Stanford

# Mark Mercola

Professor of Medicine (Cardiovascular)

Medicine - Cardiovascular Medicine

## Bio

### BIO

Dr. Mercola is Professor of Medicine and Professor in the Stanford Cardiovascular Institute. He completed postdoctoral training at the Dana-Farber Cancer Institute and Harvard Medical School, was on the faculty in the Department of Cell Biology at Harvard Medical School for 12 years, and later at the Sanford-Burnham-Prebys Institute and Department of Bioengineering at the University of California, San Diego before relocating to Stanford in 2015.

Prof. Mercola is known for identifying many of the factors that are responsible for inducing and forming the heart, including the discovery that Wnt inhibition is a critical step in cardiogenesis that provided the conceptual basis and reagents for the large-scale production of cardiovascular tissues from pluripotent stem cells. He has collaborated with medicinal chemists, optical engineers and software developers to pioneer the use of patient iPSC-cardiomyocytes for disease modeling, safety pharmacology and drug development. His academic research is focused on developing and using quantitative high throughput assays of patient-specific cardiomyocyte function to discover druggable targets for preserving contractile function in heart failure and promoting regeneration following ischemic injury. He co-established drug screening and assay development at the Conrad Prebys Drug Discovery Center (San Diego), which operated as one of 4 large screening centers of the US National Institutes of Health (NIH) Molecular Libraries screening initiative and continues as one of the largest academic drug screening centers.

Prof. Mercola received an NIH MERIT award for his work on heart formation. He holds numerous patents, including describing the invention of the first engineered dominant negative protein and small molecules for stem cell and cancer applications. He serves on multiple editorial and advisory boards, including Vala Sciences, Regencor, The Ted Rogers Centre for Heart Research and the Human Biomolecular Research Institute. His laboratory is funded by the National Institutes of Health (NIH), California Institute for Regenerative Medicine, Phospholamban Foundation and Fondation Leducq.

### ACADEMIC APPOINTMENTS

- Professor, Medicine - Cardiovascular Medicine
- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Maternal & Child Health Research Institute (MCHRI)

### LINKS

- Mercola Lab website: http://med.stanford.edu/mercolalab.html

# Teaching

## STANFORD ADVISEES

**Doctoral Dissertation Reader (AC)**

Francisco Galdos

**Postdoctoral Faculty Sponsor**

Mena Abdelsayed, Francesca Briganti, Anna Hnatiuk Hnatiuk

**Postdoctoral Research Mentor**

Anna Hnatiuk Hnatiuk

# Publications

## PUBLICATIONS

- **SARS-CoV-2 Susceptibility and ACE2 Gene Variations Within Diverse Ethnic Backgrounds.** *Frontiers in genetics*
  Vadgama, N., Kreymerman, A., Campbell, J., Shamardina, O., Brugger, C., Research Consortium, G. E., Deaconescu, A. M., Lee, R. T., Penkett, C. J., Gifford, C. A., Mercola, M., Nasir, J., Karakikes, et al
  2022; 13: 888025

- **Cardiomyocyte Na+ and Ca2+ mishandling drives vicious cycle involving CaMKII, ROS, and ryanodine receptors.** *Basic research in cardiology*
  Hegyi, B., Polonen, R., Hellgren, K. T., Ko, C. Y., Ginsburg, K. S., Bossuyt, J., Mercola, M., Bers, D. M.
  2021; 116 (1): 58

- **Highlights from Stanford Drug Discovery Symposium 2021.** *Cardiovascular research*
  Chase, A. J., Malhotra, S. V., Mercola, M., Singh, K., Wu, J. C.
  2021

- **Human-induced pluripotent stem cell-derived cardiomyocytes: Cardiovascular properties and metabolism and pharmacokinetics of deuterated mexiletine analogs.** *Pharmacology research & perspectives*
  Gomez-Galeno, J., Okolotowicz, K., Johnson, M., McKeithan, W. L., Mercola, M., Cashman, J. R.
  2021; 9 (4): e00828

- **The Present and Future of Mitochondrial-Based Therapeutics for Eye Disease.** *Translational vision science & technology*
  Ji, M. H., Kreymerman, A., Belle, K., Ghiam, B. K., Muscat, S. P., Mahajan, V. B., Enns, G. M., Mercola, M., Wood, E. H.
  2021; 10 (8): 4

