
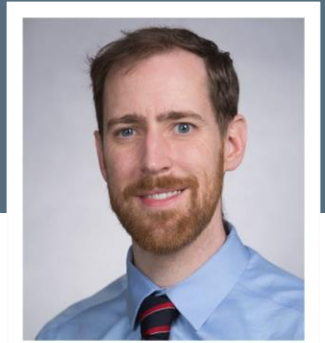


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## Professional experience

- July 2023 -** **Professor, Depts. of Pediatrics and Bioengineering**  
*University of California, San Diego*
- July 2023 -** **Professor, Dept. of Bioengineering**  
*Technical University of Denmark*
- 2018 - 2023** **Associate professor, Depts. of Pediatrics and Bioengineering**  
*University of California, San Diego*
- 2021 - Present** **Co-Founder, NeuImmune, Inc.**
- 2021 - Present** **Co-Founder, Augment Biologics, Inc.**
- 2021 - Present** **Co-Founder, AlatiCell, Inc.**
- 2017 - Present** **Co-Director, Center for CHO Systems Biology**  
*University of California, San Diego*
- 2014 - 2018** **Assistant professor, Depts. of Pediatrics and Bioengineering**  
*University of California, San Diego*
- 2013** **Assistant professor, Department of Biology**  
*Brigham Young University - Provo, UT*
- 2012-2013** **Postdoctoral fellow, Department of Genetics and Wyss Institute for Biologically Inspired Engineering**  
*Harvard Medical School - Boston, MA*
- 2008-2009** **Visiting scientist, Department of Computer Science and Mathematics**  
*Weizmann Institute of Science - Rehovot, Israel*
- 2006-2012** **Ph.D. Candidate, Department of Bioengineering**  
*University of California, San Diego*
- 2005** **Research intern, Lee Hood Lab, Stem Cell Group**  
*Institute for Systems Biology - Seattle, WA*
- 2004** **Research intern, NCI-FDA Clinical Proteomics Program**  
*National Institutes of Health - Bethesda, MD*
- 2003-2006** **Research assistant, Center for Proteomics and Mass Spectrometry**  
*Brigham Young University - Provo, UT*

## Education

- 2012** Ph.D., Bioengineering, University of California, San Diego
- 2008** M.S., Bioengineering, University of California, San Diego
- 2006** B.S., Biochemistry, Brigham Young University

## Publications

\* equal contribution, ‡ corresponding/last author, \*\* N.E. Lewis as first, corresponding, and/or senior author

- \*\* 174. Yom A., Chiang A.W.T., **Lewis N.E.**‡. A Boltzmann model predicts glycan structures from lectin binding. *bioRxiv* (2023).
- \*\* 173. Baghdassarian H.M.\*, Dimitrov D.\*, Armingol E.\*, Saez-Rodriguez J.‡, **Lewis N.E.**‡. Combining LIANA and Tensor-cell2cell to decipher cell-cell communication across multiple samples. *bioRxiv* (2023). Under review at *Nature Protocols*
- \*\* 172. Shamie I., Bliss-Moreau M., Lee J.C., Mathieu R., **Lewis N.E.**‡, Zhu Y.P.‡, Croker B.‡ Comparative single-cell lineage bias in human and murine hematopoietic stem cells. *submitted* (2023). Under review at *Nature Communications*
- \*\* 171. Kellman B.P., Mariethoz J., Zhang Y., Shaul S., Alteri M., Sandoval D., Jeffris M., Armingol E., Bao B., Lisacek F., Bojar D.‡, **Lewis N.E.**‡ Decoding glycosylation potential from protein structure across human glycoproteins with a multi-view recurrent neural network. *submitted* (2023).
- \*\* 170. Kellman B.P., Sandoval D., Zaytseva O.O., Brock K., Baboo S., Nachmanson D., Irvine E.B., Armingol E., Mih N., Zhang Y., Jeffris M., Bartels P., Nguyen T., Tam A., Gasman S., Ilan S., Shamie I., Diedrich J.K., Wang X., van Woudenberg E., Altman M., Aylward A., Bao B., Castro A., Sorrentino J., Chiang A., Campbell M., Bartsch Y., Angular P., Sigurdson C., Alter G., Lauc G., Yates III J.R., Marks D., Lisacek F., **Lewis N.E.**‡ Protein structure, a genetic encoding for glycosylation. *submitted* (2023).
- \*\* 169. Masson H.O., Samoudi M., Robinson C.M., Kuo C.C., Weiss L., Shams Ud Doha K., Campos A., Tejwani V., Dahodwala H., Menard P., Voldborg B.G., Sharfstein S.T., **Lewis N.E.**‡ Inferring secretory and metabolic pathway activity from omic data with secCellFie. *submitted* (2023). Under review at *Metabolic Engineering*
- \*\* 168. Baghdassarian H.M., Lewis N.E. Resource Allocation in Mammalian Systems. *submitted* (2023). Under review at *Cell Systems*.
167. Kima S.H., Shin S., Baeka M., Xiong K., la Cour Karottki K.J., Hefzi H., Grav L.M., Pedersen L.E., Kildegaard H.F., **Lewis N.E.**, Lee J.S., Lee G.M. Identification of hyperosmotic stress-responsive genes in Chinese hamster ovary cells via genome-wide virus-free CRISPR/Cas9 screening. *submitted* (2023). Under review at *Metabolic Engineering*
- \*\* 166. Lin W.J.\*, Chiang A.W.T.\*‡, Liang C., Ma W.L., Cheng W.C., **Lewis N.E.**‡ iLipidome: hidden biosynthetic interdependencies in the lipidome enhance statistical power and interpretability. *submitted* (2023). Under review at *Nature Communications*
- \*\* 165. Rocamora F., Peralta A.G., Shin S., Sorrentino J., Wu M., Toth E.A., Fuerst T.A., **Lewis N.E.** Glycosylation Shapes the Efficacy and Safety of Diverse Protein, Gene and Cell Therapies, *Preprints* (2023). Under review at *Biotechnology Advances*
- \*\* 164. Aamodt C., **Lewis N.E.** Single cell A/B testing for cell-cell communication, *Cell Systems*, *in press* (2023).
- \*\* 163. Liang C., Chiang A.W.T.‡, **Lewis N.E.**‡ GlycoMME, a Markov modeling platform for studying N-glycosylation biosynthesis from glycomics data. *STAR Protocols*, *in press* (2023).
- \*\* 162. Masson H.O., la Cour Karottki K.J., Tat J., Hefzi H.‡, **Lewis N.E.**‡ From Observational to Actionable: Rethinking Omics in Biologics Production. *Trends in Biotechnology*, *in press* (2023)
161. Ghaddar A., Armingol E., Huynh C., Gevirtzman L., **Lewis N.E.**, Waterston R., O'Rourke E. Whole-body gene expression atlas of an adult metazoan, *Science Advances*, *in press* (2023).
160. Baghdassarian H., Blackstone S.A., Clay O.S., Philips R., Matthiasardottir B., Nehrebecky M., Hua V.K., McVicar R., Liu Y., Tucker S.M., Randazzo D., Deuitch N., Rosenzweig S., Mark A., Sasik R., Fisch K.M., Chavan P.P., Eren E., Watts N.R., Gadina M., Schwartz D.M., Sanyal A., Werner G., Murdock D.R., Horita N., Chowdhury S., Dimmock D., Jepsen K., Remmers E.F., Goldbach-Mansky R., Gahl W.A., O'Shea J.J., Milner J.D., **Lewis N.E.**, Chang J., Kastner D.L., Torok K., Oda H., Putnam C.D., Broderick L. Variant STAT4 and Response to Ruxolitinib in an Autoinflammatory Syndrome. *New England Journal of Medicine*, *in press* (2023).
- \*\* 159. Azadiana A.\*, Khodarahmid M., Arab S.S., Sajedic R.H., Yazdanifarg M., Zahiri J.\*‡, **Lewis N.E.**‡ A Reconstructing the Cell-Cell Interaction Network Among Mouse Immune Cells. *Biotechnology & Bioengineering*, *in press* (2023).
- \*\* 158. Gopalakrishnan S., Joshi C.J., Valderrama Gomez M., Icten E., Rolandi P., Johnson W., Kontoravdi C., **Lewis N.E.** Guidelines for extracting biologically relevant context-specific metabolic models using gene expression data, *Metabolic Engineering*, 75, 181-191 (2023). doi: 10.1016/j.ymben.2022.12.003
- \*\* 157. Armingol E., Larsen R.O., Cequeira M., Baghdassarian H., **Lewis N.E.** Unraveling the coordinated dynamics of protein- and metabolite-mediated cell-cell communication. *bioRxiv* (2022)
- \*\* 156. Masson H.O., Kuo C.C., Malm M., Lundqvist M., Sievertsson Å, Berling A., Tegel H., Hober S., Uhlén M., Grassi L., Hatton D., Rockberg J.‡, **Lewis N.E.**‡ Deciphering the determinants of recombinant protein yield across the human secretome, *bioRxiv* (2022). Under review at *PNAS*
- \*\* 155. Hefzi, H., Noh, S.M., Martínez Monge, I., Decker, M., Arnsdorf, J., Kol, S., Pristovsek, N., Hansen, A.H., Sukhova, Z., Brondum, K.K., Javidi, M., Jensen, K., Kallehauge, T., Ley, D., Ménard, P., Bjorn, S.P., Petersen, H., Nielsen, L.K., Lee, G.M., Kildegaard, H.F., Voldborg, B.G., **Lewis, N.E.** Complete elimination of Warburg metabolism in Chinese hamster ovary cells. *Submitted*. Under review at *Nature Metabolism*

154. Kotidis P., Donini R., Arnsdorf J., Hansen A.H., Voldborg B.G.R., Chiang A.W.T., Haslam S., Betenbaugh M., Jimenez del Val I., **Lewis N.E.**, Krambeck F, Kontoravdi C. CHOglycoNET: Comprehensive Glycosylation Reaction Network for CHO cells. *Metabolic Engineering*, 76, 87-96 (2023). doi: 10.1016/j.ymben.2022.12.009
- \*\* 153. Masson H.O., Borland D., Reilly J., Telleria A., Shrivastava S., Watson M., Bustillo L., Li Z., Capps L., Kellman B.P., King Z.A., Richelle A., **Lewis N.E.**‡, Robasky K.‡ ImmCellFie: A user-friendly web-based platform to infer metabolic function from omics data. *STAR Protocols*, 4 (1), 102069 (2023)
- \*\* 152. Ha TK, Odena A, la Cour Karotki KJ, Kim CL, Hefzi H, Lee GM, Kildegaard HF, Nielsen LK, Grav LM, **Lewis NE**. Enhancing CHO cell productivity through a dual selection system in glutamine free medium. *Biotechnology & Bioengineering*, 120, 1159-1166 (2023).
151. Kenefake D., Armingol E., **Lewis N.E.**, Pistikopoulos E.N. An Improved Algorithm for Flux Variability Analysis. *BMC Bioinformatics*, 23,550 (2022).
- \*\* 150. Li H., Chiang A.W.T.‡, **Lewis N.E.**‡. Artificial Intelligence in the analysis of glycosylation data. *Biotechnology Advances*, 60, 108008 (2022). doi: 10.1016/j.biotechadv.2022.108008
- \*\* 149. Zhang Y., Krishnan S., Bao B., Chiang A.W.T., Sorrentino J.T., Schinn S.M., Kellman B.P.‡, **Lewis N.E.**‡ Preparing glycomics data for robust statistical analysis with GlyCompareCT, *STAR Protocols*, 4, 102162 (2023).
148. Sorrentino JT, Golden GJ, Morris C, Painter C, Nizet V, Campos AR, Smith JW, Karlsson C, Malmström J, **Lewis NE**, Esko JD, Toledo AG. Vascular proteome responses precede organ dysfunction in a murine model of Staphylococcus aureus bacteremia, *mSystems*, 7(4) (2022). bioRxiv doi: 10.1101/2021.12.07.471579
147. Tsai CM, Caldera JR, Hajam IA, Chiang AWT, Tsai CH, Li H, Díez ML, Gonzalez C, Trieu D, Martins GA, Underhill DM, Arditi M, **Lewis NE**, Liu G. Non-protective immune imprint underlies failure of S. aureus IsdB vaccine. *Cell Host and Microbe*, 30, 1163-1172 (2022)
- \*\* 146. Armingol E.\*, Baghdassarian H.\*, Martino C., Perez-Lopez A., Aamodt C., Knight R., **Lewis N.E.** Context-aware deconvolution of cell-cell communication with Tensor-cell2cell. *Nature Communications*, 13, 3665 (2022). doi: 10.1038/s41467-022-31369-2
145. Thacker B.E., Thorne K.J., Cartwright C., Park J., Glass K., Chea A., Kellman B.P., **Lewis N.E.**, Wang Z., Di Nardo A., Sharfstein S.T., Jeske W., Walenga J., Hogwood J., Gray E., Mulloy B., Esko J.D., Glass C.A. Multiplex genome editing of mammalian cells for producing recombinant heparin. *Metabolic Engineering*, 70, 155-165 (2022). DOI: 10.1016/j.ymben.2022.01.002
144. Stanley P., Moremen K.W., **Lewis N.E.**, Taniguchi N., Aebi M. N-Glycans, in *Essentials of Glycobiology*, 4th Edition (2022), Cold Spring Harbor Laboratory Press.
143. Xiao Y, Wen TH, Kupis L, Eylar L, Goel D, Vaux K, Lombardo MV, **Lewis NE**, Pierce K, Courchesne E. Neural responses to affective speech, including motherese, map onto clinical and social eye tracking profiles in ASD toddlers. *Nature Human Behavior*, 6, 443–454 (2022).
142. Savizi I.S.P., Maghsoudi N., Motamedian E., **Lewis N.E.**, Shojaosadati S.A. Valine feeding reduces ammonia production through rearrangement of metabolic fluxes in central carbon metabolism of CHO cells. *Applied Microbiology and Biotechnology*, 106, 1113–1126 (2022).
141. Manresa M.C., Wu A., Nhu Q., Chiang A.W.T., Okamoto K., Miki H., Kurten R., Pham E., Duong L.D., **Lewis N.E.**, Akuthota P., Croft M. Aceves S.S. LIGHT controls distinct homeostatic and inflammatory gene expression profiles in esophageal fibroblasts via differential HVEM and LTβR-mediated mechanisms. *Mucosal Immunology*, 15, 327–337 (2022).
- \*\*140. Siddharth T., **Lewis N.E.** Predicting pathways for old and new metabolites through clustering. *arXiv* (2022).
- \*\*139. Malm\*, M., Kuo, C.C., \* Barzadd, M.M., Mebrahtu, A., Wistbacka, N., Razavi, R., Volk, A.L., Lundqvist, M., Kotol, D., Edfors, F., Gräslund, T., Chotteau, V., Field, R., Varley, P., Roth, R.G., **Lewis, N.E.**‡, Hatton, D., Rockberg, J.‡ Harnessing secretory pathway differences between HEK293 and CHO to rescue production of difficult to express proteins. *Metabolic Engineering*, 72, 171-187 (2022).
- \*\*138. Bao B.\*, Zahiri J.\*, Gazestani V.H.\*, Lopez L., Xiao Y., Kim R., Wen T., Chiang A.W.T., Nalabolu S., Pierce K., Robasky K., Wang T., Hoekzema T., Eichler E.E., **Lewis N.E.**‡, Courchesne, E.‡. A Predictive Ensemble Classifier for the Molecular Diagnosis of ASD at Ages 1 to 4 Years. *Molecular Psychiatry*, (2022).
- \*\*139. Chiang A.W.T., Gazestani V.H., Altieri M.G., Courchesne E., **Lewis N.E.** Optimal balancing of clinical factors in large scale clinical RNA-Seq studies. *bioRxiv* (2021). doi: 10.1101/2021.06.30.450639
- \*\*137. Robasky K., Kim R., Yi H., Xu H., **Bao B.**, **Chiang A.W.T.**, Courchesne E., **Lewis N.E.** Transfer learning improves outcome predictions for ASD from gene expression in blood. *bioRxiv* (2021). doi: 10.1101/2021.06.26.449864
136. Sasmal A., Khan N., Khedri Z., Kellman B.P., Srivastava S., Verhagen A., Yu H., Bruntse A.B., Diaz S., Varki N., Beddoe T., Paton A.W., Paton J.C., Chen X., **Lewis N.E.**, Varki A. Simple and practical sialoglycan encoding system reveals vast diversity in nature and identifies a universal sialoglycan-recognizing probe derived from AB5 toxin B subunits. *Glycobiology*, 32, 1101-1115 (2022). doi: 10.1101/2021.05.28.446191
135. Pessentheiner A.R., Spann N.J., Autran C.A., Ramms B., Chiang A.W.T., Grunddal K.V., Wang Y., Quach A., Booshehri L.M., Hammond A., Tognaccini C., Latasiewicz J., Witztum J.L., Hoffman H.M., **Lewis N.E.**, Glass C.K., Bode L., Gordts P.L.S.M. The Human Milk Oligosaccharide 3-Sialyllactose Promotes Inflammation Resolution and Reduces Atherosclerosis Development in Mice. *bioRxiv*, (2021). DOI: 10.1101/2021.03.19.433472

