Stanford



Kristy Red-Horse

Professor of Biology

CONTACT INFORMATION

- **Administrative Contact**

  Brenda Koehler

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Bio

ACADEMIC APPOINTMENTS

- Professor, Biology
- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Institute for Stem Cell Biology and Regenerative Medicine
- Member, Maternal & Child Health Research Institute (MCHRI)

LINKS

- Lab website: http://redhorselab.com/

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Cardiovascular developmental biology

Teaching

COURSES

2026-27

- Biology PhD Lab Rotation: BIO 299 (Aut, Win, Spr)
- Developmental Biology: BIO 160 (Win)
- Regenerative Medicine Seminar Series: STEMREM 250 (Aut)
- Stem Cells Immersion: Applications in Medicine, Business and Law: STEMREM 203 (Aut, Win, Spr, Sum)

2025-26

- Developmental Biology: BIO 160 (Win)
- Stem Cells Immersion: Applications in Medicine, Business and Law: STEMREM 203 (Win, Spr)

2024-25

- Developmental Biology: BIO 160 (Win)

2023-24

- Developmental Biology: BIO 160 (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Anastasiia Masaltseva, Macy Vollbrecht, Sarah Wilson

Postdoctoral Faculty Sponsor

Wen Chuan Hsieh, Mira Moufarrej

Doctoral Dissertation Advisor (AC)

Azalia Martinez Jaimes, Jeffrey Naftaly, Alanna Pyke, Emily Trimm, James Zwierzynski

Doctoral Dissertation Co-Advisor (AC)

Danielle Klinger

Undergraduate Major Advisor

Akash Shah

Doctoral (Program)

Fidelia Alvina, Alvaro Amorin, Jessica Arozqueta Basurto, Gerson Ascencio, Aubrey Auerbach, Khristian Bauer-Rowe, Bohdana-Myroslava Briantseva, Andrew Burden, Sarah DiIorio, Franco Felix, Hana Ghanim, Nick Guardino, Ketan Hoey, Nicole Horsley, Austin Huang, Jared Hysinger, Rachel Kang, Omair Khan, Bekah Kim, Lauren Koepke, Benjamin Lee, Christopher Lopez, John Lu, Sofia Luna, Zachary Michel, Lyn Miranda Portillo, Arvind Muruganantham, Jeeyoon Na, Suyash Raj, Joshua Rico, Tyler Sakamoto, Celeste Sanchez, Julie Sanchez, Amitoj Singh Sawhney, Samantha Trescott, Yaara Tzadikario, Helen Wang, Sicong Wang, Joseph Ward, Kailey Worner, Jiayi Wu

Postdoctoral Research Mentor

Grayson Rodriguez

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Biology (School of Humanities and Sciences) (PhD Program)

Publications

PUBLICATIONS

- **Fibrin drives thromboinflammation and neuropathology in COVID-19.** *Nature*
  Ryu, J. K., Yan, Z., Montano, M., Sozmen, E. G., Dixit, K., Suryawanshi, R. K., Matsui, Y., Helmy, E., Kaushal, P., Makanani, S. K., Deerinck, T. J., Meyer-Franke, A., Rios Coronado, et al
  2024

- **Eph-ephrin signaling couples endothelial cell sorting and arterial specification.** *Nature communications*
  Stewen, J., Kruse, K., Godoi-Filip, A. T., , Jeong, H. W., Adams, S., Berkenfeld, F., Stehling, M., Red-Horse, K., Adams, R. H., Pitulescu, M. E.
  2024; 15 (1): 2539

- **Lineage-tracing hematopoietic stem cell origins in vivo to efficiently make human HLF+ HOXA+ hematopoietic progenitors from pluripotent stem cells.** *Developmental cell*
  Fowler, J. L., Zheng, S. L., Nguyen, A., Chen, A., Xiong, X., Chai, T., Chen, J. Y., Karigane, D., Banuelos, A. M., Niizuma, K., Kayamori, K., Nishimura, T., Cromer, et al