- **Myocardial hypoxic stress mediates functional cardiac extracellular vesicle release.** *European heart journal*
  Anselmo, A., Frank, D., Papa, L., Viviani Anselmi, C., Di Pasquale, E., Mazzola, M., Panico, C., Clemente, F., Soldani, C., Pagiatakis, C., Hinkel, R., Thalmann, R., Kozlik-Feldmann, et al
  2021

- **Human iPSC-derived Cardiomyocytes and Pyridyl-Phenyl Mexiletine Analogs.** *Bioorganic & medicinal chemistry letters*
  Johnson, M., Gomez-Galeno, J., Ryan, D., Okolotowicz, K., McKeithan, W. L., Sampson, K. J., Kass, R. S., Mercola, M., Cashman, J. R.
  2021: 128162

- **Antiarrhythmic Hit to Lead Refinement in a Dish Using Patient-Derived iPSC Cardiomyocytes.** *Journal of medicinal chemistry*
  Cashman, J. R., Ryan, D., McKeithan, W. L., Okolotowicz, K., Gomez-Galeno, J., Johnson, M., Sampson, K. J., Kass, R. S., Pezhouman, A., Karagueuzian, H. S., Mercola, M.
  2021

- **The Unfolded Protein Response as a Compensatory Mechanism and Potential Therapeutic Target in PLN R14del Cardiomyopathy.** *Circulation*
  Feyen, D. A., Perea-Gil, I., Maas, R. G., Harakalova, M., Gavidia, A. A., Arthur Ataam, J., Wu, T., Vink, A., Pei, J., Vadgama, N., Suurmeijer, A. J., Te Rijdt, W. P., Vu, et al
  2021

- **miR-132/212 Impairs Cardiomyocytes Contractility in the Failing Heart by Suppressing SERCA2a** *FRONTIERS IN CARDIOVASCULAR MEDICINE*
  Lei, Z., Wahlquist, C., el Azzouzi, H., Deddens, J. C., Kuster, D., van Mil, A., Rojas-Munoz, A., Huibers, M. M., Mercola, M., de Weger, R., van der Velden, J., Xiao, J., Doevendans, et al
  2021; 8: 592362

- **Temporal mechanisms of myogenic specification in human induced pluripotent stem cells.** *Science advances*
  Nayak, P., Colas, A., Mercola, M., Varghese, S., Subramaniam, S.
  2021; 7 (12)

- **CRISPR/Cas9-based targeting of fluorescent reporters to human iPSCs to isolate atrial and ventricular-specific cardiomyocytes.** *Scientific reports*
  Chirikian, O., Goodyer, W. R., Dzilic, E., Serpooshan, V., Buikema, J. W., McKeithan, W., Wu, H., Li, G., Lee, S., Merk, M., Galdos, F., Beck, A., Ribeiro, et al
  2021; 11 (1): 3026

- **Small-molecule probe reveals a kinase cascade that links stress signaling to TCF/LEF and Wnt responsiveness.** *Cell chemical biology*
  Cheng, J. n., Tsuda, M. n., Okolotowicz, K. n., Dwyer, M. n., Bushway, P. J., Colas, A. R., Lancman, J. J., Schade, D. n., Perea-Gil, I. n., Bruyneel, A. A., Lee, J. n., Vadgama, N. n., Quach, et al
  2021

- **Mitochondria-Rich Extracellular Vesicles Rescue Patient-Specific Cardiomyocytes From Doxorubicin Injury: Insights Into the SENECA Trial.** *JACC. CardioOncology*
  O'Brien, C. G., Ozen, M. O., Ikeda, G., Vaskova, E., Jung, J. H., Bayardo, N., Santoso, M. R., Shi, L., Wahlquist, C., Jiang, Z., Jung, Y., Zeng, Y., Egan, et al
  2021; 3 (3): 428-440

- **Mapping genetic variability in mature miRNAs and miRNA binding sites in prostate cancer.** *Journal of human genetics*
  Lee, B., Li, J. L., Marchica, J., Mercola, M., Patel, V., Perera, R. J.
  2021

- **Human iPSC modeling of heart disease for drug development.** *Cell chemical biology*
  Hnatiuk, A. P., Briganti, F. n., Staudt, D. W., Mercola, M. n.
  2021; 28 (3): 271–82

- **miR-106a-363 cluster in extracellular vesicles promotes endogenous myocardial repair via Notch3 pathway in ischemic heart injury.** *Basic research in cardiology*
  Jung, J. H., Ikeda, G. n., Tada, Y. n., von Bornstädt, D. n., Santoso, M. R., Wahlquist, C. n., Rhee, S. n., Jeon, Y. J., Yu, A. C., O'brien, C. G., Red-Horse, K. n., Appel, E. A., Mercola, et al
  2021; 116 (1): 19