- \*\*134. Spahn, P.N.\*, Zhang, X.\*, Hu, Q., Hamaker, N., Hefzi, H., Li, S., Kuo, C.C., Huang, Y., Lee, J.C., Ly, P., Lee, K.H., ‡ **Lewis, N.E.** ‡ Restoration of deficient DNA Repair Genes Mitigates Genome Instability and Increases Productivity of Chinese Hamster Ovary Cells. *Biotechnology & Bioengineering*, 119, 963-982 (2022). DOI: 10.1002/bit.28016
- \*\*133. Joshi, C.J., Ke, W., Drangowska-Way, A., O'Rourke, E.J. ‡, **Lewis, N.E.** ‡ What are housekeeping genes? *PLoS Computational Biology*, 18:e1010295 (2022).
- \*\*132. Armingol E., Ghaddar A., Joshi C.J., Baghdassarian H., Shamie I., Chan J., Her H.L., O'Rourke E.J., ‡ **Lewis N.E.** ‡ Inferring the spatial code of cell-cell interactions across a whole animal body. *PLoS Computational Biology*, 18(11): e1010715 (2022).
- \*\*131. Kellman B.P., Richelle A., Yang J.Y.E., Chapla D.G., Chiang A.W.T., Najera J., Bao B., Koga N., Mohammad M.A., Bruntse A.B., Haymond M.W., Bode L., **Lewis N.E.** Elucidating Human Milk Oligosaccharide biosynthetic genes through network-based multi-omics integration. *Nature Communications*, 13, 2455 (2022). DOI: 10.1038/s41467-022-29867-4
- \*\*130. Martino, C.\*, Kellman, B.P.\*, Sandoval, D.R.\*, Clausen, T.M., Marotz, C., Song, S.J., Wandro, S., Zaramela, L., Benítez, R.A.S., Zhu, Q., Armingol, E., Vázquez-Baeza, Y., McDonald, D., Sorrentino, J., Taylor, B., Belda-Ferre, P., Liang, C., Zhang, Y., Schifanella, L., Klatt, N.R., Havulinna, A.S., Jousilahti, P., Huang, S., Haiminen, N., Parida, L., Kim, H.C., Swafford, A.D., Zengler, K., Cheng, S., Inouye, M., Niiranen, T., Jain, M., Salomaa, V., Esko, J.D. ‡, **Lewis, N.E.** ‡, Knight, R. ‡ Bacterial modification of the host glycosaminoglycan heparan sulfate modulates SARS-CoV-2 infectivity. *bioRxiv*, (2020). DOI: 10.1101/2020.08.17.238444. PMID: PMC7444296 News Coverage: [Medical News](#)
- \*\*129. Gazestani, V., Chiang, A.W.T., Courchesne, E.\*, **Lewis, N.E.**\* Autism genetics perturb prenatal neurodevelopment through a hierarchy of broadly-expressed and brain-specific genes. *bioRxiv* (2020). DOI: 10.1101/2020.05.24.112623
128. Choi YM, Choi DH, Lee YQ, Koduru L, **Lewis, NE**, Lakshmanan M, Lee DY. Mitigating biomass composition uncertainties in flux balance analysis using ensemble representations. *bioRxiv* (2022). DOI: 10.1101/652040
127. Golden G., Toledo A.G., Marki A., Sorrentino J., Morris C., Riley R., Chen Q., Cornax I., **Lewis N.E.**, Varki N., Le D., Malmström J., Karlsson C., Ley K, Nizet V., and Esko J. Endothelial heparan sulfate mediates hepatic neutrophil trafficking and injury during Staphylococcus aureus sepsis. *mBio*, e0118121 (2021).
126. Zhu, Y.P., Shamie, I., Lee, J.C., Nowell, C.J., Peng, W., Angulo, S., Le, L.N.N., Liu, Y., Miao, H., Xiong, H., Pena, C.J., Moreno, E., Griffis, E., Labou, S.G., Franco, A., Broderick, L., Hoffman, H.M. Shimizu, C. **Lewis, N.E.** Kanegaye, J.T., Tremoulet, A.H., Burns, J.C., Croker, B.A. Immune response to intravenous immunoglobulin in patients with Kawasaki disease and MIS-C. *Journal of Clinical Investigation*, 131(20):e147076 (2021). DOI: 10.1172/JCI147076
- \*\*125. Bao, B.\*, Kellman, B.P.\*, Chiang, A.W.T., York, A.K., Mohammad, M.A., Haymond, M.W., Bode, L., Lewis, N.E. Correcting for sparsity and interdependence in glycomics by accounting for glycan biosynthesis. *Nature Communications*, 12, 4988 (2021). DOI: 10.1038/s41467-021-25183-5, PMID: PMC8371009
124. Khaleghi M.K., Savizi I.S.P., **Lewis N.E.**, Shojaosadati S.A. Synergisms of machine learning and constraint-based modeling of metabolism for analysis and optimization of fermentation parameters. *Biotechnology Journal*, 16:2100212 (2021). DOI: 10.1002/biot.202100212, PMID: 34390201
123. Lombardo MV, Eyley L, Pramparo T, Gazestani VH, Hagler Jr. DJ, Chen CH, Dale AM, Seidlitz J, Bethlehem RAI, Bertelsen N, Barnes CC, Lopez L, Campbell K, **Lewis NE**, Pierce K, Courchesne E. Atypical genomic patterning of the cerebral cortex in autism with poor early language outcome. *Science Advances*, 7, eabh1663 (2021). DOI:10.1126/sciadv.abh1663
122. Xiong, K., la Cour Karotki, K.J., Hefzi, H., Li, S., Grav, L.M., Li, S., Spahn, P., Lee, J.S., Lee, G.M., Kildegaard, H.F., **Lewis, N.E.**, Pedersen, L.E. Using targeted genome integration for virus-free genome-wide mammalian CRISPR screen. *Cell Reports Methods*, 1:100062 (2021).
- \*\*121. Shamie I.\*, Duttke S.H.\*, la Cour Karotki K.J., Han C.Z., Hansen A.H., Hefzi H., Xiong K., Li S., Roth S., Tao J., Lee G.M., Glass C.K., Kildegaard H.F., Benner C., **Lewis N.E.** A Chinese hamster transcription start site atlas that enables targeted editing of CHO cells. *NAR Genomics and Bioinformatics*, 3:lqab061 (2021). DOI: 10.1093/nargab/lqab061, PMID: PMC8276764
- \*\*120. Kuo, C.C., Chiang, A.W.T., **Lewis, N.E.** Dysregulation of the secretory pathway connects Alzheimer's disease genetics to aggregate formation. *Cell Systems*, (2021). DOI: 10.1016/j.cels.2021.06.001, PMID: 34171228
- \*\*119. Richelle, A., Kellman, B.P., Wenzel, A.T., Chiang, A.W.T., Reagan, T., Gutierrez, J.M., Joshi, C., Li, S., Liu, J.K., Masson, H., Lee, J., Li, Z., Heirendt, L., Trefois, C., Juarez, E.F., Bath, T., Borland, D., Mesirov, J.P., Robasky, K., **Lewis, N.E.** Model-based assessment of mammalian cells metabolic functionalities from omics data. *Cell Reports Methods*, 1:100040 (2021). DOI: 10.1016/j.crmeth.2021.100040
- \*\*118. Samoudi M, Masson H, Kuo CC, Robinson C, **Lewis NE**. From omics to cellular mechanisms in mammalian cell factory development. *Curr Opin in Chem Eng*, 32: 100688 (2021). DOI: 10.1016/j.coche.2021.100688
117. Chiang A.W.T. ‡, Baghdassarian H.M., Kellman B.P., Bao B., Sorrentino J.T., Liang C., Kuo C.C., Masson H.O., **Lewis N.E.** Systems glycobiology for discovering drug targets, biomarkers, and rational designs for glyco-immunotherapy. *Journal of Biomedical Science*, 28:50 (2021). DOI: 10.1186/s12929-021-00746-2, PMID: PMC8218521
116. Savizi I.S.P., Motamedian E., Maghsoudi N., **Lewis N.E.**, Jimenez del Val I., Shojaosadati S.A. An integrated modular framework for modeling the effect of ammonium on the sialylation process of monoclonal antibodies produced by CHO cells. *Biotechnology Journal*, 16:2100019 (2021). DOI: 10.1002/biot.202100019, PMID: 34021707

- \*\*115. Weiss, R.\* , Spahn, P.\* , Chiang, A.W.T., Liu, Q., Li, J., Hamill, K., Gordts, P., Tor, Y., **Lewis, N.E.** ‡, Esko, J.D. ‡ Genome-wide screens uncover KDM2B as a modifier of protein binding to heparan sulfate. *Nature Chemical Biology*, 17, 684–692 (2021). DOI: 10.1038/s41589-021-00776-9, PMCID: PMC8159865
- \*\*114. la Cour Karottki, K.J., Hefzi, H., Li, S., Pedersen, L.E., Spahn, P., Ruckerbauer, D., Bort, J.H., Thomas, A., Lee, J.S., Borth, N., Lee, G.M., Kildegaard, H.F.\* , **Lewis, N.E.**\* A metabolic CRISPR-Cas9 screen in Chinese hamster ovary cells identifies glutamine-sensitive genes. *Metabolic Engineering*, 66:114-122 (2021). DOI: 10.1016/j.ymben.2021.03.017. DOI: 10.1016/j.ymben.2021.03.017, PMCID: PMC8193919
- \*\*113. Schinn S-M, Morrison C, Wei W, Zhang L, **Lewis NE**. Systematic evaluation of parameterization for genome-scale metabolic models of cultured mammalian cells. *Metabolic Engineering*, 66:21-30 (2021). DOI: 10.1016/j.ymben.2021.03.013, PMID: 33771719
112. Granados, J.C., Richelle, A., Gutierrez, J.M., Zhang, P., Bhatnagar, V., **Lewis, N.E.**, Nigam, S.K. Coordinate regulation of systemic and kidney tryptophan metabolism by the drug transporters OAT1 and OAT3. *Journal of Biological Chemistry*. 296:100575 (2021). DOI: 10.1016/j.jbc.2021.100575, PMCID: PMC8102410
- \*\*111. Schinn S.M., Morrison C., Wei W., Zhang L., **Lewis N.E.** A genome-scale metabolic network model and machine learning predict amino acid concentrations in Chinese Hamster Ovary cell cultures. *Biotechnology and Bioengineering*, 118:2118-2123 (2021). DOI: 10.1002/bit.27714 PMID: 33580712
110. Askarian, F., Uchiyama, S., Masson, H., Bunæs, A.C., Golten, O., Mekasha, S., Røhr, Å.K., Kommedal, E., Ludvigsen, J.A., Sørensen, H.V., Arntzen, M.Ø., Schmidt, B., van Sorge, N.M., Eijnsink, V.G.H, Krengel, U., Mollnes, T.E., **Lewis, N.E.**, Nizet, V., Vaaje-Kolstad, G. The lytic polysaccharide monooxygenase CbpD promotes *Pseudomonas aeruginosa* virulence in systemic infection. *Nature Communications*, 12: 1230 (2021). DOI: 10.1038/s41467-021-21473-0, PMCID: PMC7902821
109. Toledo, A.G., Sorrentino, J., Sandoval, D., Malmström, J., **Lewis, N.E.**, Esko, J.D. A Systems View of the Heparan Sulfate Interactome. *Journal of Histochemistry & Cytochemistry*, 69(2):105–119 (2021). DOI: 10.1369/0022155420988661, PMCID: PMC7841697
108. Hsieh LY, Chiang AWT, Duong LD, Kuo CC, Dong S, Dohil R, Kurten R, **Lewis NE**, Aceves SS. A Unique Esophageal Extracellular Matrix Proteome Alters Normal Fibroblast Function in Severe Eosinophilic Esophagitis. *Journal of Allergy and Clinical Immunology*, in press (2021). DOI: 10.1016/j.jaci.2021.01.023, PMCID: PMC8342625
- \*\*107. Kellman, B.P.\* , Baghdassarian, H.M.\* , Pramparo, T., Shamie, I., Gazestani, V.H., Begzati, A., Li, S., Nalabolu, S., Murray, S., Lopez, L., Pierce, K., Courchesne, E., **Lewis, N.E.** Multiple freeze-thaw cycles lead to a loss of consistency in poly(A)-enriched RNA sequencing. *BMC Genomics*, 22, 69 (2021). DOI: 10.1186/s12864-021-07381-z, PMCID: PMC7818915
- \*\*106. Armingol, E.\* , Officer, A.\* , Harismendy, O.‡, **Lewis, N.E.**‡ Deciphering cell-cell interactions and communication from gene expression. *Nature Reviews Genetics*, 22:71–88 (2021). DOI: 10.1038/s41576-020-00292-x, PMCID: PMC7649713
105. Chiang AWT, Duong LD, Shoda T, Nhu QM, Ruffner M, Hara T, Aaron B, Joplin E, Manresa M, Abonia JP, Dellon E, Hirano I, Gonsalves N, Gupta S, Furuta G, Rothenberg ME, **Lewis NE**, Muir AB, Aceves SS, CEGIR Investigator Group. Type 2 Immunity and Age Modify Gene Expression of COVID19 Receptors in Eosinophilic Gastrointestinal Disorders. *J Pediatr Gastroenterol Nutr*, 72:718-722 (2021). DOI: 10.1097/MPG.0000000000003032, PMCID: PMC8048378
- \*\*104. Samoudi, M.\* , Kuo, C.C.\* , Robinson, C.M.\* , Shams-Ud-Doha, K., Schinn, S.M., Kol, S., Weiss, L., Bjorn, S.P., Voldborg, B.G., Campos, A.R., **Lewis, N.E.** In situ detection of protein interactions for recombinant therapeutic enzymes. *Biotechnology and Bioengineering*, 118 (2):890-904 (2021). DOI: 10.1002/bit.27621, PMCID: PMC7855575
- \*\*103. Kellman, B.P., **Lewis, N.E.** Big-data glycomics: tools to connect glycan synthesis to extracellular communication. *Trends in Biochemical Science*, 46:P284-300 (2021). DOI: 10.1016/j.tibs.2020.10.004, PMCID: PMC7954846
102. Fouladiha, H., Marashi, S.A., Li, S., Li, Z., Masson, H.O., Vaziri, B., **Lewis, N.E.** Systematically gap-filling the genome-scale model of CHO cells. *Biotechnology Letters*, 43:73–87 (2021). DOI: 10.1007/s10529-020-03021-w, PMID: 33040240
101. Lin, D., Yalamanchili, H., Zhang, X., **Lewis, N.E.**, Alves, C.L., Groot, J., Arnsdorf, J., Bjørn, S.P., Wulff, T., Voldborg, B.G., Zhou, Y., Zhang, B. CHOMics: a web-based tool for multi-omics data analysis and interactive visualization in CHO cell lines. *PLoS Computational Biology*, 16: e1008498 (2020). DOI: 10.1371/journal.pcbi.1008498, PMCID: PMC7790544
- \*\*100. Kellman, B.P.\* , Zhang, Y.\* , Logomasini, E., Meinhardt, E., Chiang, A.W.T., Sorrentino, J., Liang, A., Bao, B., Zhou, Y., Akase, S., Sogabe, I, Kuoka, T., Winzeler, E.A., Wilson, I.B.H., Campbell, M.P., Neelamegham, S., Krambeck, F., J., Aoki-Kinoshita, K.F., **Lewis, N.E.** A consensus-based and readable extension of Linear Code for Reaction Rules (LiCoRR). *Beilstein Journal of Organic Chemistry*, 16, 2645–2662 (2020). DOI: 10.3762/bjoc.16.215, PMCID: PMC7607430
99. Zhao P, Praissman JL, Grant OC, Cai Y, Xiao T, Rosenbalm KE, Aoki K, Kellman BP, Bridger R, Barouch DH, Brindley MA, **Lewis NE**, Tiemeyer M, Chen B, Woods RJ, Wells L. Virus-Receptor Interactions of Glycosylated SARS-CoV-2 Spike and Human ACE2 Receptor. *Cell Host & Microbe*, 28, P586-601.E6 (2020). DOI: 10.1016/j.chom.2020.08.004, PMCID: PMC7443692
98. Manresa, M.C., Chiang, A.W.T., Dohil, L., Brickner, H., Praveen Akuthota, P., **Lewis, N.E.**, Michael Croft, M., Aceves, S.S. Increased Production of LIGHT by T Cells in Eosinophilic Esophagitis Promotes Differentiation of Esophageal Fibroblasts Toward an Inflammatory Phenotype. *Gastroenterology*, S0016-5085(20)34997-0 (2020). DOI: 10.1053/j.gastro.2020.07.035, PMCID: PMC7726704
- \*\*97. Kol, S., Ley, D., Wulff, T., Decker, M., Arnsdorf, J., Gutierrez, J.M., Chiang, A.W.T., Pedersen, L.E., Kildegaard, H.F., Lee, G.M., **Lewis, N.E.** (2020) Multiplex secretome engineering enhances recombinant protein production and purity. *Nature*

