# Karamarie Fecho, PhD
# Publications and Products

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## PEER-REVIEWED JOURNAL ARTICLES

1. **Fecho K**,* Morris E*, Beasley J-M, Chung C-H, Edwards S, Glymph D, Korn D, Olasunkanmi O, Pasfield C, Ramon M, Richardson J, Tucker N, Williams D, Zheng W, Tropsha A,* Bizon C*. ROBOKOP v1.0: a knowledge graph–based system for exploring relationships across linked biomedical entities. *Sci Reports*, revision under peer review. **Apart from the first two co-lead authors and last two co-senior authors, all other authors are listed in alphabetical order.*
2. **Fecho K***, Balhoff J, Beasley JM, Bizon C, Edwards SW, Krishnamurthy A, Mandal M, Morris E, Tropsha A, Vaidya G, Wang M, Yi H, Peden DB*. Integrated query of three open-source bioinformatics tools to reveal clinical and molecular insights into environmental determinants of disease. *Comput Biol Med*, revision under peer review. **Apart from the first/lead author and last/senior author, all other primary authors are listed in alphabetical order.*
3. Morris E, Vaidya G, Owen P, Reilly J, **Fecho K**, Wang P, Kebede Y, Carter EK, Bizon C. The "I" in FAIR: Translating from Interoperability in Principle to Interoperation in Practice. *Sci Data*, preprint available at arXiv: https://arxiv.org/abs/2601.10008.
4. Mortensen H, Hench V, Shatz M, Schmitt S, Nymark P, Scott L, Hogberg H, Feshuk M, Thessen A, Hines D, Taylor Moxon S, **Fecho K**, Tucker N, Tropsha A, Balhoff J, Fostel J, Caufield JH, Filipovska J, Davis AP, Malinowska J, Kumar V, Martens M. Environmental Health Language Collective (EHLC) Adverse Outcome Pathway (AOP) Standards Workshop Report. *F1000Research*, preprint available at Zenodo: doi: 10.5281/zenodo.17903426.
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6. Gao Y, Mughal Z, Jaramillo-Villegas JA, Corradi M, Borrel A, Lieberman B, Sharif S, Shaffer J, **Fecho K**, Chatrath A, Maertens A, Teunis MAT, Kleinstreuer N, Hartung T, Luechtefeld T. BioBricks.ai: a versioned data registry for life sciences data assets. *Front Artif Intell (*Medicine and Public Health section) 2025;8:1599412. doi:10.3389/frai.2025.1599412.
7. **Fecho K***, Glusman G*, Baranzini SE, Bizon C, Brush M, Byrd W, Chung L, Crouse A, Deutsch E, Dumontier M, Foksinska A, Hadlock J, He K, Huang S, Hubal R, Hyde GM, Israni S, Kenmogne K, Koslicki D, Dorfman Marcette J, Mathe EA, Mesbah A, Moxon AT, Mungall CJ, Osborne J, Pasfield C, Qin G, Ramsey SA, Reese J, Roach JC, Rose R, Soman K, Su AI, Ta C, Vaidya G, Weber R, Wei Q, Williams M, Wu C, Xu C, Yakaboski C, and The Biomedical Data Translator Consortium. Announcing the Biomedical Data Translator: initial public release. *Clin Transl Sci* 2025;18(7):e70284. doi:10.1111/cts.70284. **Apart from the first two co-lead authors, all other authors are listed in alphabetical order.*
8. **Fecho K,** Tucker N, Beasley JM, Auerbach S, Bizon C, Tropsha A. Elucidating mechanistic relationships between peroxisome proliferator–activated receptors and hepatic fibrosis using the ROBOKOP knowledge graph. *Front Toxicol (Computational Toxicology and Informatics section)* 2025;7:1549268. doi: 10.3389/ftox.2025.1549268.
9. Sinha M*, Haaland P, Krishnamurthy A, Lan B, Ramsey SA, Schmitt PL, Sharma P, Xu H, **Fecho K***. Causal analysis for multivariate integrated clinical and environmental exposures data. *BMC Med Inform Decis Mak* 2025;25(1):27. doi:10.1186/s12911-025-02849-4. [Publisher's correction appears in *BMC Med Inform Decis Mak* 2025;25(1):78, doi: 10.1186/s12911-025-02911-1.] **Apart from the first/lead author and last/senior author, all other primary authors are listed in alphabetical order.*
10. **Fecho K***, Garcia JJ, Krishnamurthy A, Yi H. FHIR PIT: a geospatial and spatiotemporal data integration pipeline to support subject-level biomedical research. *BMC Med Infor Dec Mak* 2025;25(1):24. doi:10.1186/s12911-024-02815-6. [Publisher's correction appears in *BMC Med Inform Decis Mak* 2025;25(1):102, doi: 10.1186/s12911-025-02940-w.] **All authors contributed equally to this work and are listed in alphabetical order.*

