Stem Cell Reports
Editorial
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# Extraordinary challenge, extraordinary achievement: 2019–2020 year in review

What an extraordinary year this has been for science.

We witnessed an amazing international response for vaccine development to combat COVID-19. Never before has a drug passed so quickly from the bench through regulatory hurdles to bedside. We saw science take center stage in the media as our community rose to the challenge of the pandemic. And, behind the headlines of COVID-19, we watched our colleagues pass major milestones in stem cell research and regenerative medicine.

Emmanuelle Charpentier and Jennifer Doudna were awarded the Nobel Prize in Chemistry and we recognized that their methodology in genome editing will be key in the next phase of cell therapy and clinical application.

At the same time, advances in 3D organ and embryo modeling brought us closer than ever before to replicating development so that we can understand why it goes wrong, model disease, and engage in drug discovery. These emerging technologies now allow us to interrogate cell identity and behavior at a single-cell level in immense detail using innovations in imaging and computational biology.

Just as the year brought transformation in science, it brought transformation to our society. Amid upheaval, we pushed forward and established new ways to communicate your findings to the rest of the world. It was a year of resilience, innovation, and progress that will serve our community well in the years to come.

## ISSCR Guidelines: International standards for excellence

Last month, we released the 2021 update of the ISSCR Guidelines for Stem Cell Research and Clinical Translation. This update—led by Robin Lovell-Badge of the Francis Crick Institute, UK who chaired the ISSCR task force—marks the culmination of nearly two years of international collaboration among experts in stem cell science, ethics, and law. It is arguably the most anticipated Guidelines release in our society's history, again setting the standard for responsible and ethical stem cell research worldwide.

The updated Guidelines provide new recommendations in response to emerging areas of research with great scientific potential. As with previous versions, the 2021 Guidelines update is forward-looking, intending to capture the science now and anticipate advances in the forseale future. The ISSCR Guidelines maintain rigorous review for human stem cell and embryo research and related research activities, and they provide additional clarity and criteria for oversight. This year, we saw rapid advances in stem cell science related to human embryos, embryo models, organoids, chimeras, and chimeric embryos and the development of new therapies that have generated robust conversation among the scientific community, the media, and the public.

The society will open the 2021 Annual Meeting in June with a panel discussion led by members of the Guidelines task force, giving attendees the chance to learn more about the recommendations and rationale behind key changes.

## *Stem Cell Reports:* New media, greater impact

We all learned to communicate differently this year, using new media platforms to disseminate science, and calling on partnerships that collectively make the whole greater than the sum of its parts.

*Stem Cell Reports*, the ISSCR's open-access, online journal, continued to publish high-impact primary research articles, reviews, and perspectives across a breadth of stem cell science—but the way we are sharing content and spurring collaboration is evolving.

One of the most exciting endeavors is a new podcast, The Stem Cell Report with Martin Pera. Each episode goes "beyond the paper" with authors to draw new insights and explore the questions and creativity that propel new breakthroughs. The first episode featured Janet Rossant and Patrick Tam discussing their perspective article, "Opportunities and challenges with stem cell-based embryo models." Each month brings new episodes featuring authors discussing their work. I urge you to subscribe.

In September, *Stem Cell Reports* officially became the "home" journal for EUROoCS member publications that focus on the use and application of stem cells. This alliance helps bridge the bioengineering and stem cell communities to enhance the development of technologies and the sharing and application of discovery, which will ultimately lead to a better understanding of human health and the treatment of disease. The relationship has also led to work on a special issue, Organ-on-Chip and Microphysiological Systems, coming out in 2021 in which Peter Loskill and I serve as guest editors.

Throughout the year, we also featured *Stem Cell Reports* special issue content with the society's new, monthly digital scientific programs, ISSCR Digital. Most recently, the special issue, Stem Cell-based Embryo Models, complements a five-part ISSCR Digital series on the topic we hosted in April and May. *Stem Cell Reports* launched special issues on Chromatin and Nuclear Architecture in December and COVID-19 and Stem Cells in March, in which the scientific programming and journal content is thematically connected.

In addition to special issues throughout the year, in April *Stem Cell Reports* added to its virtual collections with Understanding Fetal and Adult Hematopoiesis with Stem Cells. This issue gathers recently published research from the journal that provides insights into the formation and/or function of HSCs and their progeny and insights into human iPSC-based HSC approaches for potential clinical benefit.

## Year-round scientific programs: Digital transformation, global reach

Beginning in May 2020, the ISSCR began offering weekly COVID-19 networking meetings to share new research and data related to COVID-19, much of it based on human or relevant animal stem cell models. The programs convened more than 800 researchers from 47 countries. It was the genesis of a new programmatic offering, ISSCR Digital, a multi-part webinar series delivering focused scientific content in 90-minute sessions.

The first series launched in October, Applying Organoids: The 3D Frontier, organized by Melissa Little and Toshiro Sato. Since then, the ISSCR has delivered five more: Chromatin, Epigenetics, and Nuclear Architecture in Stem Cells; Computational Stem Cell Biology; Stem Cell-based Embryo Models; Manufacturing, Engineering, and Regulation of Pluripotent Stem Cell-Derived Therapies; and Stem Cells and Global Sustainability, an emerging area of the field. Together, these new programs brough nearly 6,000 scientists together.