- Communications*, 11:1908 (2020). DOI: 10.1038/s41467-020-15866-w, PMCID: PMC7170862 News coverage: [Nature Bioengineering](#), [UCSD Jacobs](#), [Phys.org](#), [Genetic Engineering and Biotechnology News](#), [ScienceNews.dk](#)
- \*\*96. Saba\*, J. A., Ke\*, W., Yao, C., Drangowska-Way, A., Joshi, C., Mony, V.K., Hilzendeger, M., Liu, X., Liu, J., Benjamin, S., Locasale, J., Patti, G., **Lewis, N.E.** ‡, O'Rourke, E.J. ‡ Dietary serine enhances chemotherapeutic toxicity in *C. elegans* through promoting thymidine deficiency in the microbiota. *Nature Communications*, 11:2587 (2020). DOI: 10.1038/s41467-020-16220-w News coverage: [UVAToday](#)
95. Szeliouva, D., Ruckerbauer, D.E., Galleguillos, S.N., Petersen, L.B., Natter, K., Hanscho, M., Troyer, C. Causon, T., Schoeny, H., Christensen, H.B., Lee, D.Y., **Lewis, N.E.**, Koellensperger, G., Hann, S., Nielsen, L., Borth, N., Zanghellini, J. What CHO is made of: Variations in the biomass composition of Chinese hamster ovary cell lines. *Metabolic Engineering*, 61:288-300 (2020). DOI: 10.1016/j.ymben.2020.06.002, PMID: 32619503
- \*\*94. Weiss, R.J.\* , Spahn, P.N.\* , Chiang, A.W.T., Li, J., Kellman, B.P., Benner, C., Glass, C.K., Gordts, P.L.S.M., **Lewis, N.E.** ‡, Esko, J.D. ‡ ZNF263 is a novel transcriptional regulator of heparin and heparan sulfate biosynthesis. *Proc. Nat. Acad. Sci. USA*, 117:9311-9317 (2020). DOI: 10.1073/pnas.1920880117, PMCID: PMC7196839 News coverage: [UCSD Jacobs](#), [Phys.org](#), [Genetic Engineering and Biotechnology News](#).
- \*\*93. Joshi, C., Schinn, S., Richelle, A., Shamie, I., O'Rourke, E., **Lewis, N.E.** (2020) StanDep: capturing transcriptomic variability improves context-specific metabolic models. *PLoS Computational Biology*, 16(5): e1007764. (2020). DOI: 10.1371/journal.pcbi.1007764, PMCID: PMC7244210
- \*\*92. Courchesne, E., Gazestani, V.H., **Lewis, N.E.** Prenatal origins of ASD: The when, what and how of ASD development. *Trends in Neurosciences*, 43:326 (2020). DOI: 10.1016/j.tins.2020.03.005, PMCID: PMC7373219
91. Fouladiha, H.\* , Marashi, S.A.\* , Torkashvand, F., Mahboudi, F., **Lewis, N.E.**, Vaziri, B. A metabolic network-based approach for developing feeding strategies for CHO cells to increase monoclonal antibody production. *Bioprocess and Biosystems Engineering*, 43, 1381–1389 (2020). DOI: 10.1007/s00449-020-02332-6, PMID: 32211960
- \*\*90. Liang, C., Chiang, A.W.T., Hansen, A.H., Arnsdorf, J., Schoffelen, S., Voldborg, B.G., Sorrentino, J., Kellman, B., Bao, B., **Lewis, N.E.** (2020) A Markov model of glycosylation elucidates isozyme specificity and glycosyltransferase interactions for glycoengineering. *Current Research in Biotechnology*, 2:22-36 (2020). DOI: 10.1016/j.crbiot.2020.01.001, PMCID: PMC7153765 News coverage: [Bioanalysis Zone](#)
- \*\*89. Gutierrez, J.M.\* , Feizi, A.\* , Li, S., Kallehauge, T.B., Grav, L.M., Hefzi, H., Ley, D., Baycin Hizal, D., Betenbaugh, M.J., Voldborg, B., Kildegaard, H.F., Lee, G.M., Palsson, B.O., Nielsen, J., **Lewis, N.E.** (2020) Genome-scale reconstructions of the mammalian secretory pathway predict metabolic costs and limitations of protein secretion. *Nature Communications*, 11:68. DOI: 10.1038/s41467-019-13867-y, PMCID: PMC6940358 News coverage: [ScienceNews.dk](#)
88. Speir, M., Nowell, C.J., Chen, A.A., O'Donnell, J.A., Shamie, I., Lakin, P.R., D'Cruz, A.A., Braun, R.O., Babon, J.J., Lewis, R.S., Bliss-Moreau, M., Shlomovitz, I., Wang, S., Cengia, L.H., Stoica, A.I., Hakem, R., Kelliher, M.A., O'Reilly, L.A., Patsiouras, H., Lawlor, K.E., Weller, E., **Lewis, N.E.**, Roberts, A.W., Gerlic, M., Croker, B.A. (2020) PTPN6 inhibits caspase-8- and RIPK3/MLKL-dependent inflammation. *Nature Immunology*, 21:54–64 (2020). DOI:10.1038/s41590-019-0550-7, PMCID: PMC6923591
- \*\*87. la Cour Karottki, K.J., Hefzi, H., Xiong, K., Shamie, I., Hansen, A.H., Li, S., Li, S., Lee, J.S., Lee, G.M., Kildegaard, H.F. ‡, **Lewis, N.E.** ‡ (2020) Awakening dormant glycosyltransferases in CHO cells with CRISPRa. *Biotechnology and Bioengineering*, 117:593-598 (2020). DOI: 10.1002/bit.27199, PMCID: PMC7261405
86. Lieven, C., Beber, M.E., Olivier, B.G., Bergmann, F.T., Babaei, P., Bartell, J.A., Blank, L.M., Chauhan, S., Correia, K., Diener, C., Dräger, A., Ebert, B.E., Edirisinghe, J.N., Fleming, R.M.T., Garcia-Jimenez, B., van Helvoirt, W., Henry, C., Hermjakob, H., Herrgard, M.J., Kim, H.U., King, Z., Koehorst, J.J., Klamt, S., Klipp, E., Lakshmanan, M., Le Novere, N., Lee, D.Y., Lee, S.Y., Lee, S., **Lewis, N.E.**, Ma, H., Machado, D., Mahadevan, R., Maia, P., Mardinoglu, A., Medlock, G.L., Monk, J., Nielsen, J., Nielsen, L.K., Nogales, J., Nookaew, I., Resendis, O., Palsson, B.O., Papin, J.A., Patil, K.R., Price, N.D., Richelle, A., Rocha, I., Schaap, P., Sheriff, R.S.M., Shoaie, S., Sonnenschein, N., Teusink, B., Vilaca, P., Vik, J.O., Wodke, J.A., Xavier, J.C., Yuan, Q., Zakhartsev, M., Zhang, C. (2020) MEMOTE for standardized genome-scale metabolic model testing. *Nature Biotechnology*, 38:272–276 (2020). DOI: 10.1038/s41587-020-0446-y, PMCID: PMC7082222
- \*\*85. Gazestani, V.H., Pramparo, T., Nalabolu, S., Kellman, B.P., Murray, S., Lopez, L., Pierce, K., Courchesne, E. ‡, **Lewis, N.E.** ‡ (2019) A perturbed gene network containing PI3K–AKT, RAS–ERK and WNT– $\beta$ -catenin pathways in leukocytes is linked to ASD genetics and symptom severity. *Nature Neuroscience*, 22, 1624–1634. DOI: 10.1038/s41593-019-0489-x, PMCID: PMC6764590
84. Toledo, A.G., Golden, G., Campos, A.R., Cuello, H., Sorrentino, J., **Lewis, N.E.**, Varki, N., Nizet, V., Smith, J.W., Esko, J.D. (2019) Proteomic atlas of organ vasculopathies triggered by *Staphylococcus aureus* sepsis. *Nature Communications*, 10:4656 (2019). DOI: 10.1038/s41467-019-12672-x, PMID: 31604940 PMCID: PMC6789120
83. Dahodwala, H., Kaushik, P., Tejwani, V., Kuo, C.C., Menard, P., Henry, M., Voldborg, B.G., **Lewis, N.E.**, Meleady, P., Sharfstein, S.T. (2019) Increased mAb titers from amplification are associated with increased interaction of CREB1 with transgene promoter. *Current Research in Biotechnology*, 1:49-57. DOI: 10.1016/j.crbiot.2019.09.001
- \*\*82. Richelle, A., Joshi, C., **Lewis, N.E.** (2019) Assessing key decisions for transcriptomic data integration in biochemical networks. *PLoS Computational Biology*. 15(7): e1007185. PMCID: PMC6668847