11. **Fecho K***, Bizon C*, Issabekova T*, Moxon S*, Thessen AE*, Abdollahi S, Baranzini SE, Belhu B, Chung L, Crouse A, Duby MP, Ferguson S, Friedman J, Forero L, Foksinska A, Gardner V, Glusman G, Hadlock J, Hanspers K, Hinderer E, Hobbs C, Hyde G, Huang S, Koslicki D, Mease P, Ramsey SA, Roach J, Rubin I, Shalev A, Schurman SH, Smith B, Soman K, Stemann S, Su AI, Ta C, Watkins PB, Williams MD, Wu C, Xu CH; and The Biomedical Data Translator Consortium. An approach for collaborative development of a federated biomedical knowledge graph–based question-answering system: Question-of-the-Month Challenges. *J Clin Transl Sci* 2023;7(1):E214. doi.org/10.1017/cts.2023.619.**Apart from the first/lead author and subsequent four primary authors, all other authors served as secondary authors and are listed in alphabetical order.*
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13. **Fecho K***, Thessen AE*, Baranzini SE, Bizon C, Hadlock JJ, Huang S, Roper RT, Southall N, Ta C, Watkins PB, Williams MD, Xu H, Byrd W, Dančík V, Duby MP, Dumontier M, Glusman G, Harris NL, Hinderer EW, Hyde G, Johs A, Su A, Qin G, Zhu Q, and The Biomedical Data Translator Consortium. Progress toward a universal biomedical data translator. *Clin Transl Sci* 2022;15(8):1838–1847. doi: 10.1111/cts.13301. **Apart from the first two co-lead authors, all other authors are listed in alphabetical order.*
14. Unni DR*, Moxon SAT*, Bada M, Brush M, Bruskiewich R, Caufield JH, Clemons PA, Dančík V, Dumontier M, Fecho K, Glusman G, Hadlock JJ, Harris NL, Joshi A, Putman T, Qin G, Ramsey SA, Shefchek KA, Solbrig H, Soman K, Thessen AE, Haendel MA, Bizon C, Mungall CJ, and The Biomedical Data Translator Consortium. Biolink model: a universal schema for knowledge graphs in clinical, biomedical, and translational science. *Clin Transl Sci* 2022;15(8):1848–1855. doi: 10.1111/cts.13302. **Apart from the first two co-lead authors, all other authors are listed in alphabetical order.*
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18. Lan B*, Haaland P, Krishnamurthy A, Peden DB, Schmitt PL, Sharma P, Sinha M, Xu H, **Fecho K***. Open application of statistical and machine learning models to explore the impact of environmental exposures on health and disease: an asthma use case. *Int J Environ Res Public Health* 2021*;*18*(*21):11398 [published as part of a special issue titled “Application of Biostatistical Modelling in Public Health and Epidemiology”]. doi: 10.3390/ijerph182111398. **Apart from first/lead and last/senior author, all other authors are listed in alphabetical order.*
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21. **Fecho K***, Balhoff J, Bizon C, Byrd WE, Huang S, Koslicki D, Rensi SE, Schmitt P, Wawer MJ, Williams M, Ahalt SC*. Application of MCAT questions as a testing tool and evaluation metric for knowledge graph–

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31. **Fecho K**, Pfaff E, Xu H, Champion J, Cox S, Stillwell L, Bizon C, Peden D, Krishnamurthy A, Tropsha A, Ahalt SC. A novel approach for exposing and sharing clinical data: the Translator Integrated Clinical and Environmental Exposures Service. *J Am Med Inform Assoc* 2019;26(10):1064–1073. doi: 10.1093/jamia/ocz042.
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## PEER-REVIEWED VIDEOS