2024

- **CXCL12 regulates coronary artery dominance in diverse populations and links development to disease.** *medRxiv : the preprint server for health sciences*
  Rios Coronado, P. E., Zanetti, D., Zhou, J., Naftaly, J. A., Prabala, P., Kho, P. F., Martínez Jaimes, A. M., Hilliard, A. T., Pyarajan, S., Dochtermann, D., Chang, K. M., Winn, V. D., Pașca, et al
  2023
- **Sox7-positive endothelial progenitors establish coronary arteries and govern ventricular compaction.** *EMBO reports*
  Chiang, I. K., Humphrey, D., Mills, R. J., Kaltzis, P., Pachauri, S., Graus, M., Saha, D., Wu, Z., Young, P., Sim, C. B., Davidson, T., Hernandez-Garcia, A., Shaw, et al
  2023: e55043
- **Dedifferentiation and Proliferation of Artery Endothelial Cells Drive Coronary Collateral Development in Mice.** *Arteriosclerosis, thrombosis, and vascular biology*
  Arolkar, G., Krishna Kumar, S., Wang, H., Gonzalez, K. M., Kumar, S., Bishnoi, B., Rios Coronado, P. E., Woo, Y. J., Red-Horse, K., Das, S.
  2023
- **APJ+ cells in the SHF contribute to the cells of aorta and pulmonary trunk through APJ signaling.** *Developmental biology*
  Baral, K., D'amato, G., Kuschel, B., Bogan, F., Jones, B. W., Large, C. L., Whatley, J. D., Red-Horse, K., Sharma, B.
  2023
- **An NKX-COUP-TFII morphogenetic code directs mucosal endothelial addressin expression.** *Nature communications*
  Dinh, T. T., Xiang, M., Rajaraman, A., Wang, Y., Salazar, N., Zhu, Y., Roper, W., Rhee, S., Brulois, K., O'Hara, E., Kiefel, H., Dinh, T. M., Bi, et al
  2022; 13 (1): 7448
- **Identification of a minority population of LMO2+ breast cancer cells that integrate into the vasculature and initiate metastasis.** *Science advances*
  Sikandar, S. S., Gulati, G. S., Antony, J., Fetter, I., Kuo, A. H., Ho, W. H., Haro-Acosta, V., Das, S., Steen, C. B., Pereira, T. A., Qian, D., Beachy, P. A., Dirbas, et al
  2022; 8 (45): eabm3548
- **Endocardium-to-coronary artery differentiation during heart development and regeneration involves sequential roles of Bmp2 and Cxcl12/Cxcr4.** *Developmental cell*
  D'Amato, G., Phansalkar, R., Naftaly, J. A., Fan, X., Amir, Z. A., Rios Coronado, P. E., Cowley, D. O., Quinn, K. E., Sharma, B., Caron, K. M., Vigilante, A., Red-Horse, K.
  2022
- **Vascular endothelial cell development and diversity.** *Nature reviews. Cardiology*
  Trimm, E., Red-Horse, K.
  2022
- **Targeting calcineurin induces cardiomyocyte proliferation in adult mice.** *Nature cardiovascular research*
  Lam, N. T., Nguyen, N. U., Ahmed, M. S., Hsu, C. C., Rios Coronado, P. E., Li, S., Menendez-Montes, I., Thet, S., Elhelaly, W. M., Xiao, F., Wang, X., Williams, N. S., Canseco, et al
  2022; 1 (7): 679-688
- **A new resource for human coronary vessel development.** *Cardiovascular research*
  Phansalkar, R., Red-Horse, K.
  2022
- **Generating human artery and vein cells from pluripotent stem cells highlights the arterial tropism of Nipah and Hendra viruses.** *Cell*
  Ang, L. T., Nguyen, A. T., Liu, K. J., Chen, A., Xiong, X., Curtis, M., Martin, R. M., Raftry, B. C., Ng, C. Y., Vogel, U., Lander, A., Lesch, B. J., Fowler, et al
  2022
- **The Tabula Sapiens: A multiple-organ, single-cell transcriptomic atlas of humans.** *Science (New York, N.Y.)*
  Jones, R. C., Karkanias, J., Krasnow, M. A., Pisco, A. O., Quake, S. R., Salzman, J., Yosef, N., Bulthaup, B., Brown, P., Harper, W., Hemenez, M., Ponnusamy, R., Salehi, et al
  2022; 376 (6594): eabl4896