- \*\*81. Chiang, A.W.T., Li, S., Kellman, B.P., Chattopadhyay, G., Zhang, Y., Kuo, C.C., Gutierrez, J.M., Ghazi, F., Schmeisser, H., Menard, P., Bjorn, S.P., Voldborg, B.G., Rosenberg, A.S., Puig, M.‡, **Lewis, N.E.‡** (2019) Combating viral contaminants in CHO cells by engineering innate immunity. *Scientific Reports*, 9:8827. DOI: 10.1101/423590, PMCID: PMC6586939
- \*\*80. Gazestani, V.H., **Lewis, N.E.** (2019) From Genotype to Phenotype: Augmenting Deep Learning with Networks and Systems Biology. *Current Opinion in Systems Biology*, 15:68-73. DOI: 10.1016/j.coisb.2019.04.001, PMCID: PMC6880750
- \*\*79. Li, S., Cha, S.W., Heffner, K., Baycin-Hizal, D., Bowen, M., Chaerkady, R., Cole, R., Tejwani, V., Kaushik, P., Henry, M., Meleady, P., Sharfstein, S., Betenbaugh, M.J., Bafna, V., **Lewis, N.E.** (2019) Proteogenomic annotation of the Chinese hamster reveals extensive novel translation events and endogenous retroviral elements. *Journal of Proteome Research*, 18:2433-2445. DOI: 10.1021/acs.jproteome.8b00935, PMCID: PMC6571120
- \*\*78. Xiong, K. \*, Marquart, K.F. \*, la Cour Karotki, K.J. \*, Li, S., Shamie, I., Lee, J.S., Lee, G.M., **Lewis, N.E.‡**, Kildegaard, H.F.‡ (2019) Reduced Apoptosis in Chinese Hamster Ovary Cells via Optimized CRISPR Interference. *Biotechnology and Bioengineering*, 116:1813-1819. DOI: 10.1002/bit.26969, PMCID: PMC6545153
77. Pristovsek, N., Nallapareddy, S., Grav, L.M., Hefzi, H., **Lewis, N.E.**, Rugbjerg, P., Hansen, H.G., Lee, G.M., Andersen, M.R., Kildegaard, H.F. (2019) Systematic Evaluation of Site-Specific Recombinant Gene Expression for Programmable Mammalian Cell Engineering. *ACS Synthetic Biology*, 8:758-774. DOI: 10.1021/acssynbio.8b00453
- \*\*76. Richelle, A., Chiang, A.W.T., Kuo, C.C., **Lewis, N.E.** (2019) Increasing consensus of context-specific metabolic models by integrating data-inferred cell functions. *PLoS Computational Biology*, 15: e1006867. DOI: 10.1371/journal.pcbi.1006867, PMCID: PMC6483243
75. Lytle, N., Ferguson, L.P., Rajbhandari, N., Gilroy, K., Fox, R.G., Robertson, N., Deshpande, A., Schürch, C., Hamilton, M., Robertson, N., Lin, W., Noel, P., Wartenberg, M, Zlobec, I., Eichmann, M., Galván, J.A., Karamitopoulou, E., Gilderman, T., Esparza, L.A., Shima, Y., Spahn, P., French, R., **Lewis, N.E.**, Fisch, K.M., Sasik, R., Rosenthal, S.B., Kritzik, M., Von Hoff, D., Han, H., Ideker, T., Deshpande, A., Lowy, A.M., Adams, P., Reya, T. (2019) A multiscale map of the stem cell state in pancreatic adenocarcinoma. *Cell*, 177:572-586. DOI: 10.1016/j.cell.2019.03.010, PMCID: PMC6711371
74. Lee, J.S., Kildegaard, H.F., **Lewis, N.E.**, Lee, G.M. (2019) Mitigating Clonal Variation in Recombinant Mammalian Cell Lines. *Trends in Biotechnology*, 37:931-942. DOI: 10.1016/j.tibtech.2019.02.007
73. LaMonte, G., Orjuela-Sanchez, P., Wang, L., Li, S., Swann, J., Cowell, A., Zou, B.Y., Abdel-Haleem, A.M., Villa-Galarce, Z., Moreno, M., Tong-Rios, C., Vinetz, J., **Lewis, N.E.**, Winzeler, E.A. (2019) Dual RNAseq shows the human mucosal immunity protein, MUC13, is a hallmark of Plasmodium exoerythrocytic infection. *Nature Communications*, 10:488. DOI: 10.1101/183764, PMCID: PMC6353872
- \*\*72. Li, S.\*, Richelle, A. \*, **Lewis, N.E.** (2019) Enhancing product and bioprocess attributes using genome-scale models of CHO metabolism. *Cell Culture Engineering: Recombinant Protein Production*, p.73. ISBN: 978-3-527-34334-8
71. Calmels, C., Joshi, C., Malphettes, L., **Lewis, N.E.**, Andersen, M.R. (2019) Adaption of Generic Metabolic Models to Specific Cell Lines for Improved Modeling of Biopharmaceutical Production and Prediction of Processes. *Cell Culture Engineering: Recombinant Protein Production*, p.127. ISBN: 978-3-527-34334-8
70. Landig, C.S., Hazel, A., Kellman, B.P., Fong, J.J., Schwarz, F., Agarwal, S., Varki, N., Massari, P., **Lewis, N.E.**, Ram, S., Varki, A. (2019) The exclusively human-pathogen *Neisseria gonorrhoeae* engages 4 immunoregulatory siglecs in a species-specific manner. *Evolutionary Applications*, 12(2):337-349. DOI: 10.1111/eva.12744. PMCID: PMC6346652
69. Uhlen, M., Tegel, H., Sivertsson, Å., Kuo, C.C., Gutierrez, J.M., **Lewis, N.E.**, Forsström, B., Dannemeyer, M., Fagerberg, L., Rockberg, J., Malm, M., Vunk, H., Edfors, F., Hober, A., Sjöstedt, E., Mulder, J., Mardinoglu, A., Schwenk, J., Nilsson, P., Zwahlen, M., von Feilitzen, K., Lindskog, C., Ponten, F., Nielsen, J., Voldborg, B.G., Palsson, B.O., Volk, A.L.R., Lundqvist, M., Berling, A., Svensson, A.S., Kanje, A., Enstedt, H., Afshari, D., Ekblad, S., Scheffell, J., Xu, L.L., Mihai, R., Bremer, L., Westin, M., Muse, M., Mayr, L., Knight, S., Göpel, S., Davies, R., Varley, P., Hatton, D., Takanen, J.O., Schiavone, L.H., Hober, S. (2018) The human secretome – the proteins secreted from human cells. *bioRxiv*. DOI: 10.1101/465815
68. Lee, J.S., Park, J.H., Ha, T.K., Samoudi, M., **Lewis, N.E.**, Palsson, B.O., Kildegaard, H.F., Lee, G.M. (2018) Revealing key determinants of clonal variation in transgene expression in recombinant CHO cells using targeted genome editing. *ACS Synthetic Biology*, 7:2867-2878. DOI: 10.1021/acssynbio.8b00290, PMCID: PMC6535434
67. Witting, M.A., Hastings, J., Rodriguez, N., Joshi, C.J., Hattwell, J.P., Ebert, P.R., van Weeghel, M., Wakelam, M., Houtkooper, R., Mains, A., Le Novère, N., Sadykoff, S., Schroeder, F., **Lewis, N.E.**, Schirra, H.J., Kaleta, C., Casanueva, O. (2018) Modeling meets Metabolomics – The WormJam Consensus Model as basis for Metabolic Studies in the model organism *Caenorhabditis elegans*. *Frontiers in Molecular Biosciences*, 5:96. DOI:10.3389/fmolb.2018.00096, PMCID: PMC6246695
66. Lombardo, M.V., Pramparo, T., Gazestani, V., Warrier, V., Bethlehem, R.A.I., Barnes, C.C., Lopez, L., **Lewis, N.E.**, Eyler, L., Pierce, K., Courchesne, E. (2018) Large-scale associations between the leukocyte transcriptome and BOLD responses to speech differ in autism early language outcome subtypes. *Nature Neuroscience*, 21: 1680–1688. DOI: 10.1038/s41593-018-0281-3, PMCID: PMC6445349
- \*\*65. Brunk, E.\*, Chang, R.L., Xia, J., Hefzi, H., Yurkovich, J., Kim, D., Buckmiller, E., Wang, H.H., Yang, C., Palsson, B.Ø., Church, G.M., **Lewis, N.E.\*‡** (2018) Characterizing post-translational modifications in prokaryotic metabolism using a multi-scale workflow. *Proc. Nat. Acad. Sci. USA*, 115: 11096-11101. DOI: 10.1073/pnas.1811971115, PMCID: PMC6205427

64. Grav, L.M., Sergeeva, D., Lee, J.S., Marin de Mas, I., **Lewis, N.E.**, Andersen, M.R., Nielsen, L.K., Lee, G.M., Kildegaard, H.F. (2018) Minimizing clonal variation during mammalian cell line engineering for improved systems biology data generation, *ACS Synthetic Biology*, 7:2148–2159. DOI:10.1021/acssynbio.8b00140
63. Yeo, N.C., Chavez, A., Lance-Byrne, A., Chan, Y., Menn, D., Milanova, D., Kuo, C.C., Guo, X., Sharma, S., Tung, A., Cecchi, R.J., Tuttle, M., Pradhan, S., Lim, E.T., Davidsohn, N., Ebrahimkhani, M.R., Collins, J.J., **Lewis, N.E.**, Kiani, S., Church, G.M. (2018) A next-generation CRISPR repressor for targeted mammalian gene regulation, *Nature Methods*, 15:611–616. DOI:10.1038/s41592-018-0048-5, PMCID: PMC6129399
- \*\*62. Rupp, O.\* , MacDonald, M.L.\* , Li, S.\* , Dhiman, H.\* , Polson, S., Griep, S., Heffner, K., Hernandez, I., Brinkrolf, K., Jadhav, V., Samoudi, M., Hou, H., Kingham, B., Goesmann, A., Betenbaugh, M.J. ‡, **Lewis, N.E.**‡, Borth, N.‡, Lee, K.‡ (2018) A reference genome of the Chinese hamster based on a hybrid assembly strategy, *Biotechnology and Bioengineering*, 115:2087–2100. DOI: 10.1002/bit.26722, PMCID: PMC6045439
61. Heirendt, L., Arreckx, S., Pfau, T., Mendoza, S.N., Richelle, A., Heinken, A., Haraldsdottir, H.S., Keating, S.M., Vlasov, V., Wachowiak, J., Magnusdottir, S., Ng, C.Y., Preciat, G., Zagare, A., Chan, S.H.J., Aurich, M.K., Clancy, C.M., Modamio, J., Sauls, J.T., Noronha, A., Bordbar, A., Cousins, B., El Assal, D.C., Ghaderi, S., Ahookhosh, M., Ben Guebila, M., Apaolaza, I., Kostromins, A., Le, H.M., Ma, D., Sun, Y., Valcarcel, L.V., Wang, L., Yurkovich, J.T., Vuong, P.T., El Assal, L.P., Hinton, S., Bryant, W.A., Aragon Artacho, F.J., Planes, F.J., Stalidzans, E., Maass, A., Santosh Vempala, Hucka, M., Saunders, M.A., Maranas, C.D., **Lewis, N.E.**, Sauter, T., Palsson, B.Ø., Thiele, I., Fleming, R.M.T. (2019) Creation and analysis of biochemical constraint-based models: the COBRA Toolbox v3.0. *Nature Protocols*, 14:639–702. DOI: 10.1038/s41596-018-0098-2. PMCID: PMC6635304
- \*\*60. Courchesne, E., Pramparo, T., Gazestani, V.H., Lombardo, M.V., Pierce, K., **Lewis, N.E.** (2019) The ASD living biology: From cell proliferation to clinical phenotype. *Molecular Psychiatry*, 24(1):88–107. DOI: 10.1038/s41380-018-0056-y, PMCID: PMC6309606
- \*\*59. Kuo, C.C., Shamie, I., Chiang, A.W.T., Gutierrez, J.M., Samoudi, M., **Lewis, N.E.** (2018) Systems biology of protein secretion in mammalian cells, *Current Opinion in Biotechnology*, 51:64–69. DOI: 10.1016/j.copbio.2017.11.015. PMCID: PMC5988649
58. Abdel-Haleem, A.M., Hefzi, H., Mineta, K., Gao, X., Gojobori, T., Palsson, B.O., **Lewis, N.E.**, Jamshidi, N. (2018) Functional interrogation of Plasmodium genus identifies species-, stage-specific differences in nutrient essentiality and drug targets. *PLoS Computational Biology*, 14(1):e1005895. DOI: 10.1371/journal.pcbi.1005895, PMCID: PMC5771636.
57. Abdel-Haleem, A.M., **Lewis, N.E.**, Jamshidi, N., Mineta, K., Gao, X., Gojobori, T. (2017) The emerging facets of noncancerous Warburg effect. *Frontiers in Endocrinology*, 8:279. DOI: 10.3389/fendo.2017.00279, PMCID: PMC5660072.
- \*\*56. Spahn, P.N., Weiss, R., Esko, J.D., **Lewis, N.E.** ‡, Harismendy, O. ‡ (2017) PinAPL-Py: Platform-independent Analysis of CRISPR/Cas9 Pooled Screens. *Scientific Reports*, 7(1):15854. DOI: 10.1038/s41598-017-16193-9, PMCID: PMC5696473.
55. Hastings, J., et al. (2017) WormJam: Consensus *C. elegans* metabolic reconstruction and metabolomics community. *Worm*, 6(2): e1373939. DOI:10.1080/21624054.2017.1373939, PMCID: PMC5612476
- \*\*54. Richelle, A., **Lewis, N.** (2017) Improvements in protein production in mammalian cells from targeted metabolic engineering. *Current Opinion in Systems Biology*, 6, 1–6. DOI:10.1016/j.coisb.2017.05.019, PMCID: PMC5663301
53. Autran, C.A.\* , Kellman, B. \* , Asztalos, E., Blood, A., Hamilton Spense, E.C., Patel, A.L., Kim, J.H., Hou, J., **Lewis, N.E.**, Bode, L. (2017) Human milk oligosaccharide composition predicts risk of necrotizing enterocolitis in preterm infants. *Gut*, gutjnl-2016-312819. DOI:10.1136/gutjnl-2016-312819
- \*\*52. Opdam, S.\* , Richelle, A.\* , Kellman, B., Li, S., Zielinski, D.C., **Lewis, N.E.** (2017) A systematic evaluation of methods for tailoring genome-scale metabolic models. *Cell Systems*, 4:1–12. DOI:10.1016/j.cels.2017.01.010, PMCID: PMC5526624
- \*\*51. Spahn, P.N., Hansen, A.H., Kol, S., Voldborg, B.G., **Lewis, N.E.** ‡ (2017) Predictive glycoengineering of biosimilars using a Markov chain glycosylation model. *Biotechnology Journal*, 12. DOI:10.1002/biot.201600489, PMCID: PMC5293603
- \*\*50. Kallehauge, T.B., Li, S., Pedersen, L.E., Ha, T.K., Ley, D., Andersen, M.R., Kildegaard, H.F., Lee, G.M. ‡, **Lewis, N.E.**‡ (2017) Ribosome profiling-guided depletion of an mRNA improves CHO cell growth and recombinant product titers. *Scientific Reports*, 7:40388. DOI:10.1038/srep40388, PMCID: PMC5238448
49. van Wijk, X.M., Döhrmann, S., Hallström, B.M., Li, S., Voldborg, B.G., Meng, B.X., McKee, K.K., van Kuppevelt, T.H., Yurchenco, P.D., Palsson, B.O., **Lewis, N.E.**, Nizet, V., Esko, J.D. (2017) Whole Genome Sequencing of Invasion-Resistant Cells Identifies Laminin  $\alpha 2$  as a Host Factor for Bacterial Invasion. *mBio*, 8:e02128–16. DOI:10.1128/mBio.02128–16, PMCID: PMC5225314.
48. Shen, J.P., Zhao, D., Sasik, R., Luebeck, J., Birmingham, A., Bojorquez-Gomez, A., Licon, K., Klepper, K., Pekin, D., Beckett, A., Sanchez, K., Thomas, A., Kuo, C.C., Du, D., Roguev, A., **Lewis, N.E.**, Chang, A.N., Kreisberg, J.F., Krogan, N., Qi, L., Ideker, T., Mali, P. (2017) Combinatorial CRISPR-Cas9 screens for de novo mapping of genetic interactions. *Nature Methods*, 14(6):573–576. DOI: 10.1038/nmeth.4225, PMCID: PMC5449203
47. Lombardo, M.V., Courchesne, E., **Lewis, N.E.**, Pramparo, T. (2017) Hierarchical cortical transcriptome disorganization in autism. *Molecular Autism*, 8:29. DOI: 10.1186/s13229-017-0147-7, PMCID: PMC5480153.
- \*\*46. Hefzi, H.\* , Siong A.K.\* , Hanscho, M.\* , Bordbar, A.B., Ruckerbauer, D., Lakshamanan, M., Orellana, C.A., Baycin-Hizal, D., Huang, Y., Ley, D., Martinez, V.S., Kyriakopoulos, S., Jiménez, N.E., Zielinski, D.C., Quek, L.E., Wulff, T., Arnsdorf, J., Li, S., Lee, J.S., Paglia, G., Loira, N., Spahn, P.S., Pedersen, L.E., Gutierrez, J., Lund, A.M., Nagarajan, H., Thomas, A., Abdel-Haleem, A.M., Zanghellini, J., Kildegaard, H.F., Voldborg, B.G., Gerdtzen, Z.P., Betenbaugh, M., Palsson, B.O., Andersen,



