic cells as a material for regenerative medicine	Toshiko Yoshida (University of Toyama)	Yuichi Hori (Toho University)
Symposium	5	Application of the principle of epithelial tissue repair to regenerative medicine	Kenji Izumi (Niigata University)	Daisuke Nanba (Tokyo Medical and Dental University)
Symposium	6	Genome editing and gene therapy	Yasufumi Kaneda (Osaka University)	Kohnosuke Mitani (Saitama Medical University)
Symposium	6	Cutting edge research on stromal cell and extracellular matrix for functional regenerative tissue development	Katsuhisa Matsuura (Tokyo Women's Medical University)	Kiyotoshi Sekiguchi (Osaka University)
Symposium	6	Advancement of scientific knowledge on the bone quality of natural and regenerated bones	Osamu Suzuki (Tohoku University)	Takayoshi Nakano (Osaka University)

(continued on next page)

Table 1 (continued)

Session	No. of presentation	Theme	Organizer #1	Organizer #2
Symposium	5	Development of human resources that support regenerative medicine in the present and future	Tomohiro Morio (Tokyo Medical and Dental University)	Sachiko Ezoe (Osaka University)
Symposium	5	FGF-2: From the basic to clinical application	Mikimoto Kanazashi (Kanagawa Dental University)	Tomonori Matsuno (The Nippon Dental University)
Symposium	7	Articular cartilage regeneration techniques that are close to clinical application	Shigeyuki Wakitani (Mukogawa Women's University)	Mitsuo Ochi (Hiroshima University)
Symposium	5	Molecular mechanisms of cellular reprogramming and pluripotency acquisition	Takumi Era (Kumamoto University)	Kunimasa Ohta (Osaka University)
Symposium	6	Updates on cell aggregation researches	Koichi Nakayama (Saga University)	Morio Ueno (Kyoto Prefectural University of Medicine)
Symposium	6	In body Tissue Architecture (IBTA) technology: Another strategy for regenerative medicine	Yasuhide Nakayama (National Cerebral and Cardiovascular Center)	Tsuyoshi Takato (University of Tokyo)
Symposium	5	Next generation of the extracellular matrices will open a new window of regenerative medicine	Yoshinori Kuboki (Hokkaido University)	Koichi Morimoto (Kindai University)
Symposium	6	New insights and technologies of regenerative medicine using iPS cells	Keiichi Fukuda (Keio University)	Hideki Taniguchi (Yokohama City University)
Symposium	6	Recent updates on cell culture and preparation technologies	Masahiro Kino-oka (Osaka University)	Yasuyuki Sakai (University of Tokyo)
Symposium	5	Canine iPS cells and adipose-derived stem cells (ASCs): Basic research and clinical application	Masaharu Hisasue (Azabu University)	Nobuo Sasaki (University of Tokyo)
Symposium	5	Education of regenerative medicine at schools: Lay the groundwork for citizens to understand regenerative medicine	Toshiyuki Takizawa (Ibaraki University)	Masahiro Kawakami (Nara Institute of Science and Technology)
Symposium	6	Ethics, legal, social issues in genomic editing of regenerative medicine	Tomohiro Morio (Tokyo Medical and Dental University)	Yoshimi Yashiro (Kyoto University)
Joint Symposium	4	Joint symposium with Japan Research Association for Immunotherapeutics: Novel strategy of immunotherapeutics beyond the breakthrough	Kenzaburo Tani (University of Tokyo)	Tetsuya Nakatsura (National Cancer Center)
Evening Symposium	4	Challenges for 'complete' dermal tissue regeneration	Michiharu Sakamoto (Kyoto University)	Naoki Morimoto (Kansai Medical University)
Evening Symposium	4	Application of dedifferentiated fat (DFAT) cells to regenerative medicine	Taro Matsumoto (Nihon University)	Yoshiaki Sato (Nagoya University)
Evening Symposium	4	AMED Project to Build Foundation for Promoting Clinical Research of Regenerative Medicine -Formulation of regenerative medicine national consortium which renders nation-wide assistance to clinical researches-	Tsuyoshi Takato (University of Tokyo)	Masahiro Kino-oka (Osaka University)

University), Dr. Hiroshi Kanno (International University of Health and Welfare), Dr. Takuya Maeda (Kyoto University), Dr. Kenji Yanishi (Kyoto Prefectural University of Medicine), Dr. Makoto Murata (Nagoya University), Mr. Tatsuo Onishi (MLIP Business Administration and Legal Office), and Dr. Shuichiro Yamanaka (Jikei University). The poster presentations were delivered in a standard presentation format, following the progression of the chairperson through the posters. Oral presentations in all sessions were well attended and received great attention.

