Stanford

Vittorio Sebastiano

Associate Professor (Research) of Obstetrics and Gynecology (Reproductive, Perinatal & Stem Cell Biology Research)

Obstetrics & Gynecology - Reproductive Biology

Bio

ACADEMIC APPOINTMENTS

- Associate Professor (Research), Obstetrics & Gynecology - Reproductive Biology
- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Institute for Stem Cell Biology and Regenerative Medicine
- Member, Maternal & Child Health Research Institute (MCHRI)
- Member, Wu Tsai Neurosciences Institute

ADMINISTRATIVE APPOINTMENTS

- Co-Director PhD Program in Stem Cell Biology and Regenerative Medicine, Stanford School of Medicine, (2017-2019)
- Director, Transgenic Knockout and Tumor Model Service (TKTC) Stanford Cancer Institute, Stanford School of Medicine, (2014- present)
- Director, Human Pluripotent Stem Cells Core Facility Stanford Institute for SCBRM, Stanford School of Medicine, (2010-2019)

HONORS AND AWARDS

- Woods Family Faculty Scholar in Pediatric Translational Medicine, MCHRI, Stanford School of Medicine (2019)
- AFAR Junior Investigator Awardee, American Federation for Aging Research (2017)
- Siebel Stem Cell Institute Scholar, Stanford School of Medicine (2014)
- Postdoctoral Training Grant, California Institute for Regenerative Medicine, Stanford School of Medicine (2009)
- Postdoctoral Training Grant, Max Planck for Molecular Biomedicine, Max Plank Institute for Molecular Biomedicine (2004)
- Honorary fellow member, Examination Board of Zoology and Developmental Biology, University of Pavia, ITALY (2001)
- Scholarship “Borsa Jacobi-Mazzocchi” for the best B.S. thesis in Applied Biomedicine, University of Pavia, ITALY (2001)

LINKS

- SCBRM PhD Program: http://stemcellphd.stanford.edu/faculty/vittorio-sebastiano.html
- My Linkedin Profile: https://www.linkedin.com/in/vittorio-sebastiano-36605538?trk=hp-identity-photo

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Germ cells, preimplantation embryos and pluripotent stem cells at first glance seem to have nothing in common. A more careful look, though, reveals that they are very closely linked to each other. The zygote originates from the fusion of two highly specialized germ cells (the sperm and the oocyte) and

in a few days develops into a blastocyst with a pluripotent cell population (the inner cell mass). These cells diverge from the extraembryonic cells of the trophoectoderm and can give rise to embryonic stem cells, in which a perpetual pluripotent and undifferentiated state is maintained.

The correct establishment of pluripotency guarantees the correct onset of development and therefore its acquisition is a fundamental biological process; any mistake associated with it has profound impact on gestation. A detailed understanding of the mechanisms that induce and regulate pluripotency is critical for the basic understanding of fundamental developmental processes that depend from it like the onset of differentiation and cellular plasticity. This is particularly relevant in consideration of the potential clinical application of human pluripotent stem cells (hPSCs).

Teaching

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Stem Cell Biology and Regenerative Medicine (Phd Program)

Publications

PUBLICATIONS

- **Transient Epigenetic Reprogramming: The Future of Skin Rejuvenation.** *Dermatologic surgery : official publication for American Society for Dermatologic Surgery [et al.]*
  Menon, S., Monteleon, C., Rhodes, A. S., Sebastiano, V., Hsia, E.
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- **Longevity biotechnology: bridging AI, biomarkers, geroscience and clinical applications for healthy longevity.** *Aging*
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  2024; 16

- **Challenges and recommendations for the translation of biomarkers of aging.** *Nature aging*
  Herzog, C. M., Goeminne, L. J., Poganik, J. R., Barzilai, N., Belsky, D. W., Betts-LaCroix, J., Chen, B. H., Chen, M., Cohen, A. A., Cummings, S. R., Fedichev, P. O., Ferrucci, L., Fleming, et al
  2024

- **Transcriptional and epigenetic characterization of a new in vitro platform to model the formation of human pharyngeal endoderm.** *Genome biology*
  Cipriano, A., Colantoni, A., Calicchio, A., Fiorentino, J., Gomes, D., Moqri, M., Parker, A., Rasouli, S., Caldwell, M., Briganti, F., Roncarolo, M. G., Baldini, A., Weinacht, et al
  2024; 25 (1): 211

- **PRC2-AgeIndex as a universal biomarker of aging and rejuvenation.** *Nature communications*
  Moqri, M., Cipriano, A., Simpson, D. J., Rasouli, S., Murty, T., de Jong, T. A., Nachun, D., de Sena Brandine, G., Ying, K., Tarkhov, A., Aberg, K. A., van den Oord, E., Zhou, et al
  2024; 15 (1): 5956