- M.R., Nielsen, L., Borth, N. ‡, Lee, D.Y. ‡, **Lewis, N.E.** ‡. (2016) A consensus genome-scale reconstruction of CHO cell metabolism for improved biotherapeutic protein production. *Cell Systems*, 3, 434-443. DOI:10.1016/j.cels.2016.10.020, PMID: PMC5132346.
- \*\*45. Chiang, A.W.T., Li, S., Spahn, P.N., Richelle, A., Kuo, C.C., Samoudi, M., **Lewis, N.E.** ‡ (2016) Modulating carbohydrate-protein interactions through glycoengineering of monoclonal antibodies to impact cancer physiology. *Current Opinion in Structural Biology*, 10, 104–111. DOI: 10.1016/j.sbi.2016.08.008, PMID: PMC5161599
44. Swainston, N., Smallbone, K., Hefzi, H., Dobson, P.D., Brewer, J., Hanscho, M., Zielinski, D.C., Ang, K.S., Gardiner, N.J., Gutierrez, J.M., Kyriakopoulos, S., Lakshmanan, M., Li, S., Liu, J.K., Martínez, V.S., Orellana, C.A., Quek, L.E., Thomas, A., Zanghellini, J., Borth, N., Lee, D.Y., Nielsen, L.K., Kell, D.B., **Lewis, N.E.**, Mendes, P. (2016) Recon 2.2: from reconstruction to model of human metabolism. *Metabolomics*, 12:109. DOI: 10.1007/s11306-016-1051-4, PMID: PMC4896983.
- \*\*43. Golabgir, A.\*, Gutierrez, J.\*, Hefzi, H., Li, S., Palsson, B.O., Herwig, C.‡, **Lewis, N.E.** ‡. (2016) A workflow for integrating and interpreting the CHO bioprocessing bibliome. *Biotechnology Advances*, 34(5):621–633. DOI:10.1016/j.biotechadv.2016.02.011
- \*\*42. King, Z.A., Lu, J., Miller, P., Dräger, A., Ebrahim, A., Lerman, J., Palsson, B.O., **Lewis, N.E.**‡ (2016) BiGG Models: an expanded database for genome-scale metabolic network reconstructions. *Nucleic Acids Research*, 44:D515-22. DOI: 10.1093/nar/gkv1049, PMID: PMC4702785
- \*\*41. Spahn, P., Hansen, A.H., Hansen, H.G., Arnsdorf, J., Kildegaard, H.F., **Lewis, N.E.** ‡ (2016) A Markov chain model for N-linked protein glycosylation – towards a low-parameter tool for model-driven glycoengineering. *Metabolic Engineering*, 33: 52–66. DOI:10.1016/j.ymben.2015.10.007, PMID: PMC5031499
40. Huang, S., Chong, N., **Lewis, N.E.**, Jia, W., Xie, G., Garmire, L.X. (2016) Pathway-based metabolomics classification models reveal key metabolic pathways for breast cancer diagnosis and progression. *Genome Medicine*, 8:1. DOI: 10.1186/s13073-016-0289-9, PMID: PMC4818393.
39. Kumar, A., Baycin-Hizal, D., Wolozny, D., Pedersen, L.E., **Lewis, N.E.**, Chaerkady, R., Cole, R., Shiloach, J., Zhang, H., Bowen, M., Betenbaugh, M.J. (2015) Elucidation of the CHO Super-Ome (CHO-SO) by ProteoInformatics. *Journal of Proteome Research*, 14 (11), pp 4687–4703. DOI: 10.1021/acs.jproteome.5b00588
38. Ebrahim, A., et al. (2015) Do Genome-scale Models Need Exact Solvers or Clearer Standards? *Molecular Systems Biology*. 11: 831. DOI: 10.15252/msb.20156157
- \*\*37. Gutierrez, J.M., **Lewis, N.E.** ‡. (2015) Optimizing eukaryotic cell hosts for protein production through systems biotechnology and genome-scale modelling. *Biotechnology Journal*, 10:939–949. DOI: 10.1002/biot.201400647
36. Lee, J.S., Grav, L.M., **Lewis, N.E.**, Kildegaard, H.F. (2015) CRISPR Cas9 mediated genome engineering of CHO cell factories: Application and perspectives. *Biotechnology Journal*. 10:979–994. DOI: 10.1002/biot.201500082
- \*\*35. Abdel-Haleem, A.M., Abuelela, A.F, Solovyev, V., Jamshidi, N. ‡, **Lewis, N.E.** ‡. (2015) Model-Driven Analysis of Gene Expression Data: Application to Metabolic Re-programming during T-cell Activation. *BioComp*, 91-95.
34. King, Z.A., Dräger, A., Ebrahim, A., Sonnenschein, N., **Lewis, N.E.**, Palsson, B.O. (2015) Escher: A web application for building, sharing, and embedding data-rich visualizations of biological pathways. *PLoS Computational Biology*, 11:e1004321. DOI: 10.1371/journal.pcbi.1004321, PMID: PMC4552468
33. Pramparo, T., Campbell, K., Barnes, C.C., Marinero, S., Solso, S., Young, J., Mayo, M., Dale, A., Ahrens-Barbeau, C., Murray, S.S., Lopez, L., **Lewis, N.E.**, Pierce, K., Courchesne, E. (2015) Cell Cycle Networks in Gene Expression Dysregulation, Mutation and Brain Maldevelopment in Autistic Toddlers. *Molecular Systems Biology*, 11: 841. PMID: PMC4704485
32. Swann, J., Jamshidi, N., **Lewis, N.E.**, Winzeler, E. (2015) Systems Analysis of Host-Parasite Interactions. *WIREs Systems Biology and Medicine*, 7(6), 381–400. DOI: 10.1002/wsbm.1311, PMID: PMC4679367
31. Rodriguez, R.\*, Thomas, A.\*, Watanabe, L., Vazirabad, I.Y., Kofia, V., Gómez, H.F., Mittag, F., Matthes, J., Rudolph, J., Wrzodek, F., Netz, E., Diamantikos, A., Eichner, J., Keller, R., Wrzodek, C., Fröhlich, S., **Lewis, N.E.**, Myers, C.J., Le Novère, N., Palsson, B.O., Hucka, M., Dräger, A. (2015) JSBML 1.0: providing a smorgasbord of options to encode systems biology models. *Bioinformatics*, 31(20):3383-3386. DOI: 10.1093/bioinformatics/btv341
- \*\*30. Busskamp, V.\*, **Lewis, N.E.**\*, Guye, P.\*, Ng, A.H.M., Shipman, S.L., Byrne, S.M., Sanjana, N.E., Murn, J., Li, Y., Li, S., Stadler, M., Weiss, R., Church, G.M. (2014) Rapid neurogenesis through transcriptional activation in human stem cells. *Molecular Systems Biology*, 10:760. PMID: PMC4299601
- \*\*29. Hefzi, H., **Lewis, N.E.**‡. (2014) From random mutagenesis to systems biology in metabolic engineering of mammalian cells. *Pharmaceutical Bioprocessing*, 2:355-358.
- \*\*28. Spahn, P., **Lewis, N.E.**‡. (2014) Systems glycomics and glycoengineering. *Curr Opin in Biotech*, 30:218.
27. Kumar, A., Harrelson, T., **Lewis, N.E.**, Gallagher, E., LeRoith, D., Shiloach, J., Betenbaugh, M.J. (2014) Multi-tissue modeling analyzes pathophysiology of Type 2 Diabetes in MKR mice. *PLoS One*, 9(7): e102319.
26. Bordbar, A., Nagarajan, H., **Lewis, N.E.**, Schellenberger, J., Latif, H., Federowicz, S., Ebrahim, A., Palsson, B.O. (2014) Pathway-based coordinate system aids in gap discovery and expansion of regulatory network. *Molecular Systems Biology*, 10:737.
- \*\*25. Robasky, K.\*, **Lewis, N.E.**\*‡, Church, G.M. (2014) The role of replicates for error mitigation in next-generation sequencing. *Nature Reviews Genetics*, 15:56–62.

- \*\*24. Lewis, N.E.‡, Abdel-Haleem, A.M. (2013) The evolution of genome-scale models of cancer metabolism. *Front. Physiol*, 4:237.
- \*\*23. Lewis, N.E.\* , Liu, X.\* , Li, Y.\* , Nagarajan, H.\* , et al. (2013) Genomic landscapes of Chinese hamster ovary cell lines cell lines as revealed by the *Cricetulus griseus* draft genome. *Nature Biotechnology*, 31:759-65.
22. Kildegaard, H.F., Baycin-Hizal, D., Lewis, N.E., Betenbaugh, M.J. (2013) The Emerging CHO Systems Biology Era: Harnessing the 'Omics Revolution for Biotechnology. *Current Opinion in Biotechnology*, S0958-1669(13):00021.
21. Hyduke, D.R., Lewis, N.E., Palsson, B.Ø. (2013) Analysis of omics data with genome-scale models of metabolism. *Molecular BioSystems*, 9:167-174.
- \*\*20. Hefzi, H.H., Palsson, B.Ø., Lewis, N.E.‡. (2013) Reconstruction of genome-scale metabolic networks. In *Handbook of Systems Biology*, 229.
- \*\*19. Nam, H.J.\* , Lewis, N.E.\*‡, Lerman, J.A., Lee, D.H., Chang, R.L., Kim, D., Palsson, B.Ø.‡ (2012) Network context and selection in the evolution to enzyme specificity. *Science*, 337:1101-1104.
- \*\*18. Noor, E.‡, Lewis, N.E.‡, Milo, R. (2012) A proof for loop-law constraints in stoichiometric metabolic networks. *BMC Systems Biology*, 6:140. Paper designated as “Highly Accessed.”
17. Baycin-Hizal, D., Tabb, D.L., Chaerkady, R., Chen, L., Lewis, N.E., Nagarajan, H., Sarkaria, V., Kumar, A., Wolozny, D., Colao, J., Jacobson, E., Tian, Y., O'Malley, R.N., Krag, S., Cole, R.N., Palsson, B.O., Zhang, H., Betenbaugh, M.J. (2012) Proteomic analysis of Chinese hamster ovary cells. *Journal of Proteome Research*, 11:5265-76.
16. Lerman, J.A., Hyduke, D.R., Latif, H., Portnoy, V.A., Lewis, N.E., Orth, J.D., Schrimpe-Rutledge, A.C., Smith, R.D., Adkins, J.N., Zengler, K.A., Palsson, B.Ø. (2012) *In silico* method for modeling metabolism and gene product expression at genome scale. *Nature Communications*, 3:929.
- \*\*15. Lewis, N.E., Nagarajan, H., Palsson, B.Ø. (2012) Constraining the metabolic genotype-phenotype relationship using a phylogeny of *in silico* methods. *Nature Reviews Microbiology*, 10:291-305.
- \*\*14. Xu, X.\* , Nagarajan, H.\* , Lewis, N.E.\* , et al. (2011) The Genomic Sequence of the Chinese Hamster Ovary (CHO) K1 cell line. *Nature Biotechnology*, 29:735-41.
- \*\*13. Nam, H.J.\* , Conrad, T.M., Lewis, N.E.\* ‡. (2011) The role of cellular objectives and selective pressures in metabolic pathway evolution. *Current Opinions in Biotechnology*, 22:595-600.
12. Schellenberger, J., Que, R., Fleming, R.T., Thiele, I., Orth, J., Feist, A.M., Zielinski, D.C., Bordbar, A., Lewis, N.E., Rahmanian, S., Kang, J., Hyduke, D., Palsson, B.Ø. (2011) Quantitative prediction of cellular metabolism with constraint-based models: the COBRA Toolbox v2.0. *Nature Protocols*, 6:1290-307.
11. Conrad, T.M., Lewis, N.E., Palsson, B.Ø. (2011) Microbial Laboratory Evolution in the Era of Genome-Scale Science. *Molecular Systems Biology*, 7:509.
10. Schellenberger, J., Lewis, N.E., Palsson, B.Ø. (2011) Elimination of thermodynamically infeasible loops in steady state metabolic models. *Biophysical Journal*, 100:544-53.
- \*\*9. Lewis, N.E., Schramm, G., Bordbar, A., Schellenberger, J., Andersen, M.P., Cheng, J.K., Patel, N., Yee, A., Lewis, R.A., Eils, R., König, R., Palsson, B.Ø. (2010) Large-scale *in silico* modeling of metabolic interactions between cell types in the human brain. *Nature Biotechnology*, 28:1279–1285. Paper highlighted by *Nature Methods*, (January 2011).
- \*\*8. Lewis, N.E., Hixson, K.K., Conrad, T.M., Lerman, J.A., Charusanti, P., Polpitiya, A.D., Adkins, J.N., Schramm, G., Purvine, S.O., Lopez-Ferrer, D., Weitz, K.K., Eils, R., König, R., Smith, R.D., Palsson, B.Ø. (2010) Omic data from evolved *E. coli* are consistent with computed optimal growth from genome-scale models. *Molecular Systems Biology*, 6:390.
7. Conrad, T.M., Frazier, M., Joyce, A.R., Cho, B. K., Knight, E. M., Lewis, N.E., Landick, R., Palsson, B.Ø. (2010) RNA polymerase mutants found through adaptive evolution re-program *Escherichia coli* K-12 MG1655 for optimal growth in minimal media. *Proc. Nat. Acad. Sci. USA*, 107:20500-5.
6. Bordbar, A., Lewis, N.E., Schellenberger, J., Palsson, B.Ø., Jamshidi, N. (2010) Insight into human alveolar macrophage and *M. tuberculosis* interactions via metabolic reconstructions. *Molecular Systems Biology*, 6:422.
5. Portnoy, V.A., Scott, D.A., Lewis, N.E., Tarasova, Y., Osterman, A.L., Palsson, B.Ø. (2010) Deletion of genes encoding cytochrome oxidases and quinol monooxygenase blocks the aerobic-anaerobic shift in *Escherichia coli* K-12 MG1655. *Appl. Environ. Microbiol.*, 76:6529-40.
4. Bar-Even, A., Noor, E., Lewis, N.E., Milo, R. (2010) Design and analysis of synthetic carbon fixation pathways. *Proc. Natl. Acad. Sci. USA.*, 107:8889-8894.
- \*\*3. Lewis, N.E., Cho, B.K., Knight, E.M. Palsson, B. Ø. (2009) Gene expression profiling and the use of genome-scale *in silico* models of *Escherichia coli* for analysis: providing context for content. *Journal of Bacteriology*, 191:3437-44.
- \*\*2. Lewis, N.E., Jamshidi, N., Thiele, I. & Palsson, B.Ø. Metabolic systems biology: a constraint-based approach. In *Encyclopedia of Complexity and Systems Science* 5535 (Springer, New York, 2009).
1. Merrell, K., Southwick, K., Graves, S.W., Esplin, M.S., Lewis, N.E., Thulin, C.D. (2004) Analysis of low-abundance, low-molecular-weight serum proteins using mass spectrometry. *J. Biomol. Tech.*, 15:238-48.