- **Coronary blood vessels from distinct origins converge to equivalent states during mouse and human development** *ELIFE*
  Phansalkar, R., Krieger, J., Zhao, M., Kolluru, S., Jones, R. C., Quake, S. R., Weissman, I., Bernstein, D., Winn, V. D., D'Amato, G., Red-Horse, K.
  2021; 10

- **Endocardial/endothelial angiocrines regulate cardiomyocyte development and maturation and induce features of ventricular non-compaction.** *European heart journal*
  Rhee, S., Paik, D. T., Yang, J. Y., Nagelberg, D., Williams, I., Tian, L., Roth, R., Chandy, M., Ban, J., Belbachir, N., Kim, S., Zhang, H., Phansalkar, et al
  2021

- **Enhancing cardiovascular research with whole-organ imaging.** *Current opinion in hematology*
  Rios Coronado, P. E., Red-Horse, K.
  2021

- **New Research Is Shining Light on How Collateral Arteries Form in the Heart: a Future Therapeutic Direction?** *Current cardiology reports*
  Red-Horse, K., Das, S.
  2021; 23 (4): 30

- **Dach1 Extends Artery Networks and Protects Against Cardiac Injury.** *Circulation research*
  Raftrey, B., Williams, I. M., Rios Coronado, P. E., Fan, X., Chang, A. H., Zhao, M., Roth, R. K., Trimm, E., Racelis, R., D'Amato, G., Phansalkar, R., Nguyen, A., Chai, et al
  2021

- **Single-Cell RNA-seq Unveils Unique Transcriptomic Signatures of Organ-Specific Endothelial Cells.** *Circulation*
  Paik, D. T., Tian, L., Williams, I. M., Rhee, S., Zhang, H., Liu, C., Mishra, R., Wu, S. M., Red-Horse, K., Wu, J. C.
  2020

- **Single-cell maps of the human heart** *NATURE*
  Phansalkar, R., Red-Horse, K.
  2020; 577 (7792): 629–30

- **Single-cell maps of the human heart** *NATURE*
  Phansalkar, R., Red-Horse, K.
  2020; 577 (7792): 629–30

- **Wnt Activation and Reduced Cell-Cell Contact Synergistically Induce Massive Expansion of Functional Human iPSC-Derived Cardiomyocytes.** *Cell stem cell*
  Buikema, J. W., Lee, S. n., Goodyer, W. R., Maas, R. G., Chirikian, O. n., Li, G. n., Miao, Y. n., Paige, S. L., Lee, D. n., Wu, H. n., Paik, D. T., Rhee, S. n., Tian, et al
  2020; 27 (1): 50–63.e5

- **Whole-body tracking of single cells via positron emission tomography.** *Nature biomedical engineering*
  Jung, K. O., Kim, T. J., Yu, J. H., Rhee, S. n., Zhao, W. n., Ha, B. n., Red-Horse, K. n., Gambhir, S. S., Pratx, G. n.
  2020

- **Veins and Arteries Build Hierarchical Branching Patterns Differently: Bottom-Up versus Top-Down.** *BioEssays : news and reviews in molecular, cellular and developmental biology*
  Red-Horse, K., Siekmann, A. F.
  2019; 41 (3): e1800198

- **Veins and Arteries Build Hierarchical Branching Patterns Differently: Bottom-Up versus Top-Down** *BIOESSAYS*
  Red-Horse, K., Siekmann, A. F.
  2019; 41 (3)

- **A Unique Collateral Artery Development Program Promotes Neonatal Heart Regeneration** *CELL*
  Das, S., Goldstone, A. B., Wang, H., Farry, J., D'Amato, G., Paulsen, M. J., Eskandari, A., Hironaka, C. E., Phansalkar, R., Sharma, B., Rhee, S., Shamskhou, E., Agalliu, et al
  2019; 176 (5): 1128-+

- **A Unique Collateral Artery Development Program Promotes Neonatal Heart Regeneration.** *Cell*