1. **Fecho K***†, Glusman G*†, Baranzini SE, Bizon C, Brush M, Byrd W, Chung L, Crouse A†, Deutsch E, Dumontier M, Foksinska A, Hadlock J, He K, Huang S, Hubal R, Hyde GM, Israni S, Kenmogne K, Koslicki D, Dorfman Marcette J, Mathe EA, Mesbah A, Moxon AT, Mungall CJ, Osborne J, Pasfield C, Qin G, Ramsey SA, Reese J, Roach JC, Rose R†, Soman K, Su AI, Ta C, Vaidya G, Weber R, Wei Q, Williams M, Wu C, Xu C, Yakaboski C, and The Biomedical Data Translator Consortium. Announcing the Biomedical Data Translator: initial public release. Video 1: Short tutorial. *Clin Transl Sci* 2025;18(7):e70284. doi:10.1111/cts.70284. **Apart from the first two co-lead authors, all other authors are listed in alphabetical order*. †*Production team.*

## WHITE PAPERS AND TECHNICAL REPORTS

1. Hanson B, Haaland P, **Fecho K**. Exploring demographic and environmental determinants of rare pulmonary disease using ICEES. RENCI White Paper, WP-25-08, Renaissance Computing Institute, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA, 2025. doi: 10.7921/qyy2-jb07. https://archive.renci.org/wp-content/uploads/2025/11/RENCI_Hanson_White-Paper_2025-08_Combined.pdf.
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3. Mandal M, Ceger P, **Fecho K**, Hench V, Vaidya G, Balhoff JP. Integration of adverse outcome pathway information into the Biomedical Data Translator. RENCI Technical Report, TR-25-01. Renaissance Computing Institute, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA, 20254. doi: 10.7921/76KE-BY69. https://renci.org/technical-reports/tr-25-01/.
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5. **Fecho K***, Callaghan J, Glusman G, Hadlock J, Krishnamurthy A, Ta C, Wang M. Federated learning over electronic health record data: a proposed implementation. RENCI Technical Report, TR-24-01. Renaissance Computing Institute, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA, 2024. doi: 10.7921/0XNF-TK92. https://renci.org/technical-reports/tr-24-01/. **Apart from the first/lead author, all other authors are listed in alphabetical order.*
6. **Fecho K**, lead contributor. Biomedical Data Translator Technical Documentation: Teams, Tools, and Resources. 2024. https://github.com/NCATSTranslator/Translator-All/wiki.
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9. Schmitt PL*, **Fecho K**, Haaland P, Krishnamurthy A, Lan B, Sharma P, Sinha M, Xu H. A framework for estimating the bounds of contingency tables: application to an open clinical service. RENCI Technical Report, TR-22-01. Renaissance Computing Institute, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA, 2022. doi: 10.7921/2261-7b16. https://renci.org/technical-reports/tr-22-01. **Apart from the first/lead author, all other authors are listed in alphabetical order.*
10. **Fecho K**, Ta C. DILI Network Steering Committee Technical Report. Update on Translator DILI Use Case and Workflow. Prepared by Fecho K and Ta C, with contributions from Ahalt SC. Krishnamurthy A, Watkins P. July 21, 2022.
11. **Fecho K**. NIEHS Technical Report. Translator versus Causaly: A Systematic Comparative Analysis. March 9, 2022.
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### BOOK CHAPTERS

1. **Fecho K**, Lysle DT. Acute effects of heroin on the cellularity of the spleen and the apoptosis of splenic leukocytes. In: Friedman H, Klein TW, Madden JJ (Eds) *Neuroimmune Circuits, Drugs of Abuse, and Infectious Diseases*, pp. 153–162. New York: Kluwer Academic/Plenum Publishers, 2001.
2. **Fecho K**, Maslonek KA, Dykstra LA, Lysle DT. Mechanisms whereby macrophage-derived nitric oxide is involved in morphine-induced immunomodulation. In: Sharp B, Eisenstein T, Madden J, Friedman H (Eds) *The Brain-Immune Axis and Substance Abuse*, pp. 149–153. New York: Plenum Press, New York, 1995.
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### REQUESTED SHORT ARTICLES AND BLOG POSTS

1. Fecho K, Glusman G. Bridging Biomedical Data Silos with the Biomedical Data Translator. Translational Bytes blog, American Society of Clinical Pharmacology & Therapeutics, December 18, 2025. https://www.ascpt.org/Journals/CTS/Translational-Bytes/View/ArticleId/28744/Bridging-Biomedical-Data-Silos-with-the-Biomedical-Data-Translator.
2. Ward-Caviness C*, **Fecho K**, Krishnamurthy A, Natonick J, Schmitt CP. NC researchers reconvene for second Clinical and Environmental Health Data workshop. RENCI blog, April 18, 2024. https://renci.org/blog/nc-researchers-reconvene-for-second-clinical-and-environmental-health-data-workshop/. **Authors are listed in alphabetical order [K. Fecho, lead author]*
3. Ward-Caviness C*, **Fecho K**, Krishnamurthy A, Schmitt CP, Tyndall S. NC researchers come together to harness the power of clinical and environmental health data. RENCI blog, June 9, 2023. https://renci.org/blog/nc-researchers-come-together-to-harness-the-power-of-clinical-and-environmental-health-data/. **Authors are listed in alphabetical order [K. Fecho, lead author].*