## Patents

13. Kellman, B.P., **Lewis, N.E.**, Sandoval, D., Nachmenson, D., Chiang, W.T. Glycosylation engineering. Patent pending
12. **Lewis, N.E.**, Chiang, W.T., Kellman, B.P., Bao, B., Schinn, M.S. Clinical diagnostics using glycans. Patent WO2023034383A3.
11. Hefzi, H., **Lewis, N.E.**, la Cour Karotki, K.J., Kildegaard, H. Selection System for Heterologous Protein Expression in Mammalian Cells. Patent US20220356488A1.
10. Fuerst, T.R., Toth, E.A., **Lewis, N.E.**, Voldborg, B.G., Chiang, W.T. Glycoengineered Vaccines and Methods of Making the Same. Patent PCT/US2022/014338.
9. **Lewis, N.E.**, Chiang, W.T., Liang, C., Sorrentino, J.T. Method of Measuring Complex Carbohydrates at the Nano-Scale. Patent PCT/US2021/044139.
8. Martino, C., Kellman, B., **Lewis, N.E.**, Knight, R., Sandoval, D., Esko, J., Mandel-Clausen, T. Application of microbial glycosidase as a therapeutic or anti-viral. PCT/US2021/046144.
7. **Lewis, N.E.**, Spahn, P., Li, S., Hefzi, H., Shamie, I. Methods to Stabilize Mammalian Cells. Patent PCT/EP2020/078435.
6. **Lewis, N.E.**, Liang, C., Chiang, W.T.. (2019) Methods of Designing Carbohydrates. PCT/EP2020/082713
5. **Lewis, N.E.**, Chiang, W.T., Puig, M., Zhang, Y., Rosenberg, A. (2019) Method to Suppress Viral Infection of Mammalian Cells. Patent PCT/US2019/048361.
4. **Lewis, N.E.**, Gazestani, V., Pramparo, T., Courchesne, E. (2019) Expression-based diagnosis, prognosis, and treatment of complex diseases. Patent pending.
3. Hefzi, H., **Lewis, N.E.** (2017). Mammalian cells devoid of lactate dehydrogenase activity. US11242510B2.
2. Spahn, P., **Lewis, N.E.** (2016). A method for predicting glycosylation on secreted proteins. WO 2016187341 A1.
1. Herrgard, M.J., Pedersen, L.E., **Lewis, N.E.**, Bruntse, A.B. (2014). Methods for modeling Chinese hamster ovary (CHO) cell metabolism. WO2015010088-A1.

## Extramural funding

**1 R35 GM119850**

**Lewis (PI)**

**07/01/16-06/30/21**

**Unraveling the mammalian secretory pathway through systems biology and algorithm development**

This grant aims to reconstruct the mammalian secretory pathway and develop algorithms to use the pathway to simulate its functions and discover novel components.

**NNF20SA0066621**

**Lewis (PI)**

**01/01/21-12/31/23**

**National Biologics Facility**

The goal of this grant is to build computational models of glycosylation and protein secretion, and to use these to control heterologous expression of cytokines and biotherapeutics, in collaboration with the National Biologics Facility at the Technical University of Denmark

**Amgen**

**Lewis (PI)**

**12/01/18-4/01/23**

**Modeling cell scale metabolism in reactor scale bioprocesses**

This grant aims to build cell-scale metabolic models relevant to bioreactor scale phenotypes.

**1 R01MH121595**

**Pierce (PI), Lewis (Co- Investigator)**

**09/01/19-08/31/23**

**Testing the impact of early screening on the long-term outcomes of children with ASD.**

This grant examines the school age outcomes of children with ASD initially detected and referred for early treatment via our early detection program, "Get SET Early."

**CBET-2030039**

**Lewis (PI)**

**4/01/21-3/30/24**

**Elucidating essential factors for production of recombinant secreted proteins through proteomics.**

This grant aims to develop a method for measuring essential machinery for synthesizing mAbs and Fc-fusion proteins in CHO cells and identifying bottlenecks in the cells.

**Industry partner**

**Lewis (PI)**

**5/01/22-4/30/25**

**Elucidating metabolic and transcriptional drivers of AAV production through systems biology**

This grant aims to develop a model of metabolism for cells producing AAV for gene therapy. It further studies the transcriptional processes limiting production.

**Industry partner**

**Lewis (PI)**

**7/01/22-6/30/23**

**Towards a whole cell network reconstruction for CHO cells**

This grant aims to build a public knowledgebase of CHO cell metabolism and protein synthesis.

**Industry partner** Lewis (PI) 1/01/23-6/30/24

**Mapping out the protein interaction network of a production cell line**

This grant aims to use proteomic and systems biology methods to understand how a company's cell line produces their drug of interest.

**Industry partner** Lewis (PI) 6/1/23-5/30/26

**Reconstructing metabolism of a synthetic cell**

This grant aims to build metabolic models for optimizing protein production in a synthetic microbe.

**Industry partner** Geng (PI), Croker (PI), Lewis (PI), Aceves (PI) 7/15/22-7/15/24

**Genomic, Epigenomic, and High-Dimensional Cellular analysis of Type 2 Inflammation modulation by Dupilumab in Patients with Tissue Specific Atopy**

This grant aims to study the effect of Dupilumab on the immune system of children with inflammatory diseases through the use in single cell omics.

**Completed:**

**1 R21 CA199292** Esko (PI), Lewis (Co-Investigator) 07/01/15 – 06/31/17

**Genome-wide Analysis of Heparan Sulfate using CRISPR/Cas9**

This grant will use genome-wide CRISPR/Cas9 knockout screens to identify genes that modulate the transcription/translation of the enzymes or orchestrate their action to achieve the final composition of heparan sulfate observed in different cell types.

**1 R21 HD080682** Bode (PI), Lewis (Co-Investigator) 04/01/15 – 03/31/17

**Exploring Oligosaccharide Synthesis in Human Mammary Gland Epithelial Cells**

This grant will use RNA sequencing and glycan profiling data from primary cell culture models, with systems biology analysis to elucidate the enzymes responsible for human milk oligosaccharide synthesis.

**NNF16CC0021858** Palsson (PI), Lewis (Co-PI) 01/01/13-12/31/16

**Network Reconstruction and *in Silico* Biology for CHO – Chinese Hamster Ovary**

The goal of this grant is to build genome-scale models of Chinese hamster ovary metabolism and glycosylation, and use these models to interpret of genomic, transcriptomic, proteomic, metabolomic, and glycomic data.

**Genentech** Lewis (PI) 10/01/18-02/28/19

**Elucidation of RVL P identities in CHO cells**

In this grant we studied RVL P in CHO cells.

**1 R21 HD088953** Bode (PI), Lewis (Co- Investigator) 07/01/17-06/31/19

**Exploring Associations between Human Milk Oligosaccharides and Growth, Body Composition and Obesity Risk in Infancy and Early Childhood.**

This grant uses glycan profiling data from human subjects, with complex statistical models to elucidate the association of human milk oligosaccharides with infant growth and childhood obesity.

**Pfizer** Lewis (PI) 01/01/18-12/31/19

**Enhancing CHO 2.0 Performance through Systems and Synthetic biology**

The goal of this grant is to enhance Pfizer platform cells using computational models.

**Keck Foundation** O'Rourke (PI), Lewis (Co-PI), Church (Co-PI) 07/01/16-06/31/20

**Predictive modeling of animal metabolism: The *C. elegans* MetaboFlux Project**

This grant will develop technologies for sequencing, genetically perturbing, and modeling at a single cell level to study the metabolism in a whole-organism.

**2 R01 AI090141-05** Winzeler (PI), Lewis (Co-Investigator) 08/01/16-07/31/21

**Discovery of chemically validated malaria liver stage targets**

My role involves the transcriptomic analysis of host-parasite interactions following drug interventions.

<b>NNF10CC1016517</b> <b>CHO <i>in Silico</i> Engineering of Glycosylation and Protein Quality</b> The goal of this grant is to build computational models of glycosylation and protein secretion, and to use these to control heterologous protein expression.	<b>Lewis (PI)</b>	<b>01/01/17-12/31/20</b>
<b>1 R01 MH110558-01</b> <b>Developmental Functional Genomics in ASD Toddlers</b> This grant aims to develop gene expression biomarker networks for autism diagnosis and prognosis.	<b>Courchesne (PI), Lewis (PI)</b>	<b>09/01/16-06/30/21</b>
<b>R21AI154353</b> <b>Probing the Mechanisms of Fibroblast-Extracellular Matrix Interactions to Assess Disease Severity in Allergic Eosinophilic Esophagitis</b> In this grant we will study the how changes in the ECM in Eosinophilic Esophagitis impact healthy cell function and show that ECM swapping can be used for screening potential therapeutics	<b>Aceves (PI), Lewis (Co-I)</b>	<b>5/22/20-4/30/22</b>
<b>UH2AI153029</b> <b>ImmCellFIE: producing high-resolution snapshots of the functions of immune cells</b> This grant funds the development of an RNA-Seq data analysis webtool for ImmPort.org.	<b>Lewis (PI), Robasky (Co-PI)</b>	<b>6/02/20-5/31/22</b>
<b>Industry partner</b> <b>Lipid analysis with a biosynthetic Markov Network</b> In this grant we developed a computational model of lipid metabolism to aid in the analysis of murine lipid profiles in a NASH model with and without a drug treatment	<b>Lewis (PI)</b>	<b>1/1/21-8/31/21</b>

## External advisory roles

<b>2023 - present</b>	<b>Scientific Advisory Board</b> <i>CHO+Plus</i>
<b>2016 - 2017</b>	<b>Scientific Advisory Board</b> <i>Cipla BioTec</i>
<b>2016 - 2017</b>	<b>Advisory Committee Member, P41 Technology Development Grant</b> <i>Complex Carbohydrate Research Center, University of Georgia</i>

## Honors & awards

### Academic Awards, Scholarships, and Honor Societies:

- **Web of Science Highly Cited Researcher**, 2X: 2020, 2022
- **Otto Mønsted Foundation Gæsteprofessorater fellow**, 2020-2023
- **Siebel Scholar 2012** (academic/leadership award given to 85 students annually from top graduate programs in business, computer science, and bioengineering)
- The BYU Department of Chemistry **Outstanding Biochemistry Student Award** for the 2004-2005 school year (faculty-selected award given to the top student in the department each year)
- **Dean's list** for the BYU College of Physical and Mathematical Sciences
- **Phi Kappa Phi** National Honor Society
- National Chancellor's List
- National Dean's List (2x)
- Golden Key National Honor Society

Recipient of various academic scholarships at BYU, including the Snyder Academic Scholarship, the Department of Chemistry and Biochemistry Scholarship, and Dean's Choice Scholarship in the Department of Agronomy and Horticulture (2002-2005)

### Graduate and Post-doctoral Fellowships:

- Selected as **Whitaker Scholar** (full support for postdoctoral work) (2011; declined)
- Selected as **NSF Plant Systems Biology IGERT fellow** (full support) (Dec 2007 – Dec 2010)
- Selected as an **HHMI Med-Into-Grad fellow**, providing short-term clinical training in neurology and neurometabolic disorders (Fall 2009 - Winter 2010)
- Selected for the **Whitaker Fellowship** (2009; declined)
- **Fulbright Fellow** for 2008 -2009 (9 months, full support for research at Weizmann Institute, Israel)

- **NSF graduate fellowship honorable mention** (2x: 2007 & 2008)
- **Lawrence Fellowship short list** (2008; declined)

#### Research and Conference Awards:

- **Winning talk** at the 2008 HHMI Interfaces conference
- **Semi-finalist in the 2006 ABRF conference poster contest**
- Recipient of the **ORCA research fellowship**, and research was one of only a few chosen from hundreds of awardees to be spotlighted on the fellowship website (2005 - 2006)
- Recipient of the **Undergraduate Research Award** for the BYU Department of Chemistry and Biochemistry (2x: Winter and Fall 2004)

#### Teaching Awards:

- **2007-2008 UCSD Bioengineering departmental award** for excellence in teaching (two chosen annually from more than 50 teaching assistants)
- **Garth Lee Teaching Award** for teaching excellence, given to the top teaching assistants in the BYU Department of Chemistry (3x: Spring & Fall 2003, Spring 2006)

## Conference presentations and significant seminars

**Lewis, N.E. Upcoming Invited Talk**, BPI west: cell line development and engineering, San Diego, Mar 2024.

**Lewis, N.E. Upcoming Invited Talk**, Peptalk Protein Science Week, Jan 2024.

**Lewis, N.E. Upcoming Talk**, Protein expression in animal cells, Sitges, Spain, Sept 2023.

**Lewis, N.E. Upcoming Invited Seminars**, Technical University of Denmark, Lyngby, DK, Aug-Sept 2023.

**Lewis, N.E. Upcoming Invited Talk**, Metabolic Pathway Analysis, Seoul, South Korea, Jul 2023.

**Lewis, N.E. Invited Talk**, S2M2 Summer School in Metabolic Modeling, Braga, Portugal (virtual talk), July 2023.

**Lewis, N.E. Invited Seminar**, FujiFilm, Irvine, CA, May 2023.

**Lewis, N.E. Invited Seminar**, AbbVie, Lakeshore, IL, Apr 2023.

**Lewis, N.E. Chair and organizer**, Actionable Omics workshop at Cell Culture Engineering, Cancun, Mx, Apr 2023.

**Lewis, N.E. Discussion co-leader**, iBIONe Omics workshop at Cell Culture Engineering, Cancun, Mx, Apr 2023.

**Lewis, N.E. Talk**, Cell Culture Engineering, Cancun, Mx, Apr 2023.

**Lewis, N.E. Invited Talk**, Biopharma Focus on the Future, Dublin, Ireland, Apr 2023.

**Lewis, N.E. Keynote speaker**, Tercer Simposio sobre la producción y regulación de Biofármacos, Cuernavaca, MX, Mar 2023.

**Lewis, N.E. Invited Talk**, Americas Antibody Congress, San Diego, Mar 2023.

**Lewis, N.E. Invited Talk**, World Biosimilars Congress, San Diego, Mar 2023.

**Lewis, N.E. Keynote speaker**, Bioprocess international west: cell line development and engineering, San Diego, Mar 2023.

**Lewis, N.E. Invited workshop speaker**, Bioprocess international west premeeting workshops, San Diego, Mar 2023.

**Lewis, N.E. Invited Talk**, GlycoBioTec, Berlin, Germany, Jan 2023

**Lewis, N.E. Special International Speaker**, 19th Annual Symposium of Japan Consortium for Glycobiology & Glycotechnology, Gifu, Japan, Nov 2022.

**Lewis, N.E. Talk**, Born in California Meeting, Irvine, CA, Nov 2022.

**Lewis, N.E. Invited Talk**, Animal Cell Technology Industrial Platform conference, Madrid, Sept 2022.

**Lewis, N.E. Invited Seminar**, Vanderbilt, Sept 2022.

**Lewis, N.E. Talk**, Intelligent Systems in Molecular Biology, Madison, WI, July 2022.

**Lewis, N.E. Invited Talk**, S2M2 Summer School in Metabolic Modeling, Braga, Portugal (virtual talk), July 2022.

**Lewis, N.E. Talk**, Conference of the European Society of Animal Cell Technology, Lisbon, Portugal, June 2022.

**Lewis, N.E. Invited Talk**, Synthetic Biology: Engineering, Evolution & Design (SEED), Arlington, VA, May 2022.

**Lewis, N.E. Invited Talk**, 2022 San Diego Glycobiology Symposium, San Diego, Apr 2022

**Lewis, N.E. Invited Talk**, Gordon Research Conference on Patient-Centric, Modality-Independent, Data-Driven Biotherapeutic and Vaccine Development, Ventura, CA, March 2022.