- **Patient-Specific Induced Pluripotent Stem Cells Implicate Intrinsic Impaired Contractility in Hypoplastic Left Heart Syndrome.** *Circulation*
  Paige, S. L., Galdos, F. X., Lee, S., Chin, E. T., Ranjbarvaziri, S., Feyen, D. A., Darsha, A. K., Xu, S., Ryan, J. A., Beck, A. L., Qureshi, M. Y., Miao, Y., Gu, et al
  2020; 142 (16): 1605–8

- **Hyperglycemia Acutely Increases Cytosolic Reactive Oxygen Species via O-linked GlcNAcylation and CaMKII Activation in Mouse Ventricular Myocytes.** *Circulation research*
  Lu, S., Liao, Z., Lu, X., Katschinski, D. M., Mercola, M., Chen, J., Heller Brown, J., Molkentin, J. D., Bossuyt, J., Bers, D. M.
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- **Sacubitril/Valsartan Improves Cardiac Function and Decreases Myocardial Fibrosis Via Downregulation of Exosomal miR-181a in a Rodent Chronic Myocardial Infarction Model.** *Journal of the American Heart Association*
  Vaskova, E. n., Ikeda, G. n., Tada, Y. n., Wahlquist, C. n., Mercola, M. n., Yang, P. C.
  2020: e015640

- **Metabolic Maturation Media Improve Physiological Function of Human iPSC-Derived Cardiomyocytes.** *Cell reports*
  Feyen, D. A., McKeithan, W. L., Bruyneel, A. A., Spiering, S. n., Hörmann, L. n., Ulmer, B. n., Zhang, H. n., Briganti, F. n., Schweizer, M. n., Hegyi, B. n., Liao, Z. n., Pölönen, R. P., Ginsburg, et al
  2020; 32 (3): 107925

- **Reengineering an Antiarrhythmic Drug Using Patient hiPSC Cardiomyocytes to Improve Therapeutic Potential and Reduce Toxicity.** *Cell stem cell*
  McKeithan, W. L., Feyen, D. A., Bruyneel, A. A., Okolotowicz, K. J., Ryan, D. A., Sampson, K. J., Potet, F. n., Savchenko, A. n., Gómez-Galeno, J. n., Vu, M. n., Serrano, R. n., George, A. L., Kass, et al
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- **iPSC Modeling of RBM20-Deficient DCM Identifies Upregulation of RBM20 as a Therapeutic Strategy.** *Cell reports*
  Briganti, F. n., Sun, H. n., Wei, W. n., Wu, J. n., Zhu, C. n., Liss, M. n., Karakikes, I. n., Rego, S. n., Cipriano, A. n., Snyder, M. n., Meder, B. n., Xu, Z. n., Millat, et al
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- **A Novel Recessive Mutation in SPEG Causes Early Onset Dilated Cardiomyopathy.** *PLoS genetics*
  Levitas, A. n., Muhammad, E. n., Zhang, Y. n., Perea Gil, I. n., Serrano, R. n., Diaz, N. n., Arafat, M. n., Gavidia, A. A., Kapiloff, M. S., Mercola, M. n., Etzion, Y. n., Parvari, R. n., Karakikes, et al
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- **Small-Molecule Modulation of TDP-43 Recruitment to Stress Granules Prevents Persistent TDP-43 Accumulation in ALS/FTD** *NEURON*
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  2019; 103 (5): 802-+

- **Identification of a potent inhibitor of notch signaling**
  Galeno, J., Hurtado, C., Cashman, J., Mercola, M., Cheng, J., Yardimci, C.
  AMER CHEMICAL SOC.2019

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  Pei, J., Harakalova, M., Nagyova, E., Gho, J. H., Sepehrkhouy, S., van Dinter, J., van Mil, A., Buijsrogge, M. P., de Jonge, N., Huibers, M. M., Nieuwenhuis, E. S., den Ruijter, H. M., Pasterkamp, et al
  NATURE PUBLISHING GROUP.2019: 790–91

- **Stars in the Night Sky: iPSC-Cardiomyocytes Return the Patient Context to Drug Screening** *CELL STEM CELL*
  Hnatiuk, A., Mercola, M.
  2019; 24 (4): 506–7