- **Validation of biomarkers of aging.** *Nature medicine*
  Moqri, M., Herzog, C., Poganik, J. R., Ying, K., Justice, J. N., Belsky, D. W., Higgins-Chen, A. T., Chen, B. H., Cohen, A. A., Fuellen, G., Hägg, S., Marioni, R. E., Widschwendter, et al
  2024

- **Publisher Correction: Mechanisms, pathways and strategies for rejuvenation through epigenetic reprogramming.** *Nature aging*
  Cipriano, A., Moqri, M., Maybury-Lewis, S. Y., Rogers-Hammond, R., de Jong, T. A., Parker, A., Rasouli, S., Schöler, H. R., Sinclair, D. A., Sebastiano, V.
  2024

- **Mechanisms, pathways and strategies for rejuvenation through epigenetic reprogramming.** *Nature aging*
  Cipriano, A., Moqri, M., Maybury-Lewis, S. Y., Rogers-Hammond, R., de Jong, T. A., Parker, A., Rasouli, S., Schöler, H. R., Sinclair, D. A., Sebastiano, V.
  2023

- **Nuclear RNA catabolism controls endogenous retroviruses, gene expression asymmetry, and dedifferentiation.** *Molecular cell*
  Torre, D., Fstkchyan, Y. S., Ho, J. S., Cheon, Y., Patel, R. S., Degrace, E. J., Mzoughi, S., Schwarz, M., Mohammed, K., Seo, J. S., Romero-Bueno, R., Demircioglu, D., Hasson, et al
  2023

- **Monolayer platform to generate and purify primordial germ-like cells in vitro provides insights into human germline specification.** *Nature communications*
  Vijayakumar, S., Sala, R., Kang, G., Chen, A., Pablo, M. A., Adebayo, A. I., Cipriano, A., Fowler, J. L., Gomes, D. L., Ang, L. T., Loh, K. M., Sebastiano, V.
  2023; 14 (1): 5690

- **Biomarkers of aging for the identification and evaluation of longevity interventions.** *Cell*
  Moqri, M., Herzog, C., Poganik, J. R., Biomarkers of Aging Consortium, Justice, J., Belsky, D. W., Higgins-Chen, A., Moskalev, A., Fuellen, G., Cohen, A. A., Bautmans, I., Widschwendter, M., Ding, J., et al
  2023; 186 (18): 3758-3775

- **Functional Human iPSC-Derived Thymic Epithelial Progenitor Cells Reconstitute T Cell Development and Function in an In Vivo Model of Thymic Aplasia**
  Slepicka, P., Hubka, K. M., Hanh Dan Nguyen, Mohammed, A., Wang, J., Gifford, C., Sebastiano, V., Weinacht, K. G.
  AMER SOC HEMATOLOGY.2022: 7340-7341

- **Editorial: Germ cell development and reproductive aging.** *Frontiers in cell and developmental biology*
  Brieno-Enriquez, M. A., Duncan, F. E., Ghazi, A., Klutstein, M., Sebastiano, V., Tyler, J.
  2022; 10: 1051539

- **We Shall See?** *The New England journal of medicine*
  Sebastiano, V., Zack, D. J.
  2021; 384 (18): 1766–68

- **Transient non-integrative expression of nuclear reprogramming factors promotes multifaceted amelioration of aging in human cells.** *Nature communications*
  Sarkar, T. J., Quarta, M. n., Mukherjee, S. n., Colville, A. n., Paine, P. n., Doan, L. n., Tran, C. M., Chu, C. R., Horvath, S. n., Qi, L. S., Bhutani, N. n., Rando, T. A., Sebastiano, et al
  2020; 11 (1): 1545

- **Author Correction: CRISPR/Cas9 microinjection in oocytes disables pancreas development in sheep.** *Scientific reports*
  Vilarino, M. n., Rashid, S. T., Suchy, F. P., McNabb, B. R., van der Meulen, T. n., Fine, E. J., Ahsan, S. D., Mursaliyev, N. n., Sebastiano, V. n., Diab, S. S., Huising, M. O., Nakauchi, H. n., Ross, et al
  2020; 10 (1): 7500

- **Platelet-Rich Plasma (PRP) From Older Males With Knee Osteoarthritis Depresses Chondrocyte Metabolism and Upregulates Inflammation** *JOURNAL OF ORTHOPAEDIC RESEARCH*
  O'Donnell, C., Migliore, E., Grandi, F., Koltsov, J., Lingampalli, N., Cisar, C., Indelli, P. F., Sebastiano, V., Robinson, W. H., Bhutani, N., Chu, C. R.
  2019; 37 (8): 1760–70