**Lewis, N.E. Invited Talk**, Bioprocess international cell line development and engineering, San Diego, Mar 2022.

**Lewis, N.E. Invited Talk**, Americas Antibody Congress, San Diego, Mar 2022.

**Lewis, N.E. Invited Talk**, World Biosimilars Congress, San Diego, Mar 2022.

**Lewis, N.E. Invited Seminar**, Lonza, virtual, Mar 2022.

**Lewis, N.E. Invited Seminar**, AbbVie GRC Seminar series, virtual, Feb 2022.

**Lewis, N.E. Invited Talk**, Peptalk Protein Science Week, virtual, Jan 2022.

**Lewis, N.E. Invited Talk**, Annual meeting for the society for glycobiology, San Diego, CA, Nov 2021.

- Lewis, N.E. Invited Seminar**, Center for Proteomics and Metabolomics, Leiden University Medical Center, virtual, Oct 2021.
- Lewis, N.E. Invited Talk**, Import external advisory board meeting, virtual, Sept 2021
- Lewis, N.E. Invited Seminar**, Miracosta College, virtual, Sept 2021.
- Lewis, N.E. Invited Seminar**, Amgen, virtual, Aug 2021.
- Lewis, N.E. Invited Talk**, Critical Capabilities for Biologic Production, Aug 2021.
- Lewis, N.E. Invited Talk**, Bioprocess Summit, virtual, Aug 2021.
- Lewis, N.E. Invited Talk**, PEGS conference, virtual, July 2021.
- Lewis, N.E. Invited Talk**, Beilstein Glyco-Bioinformatics Symposium, Virtual, June 2021.
- Lewis, N.E. Keynote Speaker**, BPI West Cell Line Development & Engineering, virtual, May 2021.
- Lewis, N.E. Invited talk**, Human Cell Atlas Latin America Single-Cell RNA-seq Data Analysis Workshop, Apr 2021
- Lewis, N.E. Invited talk**, 2021 San Diego Glycobiology Symposium, Virtual, Apr 2021
- Lewis, N.E. Seminar**, Sanford Burnham Prebys Institute, virtual, Apr 2021.
- Lewis, N.E. Invited Talk**, World Biosimilars Congress, virtual, Mar 2021.
- Lewis, N.E. Invited Seminar**, AbbVie, virtual, Feb 2021.
- Lewis, N.E. Invited Talk**, Peptalk Protein Science Week, virtual, Jan 2021.
- Lewis, N.E. Invited Talk**, NextGen Omics, virtual Dec 2020
- Lewis, N.E. Invited Talk**, Import external advisory board meeting, virtual, Nov 2020,
- Lewis, N.E. Invited Talk**, PEGS conference, virtual, MA, Sept 2020.
- Lewis, N.E. Invited Talk**, BPI West Cell Line Development & Engineering, virtual, Sept 2020.
- Lewis, N.E. Invited Seminar**, Sanofi, virtual, Aug 2020.
- Lewis, N.E. Keynote Speaker**, BPI Europe, virtual, July 2020.
- Lewis, N.E. Talk**, ASBMB, virtual, July 2020.
- Lewis, N.E. Invited Seminar**, University College London, London, UK, Feb 2020.
- Lewis, N.E. Invited Talk**, World Biosimilars Congress, Coronado, CA, Mar 2020.
- Lewis, N.E. Invited Talk**, Peptalk Protein Science Week, San Diego, CA, Jan 2020.
- Lewis, N.E. Invited Seminar**, KTH Royal Institute of Technology, Stockholm, Sweden, Nov 2019.
- Lewis, N.E. Invited Talk**, Annual Meeting for the Society for Glycobiology. Phoenix, AZ, Nov, 2019.
- Lewis, N.E. Invited Seminar**, Brigham Young University, Provo, UT, Oct 2019.
- Lewis, N.E. Invited Seminar**, University of Maryland, Rockville, MD, Sept 2019.
- Lewis, N.E. Talk**, Protein expression in animal cells, Newport, RI, Sept 2019.
- Lewis, N.E. Invited Workshop Talk**, Fundamentals of Mammalian Cell Bioprocessing, Oceanside, CA Sept 2019.
- Lewis, N.E. Keynote Speaker**, UNAM CRISPR workshop, Cuernavaca, Aug 2019.
- Lewis, N.E. Talk**, Biochemical and Molecular Engineering XXI, Quebec, July 2019.
- Lewis, N.E. Invited Seminar**, KAIST, South Korea, June 2019
- Lewis, N.E. Invited Seminar**, Samsung Biologics, Seoul, South Korea, CA, June 2019
- Lewis, N.E. Invited Talk**, 46th annual meeting & international symposium hosted by the Korean Society for Microbiology and Biotechnology, June 2019
- Lewis, N.E. Keynote Speaker**, Cell line development and engineering, San Francisco, CA, June 2019
- Lewis, N.E. Invited Seminar**, Thermo Fisher Scientific, Carlsbad, CA, June 2019
- Lewis, N.E. Invited Seminar**, Norwegian University of Life Sciences (NMBU), Department of Chemistry, Biotechnology and Food Science (IKBM), May 2019
- Lewis, N.E. Invited Talk**, CHO genome workshop at the Conference of the European Society of Animal Cell Technology, Copenhagen, DK, May 2019
- Lewis, N.E. Keynote Speaker**, Recombinant Protein Production 10, Herklion, Greece, Apr 2019
- Lewis, N.E. Keynote Speaker**, BPI Europe: Cell line development and engineering, Vienna, Austria, Apr 2019
- Lewis, N.E. Invited Seminar**, Center for Computational Biology, La Jolla, CA, Mar 2019
- Lewis, N.E. Keynote Speaker**, Systems Biology, Bioinformatics, and Big Data in Medicine and Drug Development, Tokyo, Japan, Feb 2019
- Lewis, N.E. Invited Seminar**, Fujifilm Advanced Research Laboratory, Tokyo, Japan, Feb 2019
- Lewis, N.E. Invited Seminar**, UC San Diego – Kobe University – FBRI Joint Seminar on Systems Biology, Kobe, Japan, Feb 2019
- Lewis, N.E. Invited talk** at the 2019 San Diego Glycobiology Symposium, San Diego, CA, Feb 2019
- Lewis, N.E. Selected Talk**, GlycoBioTec, Berlin, Germany, Jan 2019
- Lewis, N.E. Invited Talk**, 18<sup>th</sup> annual PepTalk Protein Science Week, San Diego, CA, Jan 2019
- Lewis, N.E. Invited Seminar**, Department of Cellular and Molecular Medicine, La Jolla, CA, Jan 2019
- Lewis, N.E. Invited Seminar**, Irvine Scientific, Irvine, CA, Jan 2019
- Lewis, N.E. Selected Talk**, International Conference on Biomolecular Engineering, Newport Beach, CA, Jan 2019
- Lewis, N.E. Invited Seminar**, Bristol Myers Squibb, NJ, December 2018

- Lewis, N.E. Poster** Annual Meeting for the Society for Glycobiology. New Orleans, LA, Nov, 2018.
- Lewis, N.E. Keynote Speaker**, the 8th SLATCC - Latin-American Symposium on Animal Cell Technology, Rio de Janeiro, Brazil, October 2018.
- Lewis, N.E. Invited Talk**, the 5<sup>th</sup> Conference on Constraint-Based Reconstruction and Analysis, October 2018
- Lewis, N.E. Invited Seminar**, University of Kent, UK, October 2018
- Lewis, N.E. Invited Talk**, Annual BioProNet meeting, London, UK, October 2018
- Lewis, N.E. Invited Talk**, Annual meeting of the Center for Biosustainability, Helsingor, Denmark, September 2018
- Lewis, N.E. Talk**, CHO Systems Biology Summit, San Diego, CA, Aug 2018
- Lewis, N.E. Invited Talk**, CHO core, Technical University of Denmark, June 2018
- Lewis, N.E. Invited Seminar**, Center for Biosustainability, Technical University of Denmark, June 2018
- Lewis, N.E. Invited Talk**, Cell line development and Engineering, San Francisco, CA, June 2018
- Lewis, N.E. Invited Seminar**, Genentech, South San Francisco, CA, June 2018.
- Lewis, N.E. Poster**, Multifaceted mitochondria, San Diego, CA, June 2018.
- Lewis, N.E. Talk**, Omics workshop at Cell Culture Engineering, Tampa, FL, May 2018.
- Lewis, N.E. Talk**, Cell Culture Engineering, Tampa, FL, May 2018.
- Lewis, N.E. Invited Talk**. PEGS conference, Boston, MA, May 2018.
- Lewis, N.E. Invited Seminar**, Pfizer, Boston, MA, May 2018
- Lewis, N.E. Invited Talk**. Bioengineering platforms workshop, Heron Island, Australia, April 2018.
- Lewis, N.E. Invited Seminar**, University of Queensland, Brisbane, Australia, Apr 2018
- Lewis, N.E. Invited Talk**. 2018 San Diego Glycobiology Symposium, San Diego, CA, Mar 2018.
- Lewis, N.E. Invited Talk**. SLAS conference, San Diego, CA, Feb 2018.
- Lewis, N.E. Invited Talk**, 17<sup>th</sup> annual PepTalk Protein Science Week, San Diego, CA, Jan 2018
- Lewis, N.E. Invited Seminar**, Morgridge Institute at UW-Madison, Dec 2017
- Lewis, N.E. Invited Talk**, International Symposium for Trans-Omics, Tokyo, Japan, Nov 2017
- Lewis, N.E. Invited Talk**, Multi-scale systems biology methods for studying biomedical processes in patients under stress or with several chronic diseases, Riverside, CA, Nov 2017
- Lewis, N.E. Invited Seminar Lecture**, UNAM Frontiers in Genomics, Cuernavaca, Mexico, Oct 2017.
- Lewis, N.E. Invited Talk**, NGS, RNA-Seq, Single Cell Analysis & Single Molecule Analysis, San Diego, CA, Oct 2017.
- Lewis, N.E. Invited Talk**, Protein expression in animal cell culture conference, Valencia, Spain, Sept 2017.
- Lewis, N.E. Invited Talk**, Annual meeting of the Center for Biosustainability, Helsingor, Denmark, September 2017
- Lewis, N.E. Talk**, Biochemical and Molecular Engineering XX, Newport Beach, CA, July 2017.
- Lewis, N.E. Invited Talk**, Beatson International Cancer Conference, Glasgow, UK, July 2017.
- Lewis, N.E. Invited Seminar lecture**, Center for Biosustainability, Technical University of Denmark, June 2017
- Lewis, N.E. Invited Talk**, Beilstein Glyco-Bioinformatics Symposium, Berlin, Germany, June 2017.
- Lewis, N.E. Invited Talk**, Cell line development and Engineering, San Diego, CA, June 2017
- Lewis, N.E. Invited Talk**, Cell Culture World Congress, San Diego, CA, May 2017.
- Lewis, N.E., Hefzi, H., Joshi, C. Invited Talk**, GENiE Workshop, Cambridge, UK, April 2017
- Lewis, N.E. Invited Talk**, Data-driven Biotechnology conference, Copenhagen, Denmark, May 2017
- Lewis, N.E. Invited Talk**, Conference of the European Society of Animal Cell Technology, Lausanne, Sw, May 2017
- Lewis, N.E. Talk**, CHO Systems Biology Summit, San Diego, CA, Feb 2017
- Lewis, N.E. Talk**, GlycoBioTec, Berlin, Germany, Feb 2017
- Lewis, N.E. Invited talk** at the 2017 San Diego Glycobiology Symposium, San Diego, CA, Feb 2017.
- Lewis, N.E. Invited Talk**, Annual Pediatrics Research Symposium, San Diego, CA, Jan 2017
- Lewis, N.E. Invited Talk**, 16<sup>th</sup> annual PepTalk Protein Science Week, San Diego, CA, Jan 2017
- Lewis, N.E. Talk**, International Conference on Biomolecular Engineering, San Diego, CA, Jan 2017
- Lewis, N.E. Invited Seminar Lecture**, University of California, San Diego Department of Pathology, Oct 2016.
- Lewis, N.E. Invited Talk**, Annual meeting of the Center for Biosustainability, Copenhagen, Denmark, September 2016
- Lewis, N.E. Invited Talk/lecture**, Biochemical Pathways and Large Scale Metabolic Networks, Lausanne, Sw, Aug 2016
- Lewis, N.E. Invited Talk**, Bioprocessing Summit, Boston, MA, Aug 2016
- Lewis, N.E. Invited Seminar Lecture**, Bristol Myers Squib, Boston, MA, August 2016.
- Lewis, N.E. Invited Talk**, Mammalian Systems Biotechnology, Singapore, August 2016.
- Lewis, N.E. Invited Lecture**, Cipla Biotec SAB, London, UK, July 2016.
- Lewis, N.E. Invited Talk**, IBC Cell Line Development and Engineering, San Francisco, CA, June 2016.
- Lewis, N.E. Invited Talk**, Cell Culture World Congress, San Diego, CA, May 2016.
- Lewis, N.E. Selected Talk**, Cell Culture Engineering, Palm Springs, CA, May 2016.
- Lewis, N.E. Invited Seminar Lecture**, Novo Nordisk, Denmark, April 2016.
- Lewis, N.E. Invited Seminar Lecture**, GNF, San Diego, CA, April 2016.



**Lewis, N.E. Invited Seminar Lecture**, Amgen, Thousand Oaks, CA, April 2016.

**Lewis, N.E. Invited talk** at the 2016 San Diego Glycobiology Symposium, San Diego, CA, March 2016.

**Lewis, N.E. Selected Talk (Bioproduction)**, National meeting of the American Chemical Society, San Diego, Mar 2016.

**Lewis, N.E. Selected Talk (Systems Biology Technology)**, National meeting of the American Chemical Society, San Diego, Mar 2016.

**Lewis, N.E. Invited talk**. 15<sup>th</sup> annual PepTalk Protein Science Week, San Diego, CA, Jan 2016.

**Lewis, N.E. Keynote Talk**, Bioproduction Summit, San Francisco, CA, Nov 2015

**Lewis, N.E. Invited Seminar Lecture**, University of Maryland, Oct 2015.

**Lewis, N.E. Invited Seminar Lecture**, San Diego State University, Oct 2015.

**Lewis, N.E. Selected Talk**, Protein expression in animal cell culture conference, San Diego, Sept 2015.

**Lewis, N.E. Invited Talk**, Bioprocessing Summit, Boston, MA, Aug 2015

**Lewis, N.E. Poster**, Biochemical and Molecular Engineering, Puerto Vallarta, Mexico, July 2015.

**Lewis, N.E. Invited Talk**, Metabolic Pathway Analysis Conference, Braga, Portugal, June 2015

**Lewis, N.E. Poster**, Conference of the European Society of Animal Cell Technology, Barcelona, Spain, June 2015.

**Lewis, N.E. Invited Talk**, Cell Culture World Congress, San Diego, May 2015

**Lewis, N.E. Invited Seminar Lecture**, The Genetics, Bioinformatics and Systems Biology Colloquium, UCSD, May 2015.

**Lewis, N.E. Invited Seminar lecture**, Center for Biosustainability, Technical University of Denmark, April 2015

**Lewis, N.E. Invited Seminar Lecture**, Pediatric Faculty Research Seminars(PFRS), UCSD, March 2015.

**Lewis, N.E. Poster**, Glycobiology Gordon Research Conference, Barga, Italy, March 2015.

**Lewis, N.E. Invited Seminar Lecture**, Pediatrics Grand Rounds, Scripps Mercy Hospital, San Diego, CA, January 2015.

**Lewis, N.E. Invited talk** at the 14<sup>th</sup> annual PepTalk Protein Science Week, San Diego, CA, January 2015.

**Lewis, N.E. Invited talk** at the 2015 San Diego Glycobiology Symposium, San Diego, CA, January 2015.

**Lewis, N.E. Poster** at Annual Meeting for the Society for Glycobiology. Honolulu, HI, November, 2014.

**Lewis, N.E. Poster** at Systems Approaches to Metabolic Diseases, Chicago, IL, October 2014.

**Lewis, N.E. Invited talk** and "**Featured Presentation**". The 10th Annual IBC Cell Line Development and Engineering conference, Berkeley, CA, September 2014

**Lewis, N.E. Invited young investigator talk**, The 28th annual Protein Society Meeting, San Diego, CA, July 2014

**Lewis, N.E. Invited talk**, FACILIS 2014, Milan, Italy, July 2014

**Lewis, N.E. Talk** at the 3<sup>rd</sup> Conference on Constraint-Based Reconstruction and Analysis, May 2014

**Lewis, N.E. Invited Seminar lecture**, University of Copenhagen, March 10, 2014

**Lewis, N.E. Invited Seminar lecture**, Center for Biosustainability, Technical University of Denmark (DTU), March 11, 2014

**Lewis, N.E. Invited talk**, CHO genome workshop (international conference), Vienna, Austria, March 13, 2014

**Lewis, N.E., et al. Poster** at the Cell Factories and Biosustainability Conference, May 2013, Copenhagen, Denmark.

**Lewis, N.E. Invited Seminar lecture**, MRC Cancer Cell Unit, Cambridge, UK, March 2014

**Lewis, N.E. Invited Seminar lecture**, Georgia Institute of Technology, Department of Biomedical Engineering, Atlanta, GA, March 2014

**Lewis, N.E., et al. Talk** at the Q-Bio Winter Conference, February 2013, Honolulu, HI.

**Lewis, N.E., et al. Poster** at the Conference on Constraint-based Reconstruction and Analysis, October 2012, Copenhagen, Denmark.