Das, S., Goldstone, A. B., Wang, H., Farry, J., D'Amato, G., Paulsen, M. J., Eskandari, A., Hironaka, C. E., Phansalkar, R., Sharma, B., Rhee, S., Shamskhou, E. A., Agalliu, et al

2019

- **Distinct origins and molecular mechanisms contribute to lymphatic formation during cardiac growth and regeneration.** *eLife*

  Gancz, D. n., Raftrey, B. C., Perlmoter, G. n., Marín-Juez, R. n., Semo, J. n., Matsuoka, R. L., Karra, R. n., Raviv, H. n., Moshe, N. n., Addadi, Y. n., Golani, O. n., Poss, K. D., Red-Horse, et al

  2019; 8

- **Characterization of Brain Dysfunction Induced by Bacterial Lipopeptides That Alter Neuronal Activity and Network in Rodent Brains** *JOURNAL OF NEUROSCIENCE*

  Kim, K., Zamaleeva, A. I., Lee, Y., Ahmed, M., Kim, E., Lee, H., Pothineni, V., Tao, J., Rhee, S., Jayakumar, M., Inayathullah, M., Sivanesan, S., Red-Horse, et al

  2018; 38 (50): 10672–91

- **Characterization of brain dysfunction induced by bacterial lipopeptides that alter neuronal activity and network in rodent brains.** *The Journal of neuroscience : the official journal of the Society for Neuroscience*

  Kim, K., Zamaleeva, A. I., Woo Lee, Y., Ahmed, M. R., Kim, E., Lee, H., Raveendra Pothineni, V., Tao, J., Rhee, S., Jayakumar, M., Inayathullah, M., Sivanesan, S., Red-Horse, et al

  2018

- **Large-Scale Single-Cell RNA-Seq Reveals Molecular Signatures of Heterogeneous Populations of Human Induced Pluripotent Stem Cell-Derived Endothelial Cells** *CIRCULATION RESEARCH*

  Paik, D. T., Tian, L., Lee, J., Sayed, N., Chen, I. Y., Rhee, S., Rhee, J., Kim, Y., Wirka, R. C., Buikema, J. W., Wu, S. M., Red-Horse, K., Quertermous, et al

  2018; 123 (4): 443–50

- **Single-cell analysis of early progenitor cells that build coronary arteries** *NATURE*

  Su, T., Stanley, G., Sinha, R., D'Amato, G., Das, S., Rhee, S., Chang, A. H., Poduri, A., Raftrey, B., Thanh Theresa Dinh, Roper, W. A., Li, G., Quinn, K. E., et al

  2018; 559 (7714): 356-+

- **Large-Scale Single-Cell RNA-Seq Reveals Molecular Signatures of Heterogeneous Populations of Human Induced Pluripotent Stem Cell-Derived Endothelial Cells.** *Circulation research*

  Paik, D. T., Tian, L., Lee, J., Sayed, N., Chen, I. Y., Rhee, S., Rhee, J., Kim, Y., Wirka, R. C., Buikema, J. W., Wu, S. M., Red-Horse, K., Quertermous, et al

  2018

- **Endothelial deletion of Ino80 disrupts coronary angiogenesis and causes congenital heart disease.** *Nature communications*

  Rhee, S. n., Chung, J. I., King, D. A., D'amato, G. n., Paik, D. T., Duan, A. n., Chang, A. n., Nagelberg, D. n., Sharma, B. n., Jeong, Y. n., Diehn, M. n., Wu, J. C., Morrison, et al

  2018; 9 (1): 368

- **Single-cell analysis of early progenitor cells that build coronary arteries.** *Nature*

  Su, T. n., Stanley, G. n., Sinha, R. n., D'Amato, G. n., Das, S. n., Rhee, S. n., Chang, A. H., Poduri, A. n., Raftrey, B. n., Dinh, T. T., Roper, W. A., Li, G. n., Quinn, et al

  2018

- **DACH1 stimulates shear stress-guided endothelial cell migration and coronary artery growth through the CXCL12-CXCR4 signaling axis** *GENES & DEVELOPMENT*

  Chang, A. H., Raftrey, B. C., D'Amato, G., Surya, V. N., Poduri, A., Chen, H. I., Goldstone, A. B., Woo, J., Fuller, G. G., Dunn, A. R., Red-Horse, K.