- **Highly Efficient and Marker-free Genome Editing of Human Pluripotent Stem Cells by CRISPR-Cas9 RNP and AAV6 Donor-Mediated Homologous Recombination.** *Cell stem cell*
  Martin, R. M., Ikeda, K., Cromer, M. K., Uchida, N., Nishimura, T., Romano, R., Tong, A. J., Lemgart, V. T., Camarena, J., Pavel-Dinu, M., Sindhu, C., Wiebking, V., Vaidyanathan, et al
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- **Highly Efficient and Marker-free Genome Editing of Human Pluripotent Stem Cells by CRISPR-Cas9 RNP and AAV6 Donor-Mediated Homologous Recombination** *CELL STEM CELL*
  Martin, R. M., Ikeda, K., Cromer, M., Uchida, N., Nishimura, T., Romano, R., Tong, A. J., Lemgart, V. T., Camarena, J., Pavel-Dinu, M., Sindhu, C., Wiebking, V., Vaidyanathan, et al
  2019; 24 (5): 821-+

- **Platelet-Rich Plasma (PRP) from Older Males with Knee Osteoarthritis Depresses Chondrocyte Metabolism and Upregulates Inflammation.** *Journal of orthopaedic research : official publication of the Orthopaedic Research Society*
  O'Donnell, C., Migliore, E., Grandi, F. C., Koltsov, J., Lingampalli, N., Cisar, C., Indelli, P. F., Sebastiano, V., Robinson, W. H., Bhutani, N., Chu, C. R.
  2019

- **Replication study: Melanoma exosomes educate bone marrow progenitor cells toward a pro-metastatic phenotype through MET.** *eLife*
  Kim, J., Afshari, A., Sengupta, R., Sebastiano, V., Gupta, A., Kim, Y. H., Reproducibility Project: Cancer Biology, Iorns, E., Tsui, R., Denis, A., Perfito, N., Errington, T. M., Iorns, E., et al
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- **Honey bee Royalactin unlocks conserved pluripotency pathway in mammals.** *Nature communications*
  Wan, D. C., Morgan, S. L., Spencley, A. L., Mariano, N., Chang, E. Y., Shankar, G., Luo, Y., Li, T. H., Huh, D., Huynh, S. K., Garcia, J. M., Dovey, C. M., Lumb, et al
  2018; 9 (1): 5078

- **Efficient scarless genome editing in human pluripotent stem cells.** *Nature methods*
  Ikeda, K., Uchida, N., Nishimura, T., White, J., Martin, R. M., Nakauchi, H., Sebastiano, V., Weinberg, K. I., Porteus, M. H.
  2018; 15 (12): 1045–47

- **Engineering Regenerative Thymic Tissues to Restore Long-Term T Cell Lymphopoiesis**
  Gai, H., Gras-Pena, R., Verma, Y., Fateh, V., Ikeda, K., Dejene, B., Min, D., Wang, J., Swigut, T., Weinberg, K. I., Hollander, G. A., Heilshorn, S., Roncarolo, et al
  AMER SOC HEMATOLOGY.2018

- **A distinct isoform of ZNF207 controls self-renewal and pluripotency of human embryonic stem cells.** *Nature communications*
  Fang, F., Xia, N., Angulo, B., Carey, J., Cady, Z., Durruthy-Durruthy, J., Bennett, T., Sebastiano, V., Reijo Pera, R. A.
  2018; 9 (1): 4384

- **Influenza virus infection causes global RNAPII termination defects** *NATURE STRUCTURAL & MOLECULAR BIOLOGY*
  Zhao, N., Sebastiano, V., Moshkina, N., Mena, N., Hultquist, J., Jimenez-Morales, D., Ma, Y., Rialdi, A., Albrecht, R., Fenouil, R., Sanchez-Aparicio, M., Ayllon, J., Ravisankar, et al
  2018; 25 (9): 885-+

- **Do Induced Pluripotent Stem Cell Characteristics Correlate with Efficient In Vitro Smooth Muscle Cell Differentiation? A Comparison of Three Patient-Derived Induced Pluripotent Stem Cell Lines.** *Stem cells and development*
  Zhou, Y., Kang, G., Wen, Y., Briggs, M., Sebastiano, V., Pederson, R., Chen, B.
  2018

- **NKX3-1 is required for induced pluripotent stem cell reprogramming and can replace OCT4 in mouse and human iPSC induction.** *Nature cell biology*
  Mai, T., Markov, G. J., Brady, J. J., Palla, A., Zeng, H., Sebastiano, V., Blau, H. M.
  2018

- **Use of human-derived stem cells to create a novel, in vitro model designed to explore FMR1 CGG repeat instability amongst female premutation carriers.** *Journal of assisted reproduction and genetics*
  Gustin, S. L., Wang, G., Baker, V. M., Latham, G., Sebastiano, V.
  2018