- **A Premature Termination Codon Mutation in MYBPC3 Causes Hypertrophic Cardiomyopathy via Chronic Activation of Nonsense-Mediated Decay** *CIRCULATION*
  Seeger, T., Shrestha, R., Lam, C., Chen, C., McKeithan, W. L., Lau, E., Wnorowski, A., McMullen, G., Greenhaw, M., Lee, J., Oikonomopoulos, A., Lee, S., Yang, et al
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- **Crataegus Extract WS1442 Stimulates Cardiomyogenesis and Angiogenesis From Stem Cells: A Possible New Pharmacology for Hawthorn?** *Frontiers in pharmacology*
  Halver, J., Wenzel, K., Sendker, J., Carrillo Garcia, C., Erdelmeier, C. A., Willems, E., Mercola, M., Symma, N., Konemann, S., Koch, E., Hensel, A., Schade, D.
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- **Disruption of NOTCH signaling by a small molecule inhibitor of the transcription factor RBPJ.** *Scientific reports*
  Hurtado, C. n., Safarova, A. n., Smith, M. n., Chung, R. n., Bruyneel, A. A., Gomez-Galeno, J. n., Oswald, F. n., Larson, C. J., Cashman, J. R., Ruiz-Lozano, P. n., Janiak, P. n., Suzuki, T. n., Mercola, et al
  2019; 9 (1): 10811

- **AlleleProfileR: A versatile tool to identify and profile sequence variants in edited genomes.** *PloS one*
  Bruyneel, A. A., Colas, A. R., Karakikes, I., Mercola, M.
  2019; 14 (12): e0226694

- **High-Throughput Phenotypic Screening Using Induced Pluripotent Stem Cell Derived Cardiomyocytes Identifies Compounds That Rescue Genetic Dilated Cardiomyopathy**
  Perea-Gil, I., Prado, M., Bruyneel, A. A., McKeithan, W. L., Feyen, D. A., Nair, P., Mercola, M., Karakikes, I.
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- **Mechanosensitive miR-376c Modulates Arrhythmia Susceptibility Via Regulation Of KCNJ2 In hiPSC-derived Cardiomyocytes**
  Wahlquist, C. A., Rojas-Munoz, A., Brunyeel, A. A., Greenhaw, M., Chung, R., Vu, M., Karakikes, I., Mercola, M.
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- **Use of human induced pluripotent stem cell-derived cardiomyocytes to assess drug cardiotoxicity** *NATURE PROTOCOLS*
  Sharma, A., McKeithan, W. L., Serrano, R., Kitani, T., Burridge, P. W., del Alamo, J. C., Mercola, M., Wu, J. C.
  2018; 13 (12): 3018–41