  2017; 31 (13): 1308–24

- **Patterning coronary artery development**

  Red-Horse, K.

  WILEY.2017

- **Coronary Artery Development: Progenitor Cells and Differentiation Pathways.** *Annual review of physiology*

  Sharma, B., Chang, A., Red-Horse, K.

  2017; 79: 1-19

- **Cellular plasticity in cardiovascular development and disease.** *Developmental dynamics*

Das, S., Red-Horse, K.
2017

- **Alternative Progenitor Cells Compensate to Rebuild the Coronary Vasculature in Elabela- and Apj-Deficient Hearts.** *Developmental cell*
  Sharma, B. n., Ho, L. n., Ford, G. H., Chen, H. I., Goldstone, A. B., Woo, Y. J., Quertermous, T. n., Reversade, B. n., Red-Horse, K. n.
  2017
- **Endothelial cells respond to the direction of mechanical stimuli through SMAD signaling to regulate coronary artery size.** *Development (Cambridge, England)*
  Poduri, A. n., Chang, A. H., Raftrey, B. n., Rhee, S. n., Van, M. n., Red-Horse, K. n.
  2017; 144 (18): 3241–52
- **Endothelial APLNR regulates tissue fatty acid uptake and is essential for apelin's glucose-lowering effects.** *Science translational medicine*
  Hwangbo, C. n., Wu, J. n., Papangeli, I. n., Adachi, T. n., Sharma, B. n., Park, S. n., Zhao, L. n., Ju, H. n., Go, G. W., Cui, G. n., Inayathullah, M. n., Job, J. K., Rajadas, et al
  2017; 9 (407)
- **MicroRNA 139-5p coordinates APLNR-CXCR4 crosstalk during vascular maturation** *NATURE COMMUNICATIONS*
  Papangeli, I., Kim, J., Maier, I., Park, S., Lee, A., Kang, Y., Tanaka, K., Khan, O. F., Ju, H., Kojima, Y., Red-Horse, K., Anderson, D. G., Siekmann, et al
  2016; 7
- **Pericytes are progenitors for coronary artery smooth muscle.** *eLife*
  Volz, K. S., Jacobs, A. H., Chen, H. I., Poduri, A., McKay, A. S., Riordan, D. P., Kofler, N., Kitajewski, J., Weissman, I., Red-Horse, K.
  2015; 4
- **Genetic targeting of sprouting angiogenesis using Apln-CreER.** *Nature communications*
  Liu, Q., Hu, T., He, L., Huang, X., Tian, X., Zhang, H., He, L., Pu, W., Zhang, L., Sun, H., Fang, J., Yu, Y., Duan, et al
  2015; 6: 6020-?
- **Genetic targeting of sprouting angiogenesis using Apln-CreER.** *Nature communications*
  Liu, Q., Hu, T., He, L., Huang, X., Tian, X., Zhang, H., He, L., Pu, W., Zhang, L., Sun, H., Fang, J., Yu, Y., Duan, et al
  2015; 6: 6020-?
- **The sinus venosus contributes to coronary vasculature through VEGFC-stimulated angiogenesis** *DEVELOPMENT*
  Chen, H. I., Sharma, B., Akerberg, B. N., Numi, H. J., Kivela, R., Saharinen, P., Aghajanian, H., McKay, A. S., Bogard, P. E., Chang, A. H., Jacobs, A. H., Epstein, J. A., Stankunas, et al
  2014; 141 (23): 4500-4512
- **Oxygen regulates human cytotrophoblast migration by controlling chemokine and receptor expression** *PLACENTA*
  Schanz, A., Red-Horse, K., Hess, A. P., Baston-Buest, D. M., Heiss, C., Kruessel, J. S.
  2014; 35 (12): 1089-1094
- **Oxygen regulates human cytotrophoblast migration by controlling chemokine and receptor expression** *PLACENTA*
  Schanz, A., Red-Horse, K., Hess, A. P., Baston-Buest, D. M., Heiss, C., Kruessel, J. S.
  2014; 35 (12): 1089-1094
- **VEGF-C and aortic cardiomyocytes guide coronary artery stem development** *JOURNAL OF CLINICAL INVESTIGATION*
  Chen, H. I., Poduri, A., Numi, H., Kivela, R., Saharinen, P., McKay, A. S., Raftrey, B., Churko, J., Tian, X., Zhou, B., Wu, J. C., Alitalo, K., Red-Horse, et al
  2014; 124 (11): 4899-4914
- **The sinus venosus contributes to the coronary vasculature through VEGF-C stimulated angiogenesis**
  Chen, H., Sharma, B., Nurmi, H. J., Kivela, R., Saharinen, P., McKay, A. S., Chang, A. H., Stankunas, K., Alitalo, K., Red-Horse, K.
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  Sharma, B., Jacobs, A. H., Red-Horse, K.
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- **Aortic cardiomyocytes guide coronary artery stem formation**