- **Single cell expression analysis of primate-specific retroviruses-derived HPAT lincRNAs in viable human blastocysts identifies embryonic cells co-expressing genetic markers of multiple lineages** *HELIYON*
  Glinsky, G., Durruthy-Durruthy, J., Wossidlo, M., Grow, E. J., Weirather, J. L., Au, K., Wysocka, J., Sebastiano, V.
  2018; 4 (6): e00667

- **Human Ipsc-Derived Thymic Epithelial Progenitor Cells as Stem Cell-Based Therapyto Restore Thymic Function in Hematopoietic Stem Cell Transplant Recipients**
  Gai, H., Sebastiano, V., Weinacht, K. G.
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- **CRISPR/Cas9 microinjection in oocytes disables pancreas development in sheep** *SCIENTIFIC REPORTS*
  Vilarino, M., Rashid, S., Suchy, F., McNabb, B., van der Meulen, T., Fine, E. J., Ahsan, S., Mursaliyev, N., Sebastiano, V., Diab, S., Huising, M. O., Nakauchi, H., Ross, et al
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- **A semi-interpenetrating network of polyacrylamide and recombinant basement membrane allows pluripotent cell culture in a soft, ligand-rich microenvironment.** *Biomaterials*
  Price, A. J., Huang, E. Y., Sebastiano, V., Dunn, A. R.

2017; 121: 179-192

- **A Comprehensive TALEN-Based Knockout Library for Generating Human Induced Pluripotent Stem Cell-Based Models for Cardiovascular Diseases.** *Circulation research*
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- **Comprehensive comparison of Pacific Biosciences and Oxford Nanopore Technologies and their applications to transcriptome analysis.** *F1000Research*
  Weirather, J. L., de Cesare, M., Wang, Y., Piazza, P., Sebastiano, V., Wang, X. J., Buck, D., Au, K. F.
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- **Spatiotemporal Reconstruction of the Human Blastocyst by Single-Cell Gene-Expression Analysis Informs Induction of Naive Pluripotency** *DEVELOPMENTAL CELL*
  Durruthy-Durruthy, J., Wossidlo, M., Pai, S., Takahashi, Y., Kang, G., Omberg, L., Chen, B., Nakauchi, H., Pera, R. R., Sebastiano, V.
  2016; 38 (1): 100-115
- **YAP Induces Human Naive Pluripotency.** *Cell reports*
  Qin, H., Hejna, M., Liu, Y., Percharde, M., Wossidlo, M., Blouin, L., Durruthy-Durruthy, J., Wong, P., Qi, Z., Yu, J., Qi, L. S., Sebastiano, V., Song, et al
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- **The primate-specific noncoding RNA HPAT5 regulates pluripotency during human preimplantation development and nuclear reprogramming.** *Nature genetics*
  Durruthy-Durruthy, J., Sebastiano, V., Wossidlo, M., Cepeda, D., Cui, J., Grow, E. J., Davila, J., Mall, M., Wong, W. H., Wysocka, J., Au, K. F., Reijo Pera, R. A.
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  Senatore, V., Scott, C. T., Sebastiano, V.
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- **Derivation of GMP-Compliant Integration-Free hiPSCs Using Modified mRNAs.** *Methods in molecular biology (Clifton, N.J.)*
  Durruthy, J. D., Sebastiano, V.
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- **Lift NIH restrictions on chimera research.** *Science (New York, N.Y.)*
  Sharma, A. n., Sebastiano, V. n., Scott, C. T., Magnus, D. n., Koyano-Nakagawa, N. n., Garry, D. J., Witte, O. N., Nakauchi, H. n., Wu, J. C., Weissman, I. L., Wu, S. M.
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- **Rapid and Efficient Conversion of Integration-Free Human Induced Pluripotent Stem Cells to GMP-Grade Culture Conditions.** *PloS one*

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- **Characterization of the human ESC transcriptome by hybrid sequencing** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*

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- **SHANK3 and IGF1 restore synaptic deficits in neurons from 22q13 deletion syndrome patients** *NATURE*

  Shcheglovitov, A., Shcheglovitova, O., Yazawa, M., Portmann, T., Shu, R., Sebastiano, V., Krawisz, A., Froehlich, W., Bernstein, J. A., Hallmayer, J. F., Dolmetsch, R. E.

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- **Human Amniotic Mesenchymal Stem Cell-Derived Induced Pluripotent Stem Cells May Generate a Universal Source of Cardiac Cells** *STEM CELLS AND DEVELOPMENT*

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  Sebastiano, V., Maeder, M. L., Angstman, J. F., Haddad, B., Khayter, C., Yeo, D. T., Goodwin, M. J., Hawkins, J. S., Ramirez, C. L., Batista, L. F., Artandi, S. E., Wernig, M., Joung, et al

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