Amid the launch of ISSCR Digital, the society also hosted VISION2030: A Forecast for the Field, gathering scientific founders of biotechnology for in-depth interviews reflecting on the past and sharing insights on where the field is heading.

New ISSCR Digital programs are now announced regularly and slated to continue indefinitely. A truly positive change resulting from COVID-19! Registration for upcoming meetings, and on-demand viewing of past programs, is available to members at no charge.

## The ISSCR Annual Meeting: An evolution

The virtual 2021 Annual Meeting is hosted on a new platform designed for ease of use and social interaction. Personalized meeting content is recommended to attendees based on individual interests, poster presenters have access to their own dedicated video chat rooms, and networking and career events occur in real time. Additionally, key sessions will be rebroadcast, with live chat, giving greater access to members in Asia and around the world..

The meeting is organized around five main themes: Tissue Stem Cells and Regeneration, Cellular Identity, Modeling Development and Disease, New Technologies, and Clinical Applications. Theme Sessions (formerly known as Concurrents) and Plenaries will identify with one of these core themes, and each day of the meeting will focus on one or two themes. Overall, the structure makes it easier to find and network with scientists of similar interests.

Brand new this year are three Plenary Roundtables: The Fascination with Gastrulation: The Applications and Ethics of Modeling Early Development; Stem Cell Organoid Models as Empirical Testbeds for Personal Medicine Development—focusing on Cystic Fibrosis; and Engineered Tissues: Challenges to Bring to Clinic. These thought-provoking Plenary Roundtables are designed to generate discussion and input among our community.

For the first time, the ISSCR will host a panel on Equity in Stem Cell Science where leading scientists will discuss how to promote equity in STEM, support scientists from historically underrepresented groups, and identify systemic changes that we can advocate for that will promote diversity, equity, and inclusion in the field of stem cell science. And, our third annual Women in Science will convene female leaders to discuss challenges and successes in transitioning to leadership positions.

Last, but certainly not least, the ISSCR's 2021 scientific award honorees will each deliver a special lecture on different days throughout the program. We will hear from Valentina Greco, Madeline Lancaster, Stuart Orkin, and Janet Rossant about their science now and where it is heading.

## Advocating for science-based policies

Throughout the last year, the ISSCR has bolstered its focus on public policy, consistently reinforcing the need for evidence-based policymaking.



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The ISSCR advocated for the value of fetal tissue research and opposed the blatant imbalance of a newly formed NIH Human Fetal Tissue Ethics Advisory Board. The society led efforts of a coalition of scientific and patient organizations in support of this important research and issued statements urging that the US Department of Health and Human Services (HHS) reject the recommendations of the board. In April, the society applauded the Biden administration for rescinding the restrictive policies regarding fetal tissue research imposed by former President Trump.

Outside the US, the society continues to engage on issues impacting the field. In January, the ISSCR issued a statement on proposed cuts to scientific research in Europe. The ISSCR also issued comments on Hong Kong's Draft Guidance for Cell and Tissue Products as well as the European Medicines Agency's Network Strategy for 2025 and issued comments on WHO genome editing consultation. The society also commented recently on the European Union's blood, cell, and tissue legislation. These activities demonstrate the global commitment of the ISSCR's public policy program.

Internationally, the ISSCR continues work to curb unproven interventions and improve regulation of cellular therapies. This work, in part, has led to the US Food and Drug Administration's recent commitment to increase enforcement. The ISSCR also has urged the European Medicines Agency (EMA) and the US Food and Drug Administration (FDA) to enforce their existing regulation of those clinics. The society's consistent and vocal stance on this topic has been represented as well in media stories that seek to inform the public. The society also has recognized the important role that the EMA and national regulators have with overseeing the development of new products and offered recommendations to ensure that new products are proven safe and effective before being marketed to patients.

Finally, the society took another crucial step forward in our policy program, expanding into regulatory issues to support the field as stem cell discoveries are translated into medicine. As stem cell science advances, this is a pivotal area in which our community will lead.

## Public education: From students to physicians

In November, the ISSCR launched *Core Concepts in Stem Cell Biology: Syllabus and Learning Guide*, developed by the ISSCR Education Committee in response to advances in the field and the lack of resources to teach stem cell biology. Designed for undergraduate students, early graduate students, or medical students, educators can use the materials to design an entire course or integrate any of the eight core concepts into an existing class. This product is a service to the field and available to any educator at no cost or regardless of membership. Next year, this resource will expand to include supplementary interviews with authors of foundational papers, adding an even greater dimension to learning.

In October, the ISSCR's *Stem Cell-Based Clinical Trials: Practical Advice for Physicians and Ethics/Institutional Review Committees* was honored by Tech Spotlight at Harvard Kennedy School's Belfer Center. Tech Spotlight recognizes the technologists, activists, and policymakers who are thoughtfully creating and using technology in ways to protect the public good and help shape a better future. The guide was developed by practicing physician-scientists and stem cell professionals on the ISSCR's Clinical Translation Committee.

The society continues to share new content through the A Closer Look at Stem Cells website that informs patients and families about novel advances in stem cell research and clinical applications.

## In closing

Through all the change and challenge this year, we found a way not just to persevere, but to innovate and to thrive. Serving as ISSCR President during such remarkable times has been a privilege: somewhat daunting to start, but a delight to see what we have achieved that will provide even stronger foundations for our future than we had before. We look forward to sharing this bright future with you.

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