- **Use of human induced pluripotent stem cell-derived cardiomyocytes to assess drug cardiotoxicity.** *Nature protocols*
  Sharma, A., McKeithan, W. L., Serrano, R., Kitani, T., Burridge, P. W., Del Alamo, J. C., Mercola, M., Wu, J. C.
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- **High-Throughput Physiological Assay for Force and Stiffness Quantification in IPS Derived Cardiomyocytes**
  Serrano, R., McKeithan, W. L., Mercola, M., del Alamo, J. C.
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- **Exosomal miR-106a-363 Cluster Repairs the Injured Myocardium**
  Jung, J., Tada, Y., Wahlquist, C., Bornstadt, D., Santoso, M., Woo, J., Mercola, M., Yang, P.
  LIPPINCOTT WILLIAMS & WILKINS.2018
- **b-Annulated 1,4-dihydropyridines as Notch inhibitors** *BIOORGANIC & MEDICINAL CHEMISTRY LETTERS*
  Gomez-Galeno, J. E., Hurtado, C., Cheng, J., Yardimci, C., Mercola, M., Cashman, J. R.
  2018; 28 (20): 3363–67
- **A Premature Termination Codon Mutation in MYBPC3 Causes Hypertrophic Cardiomyopathy via Chronic Activation of Nonsense-Mediated Decay.** *Circulation*
  Seeger, T., Shrestha, R., Lam, C. K., Chen, C., McKeithan, W. L., Lau, E., Wnorowski, A., McMullen, G., Greenhaw, M., Lee, J., Oikonomopoulos, A., Lee, S., Yang, et al
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- **Will iPSC-cardiomyocytes revolutionize the discovery of drugs for heart disease?** *CURRENT OPINION IN PHARMACOLOGY*
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  2018; 42: 55–61
- **A Novel Inhibitor Targets Both Wnt Signaling and ATM/p53 in Colorectal Cancer** *CANCER RESEARCH*
  Cheng, J., Dwyer, M., Okolotowicz, K. J., Mercola, M., Cashman, J. R.
  2018; 78 (17): 5072–83
- **Novel tertiary sulfonamides as potent anti-cancer agents** *BIOORGANIC & MEDICINAL CHEMISTRY*
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  Bruyneel, A. A., McKeithan, W. L., Feyen, D. A., Mercola, M.
  2018; 42: 55–61
- **Using iPSC Models to Probe Regulation of Cardiac Ion Channel Function** *CURRENT CARDIOLOGY REPORTS*
  Bruyneel, A. N., McKeithan, W. L., Feyen, D. M., Mercola, M.
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- **INHIBITING MIR-25 THROUGH TOUGH DECOY GENE THERAPY IMPROVES CALCIUM HANDLING AND ABROGATES CARDIAC DYSFUNCTION IN AGED MDX/UTRN KO MICE**
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  WILEY.2018: 5
- **EXOSOMAL MIR-106A-363 CLUSTER FROM THE HYPOXIC HUMAN IPSC-DERIVED CARDIOMYOCYTES RESTORE THE ISCHEMIC MYOCARDIUM**
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- **High-Throughput Functional Screening Assay of Force and Stiffness in IPSC Derived Cardiomyocytes**
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- **Id genes are essential for early heart formation** *GENES & DEVELOPMENT*
  Cunningham, T. J., Yu, M. S., McKeithan, W. L., Spiering, S., Carrette, F., Huang, C., Bushway, P. J., Tierney, M., Albini, S., Giacca, M., Mano, M., Puri, P., Sacco, et al
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- **The All-Chemical Approach: A Solution for Converting Fibroblasts Into Myocytes.** *Circulation research*
  Liu, Y., Mercola, M., Schwartz, R. J.
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- **Extracellular vesicles as effective substitutes for cell therapy for chronic heart failure**
  Kervadec, A., Bellamy, V., El Harane, N., Smit, N., Meijborg, V., Nematalla, H., Perier, M. C., Renault, M. P., Colas, A., Hagege, A., Colonel, R., Mercola, M., Silvestre, et al
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  del Alamo, J. C., Lemons, D., Serrano, R., Savchenko, A., Cerignoli, F., Bodmer, R., Mercola, M.
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- **Notch-independent RBPJ controls angiogenesis in the adult heart** *NATURE COMMUNICATIONS*
  Diaz-Trelles, R., Scimia, M. C., Bushway, P., Tran, D., Monosov, A., Monosov, E., Peterson, K., Rentschler, S., Cabrales, P., Ruiz-Lozano, P., Mercola, M.
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- **Inhibition of Tumor Growth in an Orthotopic Model of Invasive Pancreatic Cancer: A Novel Molecular Pathway Inhibitor**
  Cheng, J., Okolotowicz, K., Lowy, A. M., Mercola, M., Cashman, J.
  FEDERATION AMER SOC EXP BIOL.2016

- **Metallic Nanoislands on Graphene as Highly Sensitive Transducers of Mechanical, Biological, and Optical Signals** *NANO LETTERS*
  Zaretski, A. V., Root, S. E., Savchenko, A., Molokanova, E., Printz, A. D., Jibril, L., Arya, G., Mercola, M., Lipomi, D. J.
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- **A molecular pathway inhibitor that inhibits tumor growth in an orthotopic model of invasive pancreatic cancer**
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- **DISEASE IN A DISH: PATIENT-SPECIFIC hiPSC-DERIVED CARDIOMYOCYTES TO STUDY LONG QT INTERVAL AND hERG CHANNEL TOXICITY**
  Ryan, D. A., Okolotowicz, K. J., McKeithan, W. L., Savtchenko, A., Kass, R. S., Mercola, M., Cashman, J. R.
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  Cunningham, T. J., Brade, T., Sandell, L. L., Lewandoski, M., Trainor, P. A., Colas, A., Mercola, M., Duester, G.
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  Wei, K., Díaz-Trelles, R., Liu, Q., Diez-Cuñado, M., Scimia, M., Cai, W., Sawada, J., Komatsu, M., Boyle, J. J., Zhou, B., Ruiz-Lozano, P., Mercola, M.
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  Ryan, D. A., Okolotowicz, K. J., Mercola, M., Cashman, J. R.
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  Cabral-Teixeira, J., Martinez-Fernandez, A., Cai, W., Terzic, A., Mercola, M., Willems, E.
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  Banerjee, I., Carrion, K., Serrano, R., Dyo, J., Sasik, R., Lund, S., Willems, E., Aceves, S., Meili, R., Mercola, M., Chen, J., Zambon, A., Hardiman, et al
  2015; 79: 133-144

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