Poduri, A., Red-Horse, K.
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- **Developmental Heterogeneity of Cardiac Fibroblasts Does Not Predict Pathological Proliferation and Activation** *CIRCULATION RESEARCH*
  Ali, S. R., Ranjbarvaziri, S., Talkhabi, M., Zhao, P., Subat, A., Hojjat, A., Kamran, P., Mueller, A. M., Volz, K. S., Tang, Z., Red-Horse, K., Ardehali, R.
  2014; 115 (7): 625-U81
- **Developmental heterogeneity of cardiac fibroblasts does not predict pathological proliferation and activation.** *Circulation research*
  Ali, S. R., Ranjbarvaziri, S., Talkhabi, M., Zhao, P., Subat, A., Hojjat, A., Kamran, P., Müller, A. M., Volz, K. S., Tang, Z., Red-Horse, K., Ardehali, R.
  2014; 115 (7): 625-635
- **Human induced pluripotent stem cell-derived cardiomyocytes as an in vitro model for coxsackievirus b3-induced myocarditis and antiviral drug screening platform.** *Circulation research*
  Sharma, A., Marceau, C., Hamaguchi, R., Burridge, P. W., Rajarajan, K., Churko, J. M., Wu, H., Sallam, K. I., Matsa, E., Sturzu, A. C., Che, Y., Ebert, A., Diecke, et al
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- **Human induced pluripotent stem cell-derived cardiomyocytes as an in vitro model for coxsackievirus B3-induced myocarditis and antiviral drug screening platform.** *Circulation research*
  Sharma, A., Marceau, C., Hamaguchi, R., Burridge, P. W., Rajarajan, K., Churko, J. M., Wu, H., Sallam, K. I., Matsa, E., Sturzu, A. C., Che, Y., Ebert, A., Diecke, et al
  2014; 115 (6): 556-566
- **Exploring the world of human development and reproduction** *INTERNATIONAL JOURNAL OF DEVELOPMENTAL BIOLOGY*
  Red-Horse, K., Drake, P. M., Fisher, S.
  2014; 58 (2-4): 87-93
- **Subepicardial endothelial cells invade the embryonic ventricle wall to form coronary arteries** *CELL RESEARCH*
  Tian, X., Hu, T., Zhang, H., He, L., Huang, X., Liu, Q., Yu, W., He, L., Yang, Z., Zhang, Z., Zhong, T. P., Yang, X., Yang, et al
  2013; 23 (9): 1075-1090
- **The Origin Of Cardiac Fibroblasts During Normal Development And After Injury**
  Ranjbarvaziri, S., Ali, S. R., Talkhabi, M., Subat, A., Zhao, P., Volz, K. S., Red-Horse, K., Ardehali, R.
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- **Aortic specific cardiomyocyte migration patterns coronary artery stem formation**
  Red-Horse, K.
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- **Radial Construction of an Arterial Wall** *DEVELOPMENTAL CELL*
  Greif, D. M., Kumar, M., Lighthouse, J. K., Hum, J., An, A., Ding, L., Red-Horse, K., Espinoza, F. H., Olson, L., Offermanns, S., Krasnow, M. A.
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  Red-Horse, K., Ueno, H., Weissman, I. L., Krasnow, M. A.
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- **Lymphatic vessel dynamics in the uterine wall** *PLACENTA*
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