7. Co-organized seminars

Thirty-one sessions of co-organized luncheon seminars (52 topics) and 2 sessions of co-organized evening seminars (3 topics) were held. These seminars focused on tissue engineering and cell therapy, as well as large laboratory equipment, and clinical evaluation of experimental drugs.

8. Hands-on learning program for high school students

Four special seminars and 3 hands-on learning programs were held as part of the hands-on learning program for high school students. Special seminars were delivered by Dr. Kiyokazu Agata (Gakusyu-in University) on regenerative medicine, Dr. Tetsuya Inagaki (National Institute of Informatics) and Dr. Shin-ichi Izumi (Tohoku University) on physical sensations and rehabilitation, Dr.

Hideo Shichinohe (Hokkaido University) on cell therapy for use in a clinical setting, and Dr. Mari Dezawa (Tohoku University) on state-of-the-art stem cell/regenerative medicine. These seminars were chaired by Dr. Masaaki Kitada (Tohoku University). Dr. Tadayoshi Ueda (DS Pharma Biomedical Co., Ltd.) led a hands-on learning program on practical cell culture and observing cultured cells. Mr. Hiroki Yamada (National Institute of Informatics) hosted a hands-on experience on the relationship between virtual reality and body representation in the brain. Furthermore, a program on research in regenerative biology using amphibians was hosted cooperatively by the Japanese Community for Next-Generation Amphibian Research and NBRP *Xenopus tropicalis* members. All of these programs were well attended, and the participating high school students were eager to get involved in each program.

9. Up-to-date technology introduction corner

153 organizations presented various new technologies for the up-to-date technology introduction corner. It was a place to promote laboratory equipment and experimental pharmaceuticals used for research in regenerative medicine, as well as large automated equipment and cell transport technology for regenerative medicine in a clinical setting, but also an opportunity to learn about various industries via a consortium of independent organizations and regional municipalities, universities, and businesses. It was

Table 2

The summary of the public program, “Reach the patients! - Recent updates on regenerative medicine”.

Session	Lecturer	Title
Session #1	Yoshiyuki Sankai (Tsukuba University)	Cybernic Revolution: Pioneering the future through medical HAL and regenerative medicine
Session #1	Toshio Nakatani (Ijinka Takeda General Hospital)	Fifteen years experiences of clinical trials for spinal cord injury treatment with bone marrow cells -Feasibility of recovering function of arms and legs-
Session #1	Satoshi Morimoto (Life Science Institute Inc.)	Challenge to the sustainable and accessible regenerative medicine -Potential of Muse cells as the pharmaceutical product-
Session #2	Yoshimi Yashiro (Kyoto University)	Upcoming regenerative medicine: Let's imagine and discuss it by ourselves

held in the same hall as the poster presentations, and included a stamp rally and Sendai specialty desserts. It was quite a success.

10. Public program

We also served the public program at March 6th, 2017; the theme of it was “Reach the patients! - Recent updates on regenerative medicine”, and it consisted of 2 sessions. The lecturers and seminar titles of this program are listed in Table 2. In the first session, 3 lecturers gave a talk regarding the regenerative medicine, which has already been applied to or is going to be applied to the patients. In the second session, one lecturer discussed the ethical aspect of regenerative medicine. The chairpersons in the first and second sessions were Dr. Seichi Kiso (LSII) and Dr. Atsushi Asai (Tohoku University), respectively. There was a large audience, and we received many questions from the participants.

11. Organizer and organizing committee

The congress chair, Prof. Mari Dezawa, and the secretary general, Associate Prof. Masaaki Kitada, work for the Secretariat, at the Department of Stem Cell Biology and Histology, Tohoku University Graduate School of Medicine. The organizing committee comprises the following members (titles omitted). Shin-ichi Izumi (Tohoku University), Tadayoshi Ueda (DS Pharma Biomedical Co., Ltd.), Minoru Ueda (Nagoya University), Mime Egami (Tokyo Women's Medical University), Koichi Omori (Kyoto University), Mikimoto Kanazashi (Kanagawa Dental University), Satoshi Kuroda (University of Toyama), Masato Sato (Tokai University), Tsuyoshi Takato (University of Tokyo), Shuji Terai (Niigata University), Keiichi Fukuda (Keio University), Katsuhisa Matsuura (Tokyo Women's Medical University), Akifumi Matsuyama (National Institute of Biomedical Innovation), Kotaro Yoshimura (Jichi Medical University), Shigeyuki Wakitani (Mukogawa Women's University), Masafumi Goto (Tohoku University), Shohei Wakao (Tohoku University), Yoshihiro Kushida (Tohoku University).

12. Concluding remarks

Over 3500 participants were present at this congress and contributed to its success. We hope that it provided an opportunity for the participants to deepen their understanding of their respective roles in regenerative medicine. We are grateful to the participants, supporting organizations, and members of the organizing committee for their involvement in this event.