**Lewis, N.E., et al. Talk** at SynBERC, September 2012, Cambridge, MA.

**Lewis, N.E., et al. Talk** at the International Conference on Systems Biology, August 2012, Toronto, Canada.

**Lewis, N.E. Invited Talk** at the IOMPA session of the International Conference on Systems Biology, August 2011, Heidelberg, Germany.

**Lewis, N.E., et al. Poster** at the International Conference on Systems Biology 2011, Heidelberg, Germany.

**Lewis, N.E. Invited talk** at the IBC Conference on Cell Line Development and Engineering 2011, Boston, MA.

**Lewis, N.E., et al. Poster** at the International Conference on Systems Biology 2009, Stanford, CA.

**Lewis, N.E., Palsson, B.Ø., Segal, E. Poster** at ISMB/ECCB 2009, Stockholm, Sweden.

**Lewis, N.E., et al. Talk** at the German Symposium on Systems Biology 2009, Heidelberg, Germany.

**Lewis, N.E., et al. Poster** at the IGERT 2008 meeting, Washington, D.C.

**Lewis, N.E., et al. Talk** and poster at the FASEB Experimental Biology 2008 meeting, San Diego, CA.

**Lewis, N.E., et al. Poster** at the Conference for the Association of Biomolecular Resource Facilities 2006, Long Beach, CA. Semi-finalist in the poster contest.

## Teaching experience

**Biochemical engineering 1: Bioreactor engineering (BENG 161A)** (Course on bioprocess engineering)  
University of California, San Diego, Fall 2021, Fall 2023 (scheduled).

**Fundamentals of Mammalian Cell Bioprocessing (BENG 207)** (Course on mammalian cell culture, bioprocessing, separations of biological products, and regulatory concerns in the biotechnology industry)

University of California, San Diego, Fall 2019.

**Biochemical engineering 2: Bioseparations (BENG 161B)** (Course on separations of biological products)

University of California, San Diego, Winter 2018, 2019, 2020.

**Bioinformatics Student Research Talks (BNFO 283)** (Course on effective research presentation and feedback for student work)

University of California, San Diego, Spring/Fall 2014, Winter/Spring/Fall 2015, Fall 2016, Winter/Spring/Fall 2017, Winter/Spring/Fall 2018, Winter/Spring 2019, Winter 2020, 2021, 2022, 2023, 2024 (scheduled).

**High throughput data and systems biology** (Measurement and statistical analysis of –omic data types, biological network construction and comparison, pathway simulation, nonlinear dynamics, constraint-based modeling, regulatory network modeling)

Brigham Young University, Winter 2013.

Developed and taught entire course.

**Systems Biology and Bioengineering with Bernhard Palsson, Ph.D.** (Constraint-based Modeling, Reaction Kinetics, Dynamic Analyses of Metabolic Network Functions, Linearization, Jacobian, Singular Value Decomposition)

Graduate Teaching Assistant, University of California, San Diego, Winter 2007/2008.

Was awarded the **2007-2008 departmental award** for excellence in teaching.

**Modeling and Computation in Bioengineering with Jeff Hasty, Ph.D.** (Modeling Non-linear Systems, Linearization, Jacobian)

Graduate Teaching Assistant, University of California, San Diego, Spring 2008.

**Human Anatomy with Professor David Busath, M.D.**

Undergraduate Teaching Assistant, Brigham Young University, Summer 2003.

**General Chemistry with Professors John Cannon, Delbert Eatough, Lee Hansen, and Paul Farnsworth**

Recitation Leader, Brigham Young University, 5x: Fall 2002 – Fall 2003 & Spring 2006.

Was awarded the **Garth Lee Award** three times for excellence in teaching.

## Doctoral committees

### Chair:

Alex Thomas (Ph.D., UCSD, Bioinformatics and Systems Biology, Graduated Oct 2015)

Hooman Hefzi (Ph.D., UCSD, Bioengineering, Graduated Feb 2018)

Jahir Gutierrez (Ph.D., UCSD, Bioengineering, Graduated July 2018)

Shangzhong Li (Ph.D., UCSD, Bioengineering, Graduated Mar 2019)

Benjamin Kellman (Ph.D., UCSD, Bioinformatics and Systems Biology, Graduated Sept 2020)

Chi-Chung Kuo (Ph.D., UCSD, Bioengineering, Graduated July 2021)

Isaac Shamie (Ph.D., UCSD, Bioinformatics and Systems Biology, Graduated Dec 2022)

Bokan Bao (Ph.D., UCSD, Bioinformatics and Systems Biology, Graduated Dec 2022)

James Sorrentino (Ph.D., UCSD, Bioinformatics and Systems Biology, Graduated Feb 2023)

Erick Armingol (Ph.D., UCSD, Bioinformatics and Systems Biology, Graduated May 2023)

Helen Masson (Ph.D., UCSD, Bioengineering, Graduated June 2023)

Hratch Baghdassarian (Ph.D., UCSD, Bioinformatics and Systems Biology)

Albert Liang (Ph.D., UC San Diego, Bioengineering)

### Co-chair:

Joanna Liu (Ph.D., UCSD, Bioinformatics and Systems Biology, Graduated Aug 2017)

### Committee Member:

Kimberly Robasky (Ph.D., Boston University, Bioinformatics, Graduated Aug. 2012)

Perry Ridge (Ph.D., Brigham Young University, Biology, Graduated Dec. 2012)

Victoria Catherine Corey (Ph.D., UCSD, Biomedical Sciences, Graduated Apr 2016)

Hoang Dinh (Masters, UCSD Bioengineering, Graduated 2017)

Chuankai Cheng (Masters, UCSD Bioengineering, Graduated 2017)

James Jensen (Ph.D., UCSD, Bioinformatics and Systems Biology, Graduated Dec 2018)

James Yurkovich (Ph.D., UCSD, Bioinformatics and Systems Biology, Graduated Apr 2018)

Nassim Ajami (Ph.D., UCSD, Bioinformatics and Systems Biology, Graduated June 2018)

Brian Yik Tak Tsui (Ph.D. UCSD, Bioinformatics and Systems Biology, Graduated 2018)

Yilan Shi (Ph.D., UCSD, Biomedical Sciences)

Daniel Sandoval (Ph.D., UCSD, Biomedical Sciences, Graduated 2019)

John Sauls (Ph.D., UCSD, Bioinformatics and Systems Biology, Graduated 2019)

Rob Foreman (Ph.D., UCSD, Bioinformatics and Systems Biology, Graduated 2019)

Shamim Ara Mollah (Ph.D. UCSD, Bioinformatics and Systems Biology, Graduated 2019)  
Margaret Donovan (Ph.D. UCSD, Bioinformatics and Systems Biology, Graduated 2019)  
Argus Jerome Athanas-Crannell (Ph.D. UCSD, Bioinformatics and Systems Biology, Graduated 2020)  
Gregoire Thouvenin (Ph.D. UCSD, Bioengineering, Graduated 2020)  
Bijie Ren (Ph.D. UCSD, Biology, Graduated 2021)  
Patrick Fiaux (Ph.D. UCSD, Bioinformatics and Systems Biology, Graduated 2021)  
Patrick Phaneuf (Ph.D., Bioinformatics and Systems Biology, Graduated 2021)  
Avi Kumar (Ph.D. UCSD, Bioengineering, Graduated 2021)  
Kevin Glass (Masters, UCSD Bioengineering, Graduated 2021)  
CJ Norsigian (Ph.D. UCSD, Bioengineering, Graduated 2021)  
Kanishk Asthana (Ph.D. UCSD, Bioinformatics and Systems Biology, Graduated 2022)  
Cameron Martino (Ph.D. UCSD, Bioinformatics and Systems Biology, Graduated 2022)  
Madeline Luth (Ph.D. UCSD, Biomedical sciences, Graduated 2022)  
Rick Zhenzhi Li (Ph.D. UCSD, Bioinformatics and Systems Biology, Graduated 2023)  
Kivilcim Ozturk (Ph.D. UCSD, Bioinformatics and Systems Biology, Graduated 2023)  
Gibraan Rahman (Ph.D. UCSD, Bioinformatics and Systems Biology, Graduated 2023)  
Jeffry Granados (Ph.D. UCSD, Bioengineering, Graduated 2023)  
Samson Fong (Ph.D. UCSD, Bioengineering, Graduated 2023)  
Edward Catoiu (Ph.D. UCSD, Bioengineering)  
Zachary Haiman (Ph.D. UCSD, Bioengineering)  
Jivani Manovathy Gengatharan (Ph.D. UCSD, Bioengineering)  
Juan Tibocha-Bonilla (Ph.D. UCSD, Bioinformatics and Systems Biology)  
Anna Trimble (Ph.D. UCSD, Bioengineering)  
Andrew Portell (Ph.D. UCSD, Bioengineering)  
Daniela Vo (Ph.D. UCSD, Bioinformatics and Systems Biology)  
Yi Fu (Ph.D. UCSD, Bioinformatics and Systems Biology)  
Ruth Elgamal (Ph.D. UCSD, Biomedical sciences)  
Karla Godinez (Ph.D. UCSD, Biomedical sciences)

**Chair/advisor (Masters Committees):**

Tyler Paul Huelsman (M.S., UCSD, Bioengineering, Graduated 2015)  
Anders Bech Bruntse (Technical University of Denmark, Graduated 2015)  
Caressa Robinson (M.S., UC San Diego, Bioengineering, Graduated 2020)  
Jamie Lee (M.S., UC San Diego, Bioengineering, Graduated 2020)  
Mia Altieri (M.S. UC San Diego, Computer Science and Engineering, Graduated 2021)  
Ying Min Wu (M.S., UC San Diego, Bioengineering, Graduating 2023)

**External Committee member:**

Christian Kaas (Ph.D., DTU, 2015)  
Alyaa Mahmoud (Ph.D., KAUST 2019)  
Erika Hagrot (Ph.D., KTH Sweden, 2019)  
Maximilian Lularevic (Ph.D., UCL, 2020)  
Peter Eisenhut (Ph.D., BOKU, 2020)  
Elli Makrydaki (Ph.D., Imperial College London, 2020)  
Leo Alexander Dworkin (University of Copenhagen, 2022)  
WenJen Lin (China Medical University, 2022)  
José Vítor de Castro Vieira (Universidade do Minho, 2022)  
Yves Grandjean (M.S., EPFL, 2022)

## University service

**University of California, San Diego:**

Limited Submissions Biomedical Sciences Early Career (2023 - present)  
Jr. Faculty Summer Institute Panel (2022)  
Chair of Bioinformatics student fellowship committee (2019 - present)  
Bioinformatics student fellowship committee (2015 - 2019)  
Bioinformatics brochure committee (2016)  
Bioinformatics PhD program recruitment committee (2016-present)  
Bioengineering PhD program application reviewer (2014-present)

Reviewer of PhD applicants for Bioinformatics programs (2014-present)

**Brigham Young University:**

Bioinformatics faculty search committee (2012 - 2013)

College Computer Users' Council – represented the Department of Biology (2013)

## Outreach activities

**Teaching science in a Seattle middle school (2005)**

In conjunction with the Institute for Systems Biology, I participated in a middle school science education outreach program, teaching science to students from less advantaged backgrounds.

**Assisting in science teaching in San Diego charter school (2007)**

Aided in teaching an 8<sup>th</sup> grade science course at a local charter school that focuses on teaching students from less advantaged backgrounds.

**Faculty advisor for UCSD iGEM team (2014)**

Team developed tool for cataloging genetic circuits (Gold medal at iGEM conference)

**Founder and faculty advisor for Highschool Data Science program (2019)**

Developed a biomedical data science summer program introducing high school students to the field.

## Conference administration

**Conference administration**

Conference organizing committee, PEACE, 2023, Stiges, Spain

Workshop organizer, Cell culture engineering 2023, Cancun, MX

Session chair, Peptalk protein science week, 2021, San Diego, CA

Conference organizing committee, PEACE, 2021, Virtual

Workshop organizer, Cell culture engineering 2020, Tucson, AZ

Session chair, Peptalk protein science week, 2020, San Diego, CA

Conference organizing committee, PEACE, 2019, Newport, RI

Session organizer and chair, Biochemical and molecular engineering 2019, Mont Tremblant, Quebec

Session organizer, National meeting of the American Chemical Society 2019

Meeting organizer and chair, CHO systems biology center research summit, 2018, San Diego, CA

Session chair, Cell line development and Engineering 2018, San Diego, CA

Workshop organizer, Cell culture engineering 2018, Tampa, FL

Session organizer and chair, Biochemical and molecular engineering 2017, Newport Beach, CA

Session chair, Cell line development and Engineering 2017, San Diego, CA

Session organizer, National meeting of the American Chemical Society 2017, San Francisco, CA

Meeting organizer and chair, CHO systems biology center research summit, 2017, San Diego, CA

Conference organizing committee, Mammalian systems biotechnology, 2016, Singapore

Session chair, Cell line development and Engineering 2016, San Francisco, CA

Poster session chair, Cell Culture Engineering, 2016, Palm Springs, CA

Session chair, National meeting of the American Chemical Society 2016, San Diego, CA

Program committee for the 11th Biotechnology and Bioinformatics Symposium, 2015, Provo, UT

Meeting organizer and chair, Microbial systems biology symposium, San Diego, CA

Program committee for the 10th Biotechnology and Bioinformatics Symposium, 2014, Provo, UT

Program committee for the 9th Biotechnology and Bioinformatics Symposium, 2013, Provo, UT