Declaration of interest

M.D. is affiliated with the Department of Stem Cell Biology and Histology at Tohoku University Graduate School of Medicine (Sendai, Japan), which is party to a codevelopment agreement with

LSII (Tokyo, Japan). M.D. has a patent for Muse cells and the isolation method thereof licensed to LSII.

Acknowledgements

Authors would like to express sincere thanks to the lab members for preparing and assisting the congress. Especially, authors are grateful to Ms. Yashiro for her excellent assistance for the administration. Authors are also thankful to Mr. Mano and Ms. Kaieda for their contribution in preparing the manuscript.

References

- [1] Konomi K, Tobita M, Kimura K, Sato D. New Japanese initiatives on stem cell therapies. *Cell Stem Cell* 2015;16(4):350–2.
- [2] Hara A, Sato D, Sahara Y. New governmental regulatory system for stem cell-based therapies in Japan. *Ther Innov Regul Sci* 2014;48:681–8.
- [3] Tobita M, Konomi K, Torashima Y, Kimura K, Taoka M, Kaminota M. Japan's challenges of translational regenerative medicine: Act on the safety of regenerative medicine. *Regen Ther* 2016;4:78–81.
- [4] Dezawa M. Muse cells provide the pluripotency of mesenchymal stem cells: direct contribution of muse cells to tissue regeneration. *Cell Transpl* 2016;25(5):849–61.
- [5] Kuroda Y, Kitada M, Wakao S, Nishikawa K, Tanimura Y, Makinoshima H, et al. Unique multipotent cells in adult human mesenchymal cell populations. *Proc Natl Acad Sci USA* 2010;107(19):8639–43.
- [6] Kuroda Y, Wakao S, Kitada M, Murakami T, Nojima M, Dezawa M. Isolation, culture and evaluation of multilineage-differentiating stress-enduring (Muse) cells. *Nat Protoc* 2013;8(7):1391–415.
- [7] Bartolucci J, Verdugo FJ, Gonzalez PL, Larrea RE, Abarzua E, Goset C, et al. Safety and efficacy of the intravenous infusion of umbilical cord mesenchymal stem cells in patients with heart failure: a phase 1/2 randomized controlled trial (RIMECARD trial [randomized clinical trial of intravenous infusion umbilical cord mesenchymal stem cells on cardiopathy]). *Circ Res* 2017;121(10):1192–204.
- [8] Nam YJ, Lubczyk C, Bhakta M, Zang T, Fernandez-Perez A, McAnally J, et al. Induction of diverse cardiac cell types by reprogramming fibroblasts with cardiac transcription factors. *Development* 2014;141(22):4267–78.
- [9] Nam YJ, Song K, Luo X, Daniel E, Lambeth K, West K, et al. Reprogramming of human fibroblasts toward a cardiac fate. *Proc Natl Acad Sci USA* 2013;110(14):5588–93.
- [10] Long C, Amoasii L, Bassel-Duby R, Olson EN. Genome editing of monogenic neuromuscular diseases: a systematic review. *JAMA Neurol* 2016;73(11):1349–55.
- [11] Long C, Amoasii L, Mireault AA, McAnally JR, Li H, Sanchez-Ortiz E, et al. Postnatal genome editing partially restores dystrophin expression in a mouse model of muscular dystrophy. *Science* 2016;351(6271):400–3.
- [12] Moll G, Alm JJ, Davies LC, von Bahr L, Heldring N, Stenbeck-Funke L, et al. Do cryopreserved mesenchymal stromal cells display impaired immunomodulatory and therapeutic properties? *Stem Cells* 2014;32(9):2430–42.
- [13] Moll G, Rasmusson-Duprez I, von Bahr L, Connolly-Andersen AM, Elgue G, Funke L, et al. Are therapeutic human mesenchymal stromal cells compatible with human blood? *Stem Cells* 2012;30(7):1565–74.
- [14] Yeh DC, Chan TM, Harn HJ, Chiou TW, Chen HS, Lin ZS, et al. Adipose tissue-derived stem cells in neural regenerative medicine. *Cell Transpl* 2015;24(3):487–92.
- [15] Mashkouri S, Crowley MG, Liska MG, Corey S, Borlongan CV. Utilizing pharmacotherapy and mesenchymal stem cell therapy to reduce inflammation following traumatic brain injury. *Neural Regen Res* 2016;11(9):1379–84.
- [16] Tajiri N, De La Pena I, Acosta SA, Kaneko Y, Tamir S, Landesman Y, et al. A nuclear attack on traumatic brain injury: sequestration of cell death in the nucleus. *CNS Neurosci Ther* 2016;22(4):306–15.