4. Harris NL, Moxon S, Unni D, **Fecho K**, Mungall C. Let's Connect! Biolink Model Brings Data Together. *ASCPT* Translational Bytes, March 13, 2023. https://www.ascpt.org/Journals/CTS/Translational-Bytes/View/ArticleID/28115.
5. **Fecho K.** Rules of Engagement: Writers and Editors. *AMWA Journal* 2014;29(4):166–167.
6. **Fecho K**. OS-41: Marketing Bingo! *AMWA Journal* 2014;29(1):23–24.
7. **Fecho K**. 2011 AMWA salary survey. *AMWA Journal* 2011;26(4):e4.

**PUBLISHED PEER-REVIEWED CONFERENCE PAPERS AND PROCEEDINGS**

1. **Fecho K**, Morris E, Glymph D, Shah H, Carter EK, Vaidya G, Tropsha A, Bizon C. Reasoning Over Biomedical Objects linked in Knowledge Oriented Pathways: Leveraging Ontologies for Data Normalization, Integration, and Query. Conference paper and oral presentation, International Conference on Biological and Biomedical Ontology, November 11, 2025. https://icbo-conference.github.io/icbo2025/.
1. **Fecho** K. Reasoning Over Biomedical Objects linked in Knowledge Oriented Pathways: Building Sustainable Solutions for Federally-funded Open-source Biomedical Tools and Technologies. Invited presentation, Intelligent Systems for Molecular Biology (ISMB) – International Society for Computational Biology (ISCB) *2025,* ISMB-ECCB 2025 joint NIH-ELIXIR session on "Ontologies and Knowledge Graphs in Biodata Systems", July 23, 2025. https://www.iscb.org/ismbeccb2025/scientific-programme/elixir.
2. Mandal M, Ceger P, Hench V, Vaidya G, Balhoff JP, **Fecho K**. Transforming AOPs to computationally link exposures to adverse outcomes: a real-world case study. Conference paper and poster presentation, SOT 2025, 64th Annual Meeting & ToxExpo, March 16-20, 2025, Orlando, FL. https://www.toxicology.org/pubs/docs/Prog/2025Program.pdf.
3. Carter K, **Fecho K**, Morris E, Beasley JM, Glymph D, Tucker N, Bizon C. Application of the ROBOKOP knowledge graph–based system for exploring relationships across linked biomedical and biopsychosocial entities. Conference paper and poster presentation, 27th Annual CyberPsychology, CyberTherapy and Social Networking Conference, Tempe, AZ, September 2024.
4. Garcia JJ, YI H, **Fecho K**, Krishnamurthy A. FHIR-PIT: Link FHIR records with environmental exposures. Conference paper and poster presentation, Bio-IT World, May 2023.
5. **Fecho K***, Ahalt SC, Krishnamurthy A, Pfaff E, Stillwell L, Yi H. Leveraging electronic health record data for environmental health research and WoE toxicology. Oral presentation, 11th Annual Meeting of the ASCCT, Shifting the Paradigm to Next-Generation (Quantitative) Risk Assessment, Session on Human Data and WoE Toxicology, October 2022. **Apart from the first/lead author, all other authors are listed in alphabetical order.*
6. Borland D, Brain I, **Fecho K**, Pfaff E, Xu H, Champion J, Bizon C, Gotz D. Enabling exploratory longitudinal analysis of UNC Health Data on COVID. Conference proceedings, 12th Workshop on Visual Analytics in Healthcare, Session 3 – COVID-19 and Public Health, conference paper #5, VAHC 2021, October 2021. https://vaclab.unc.edu/publication/vahc_2021_borland/.
7. **Fecho K***, Garantziotis S, Krishnamurthy A, Pfaff E, Schmitt C, Schurman S, Shuptrine S, Xu H, Ahalt A*. Open integrated analysis of multi-institutional data using ICEES. AMIA 2021 Virtual Annual Informatics Summit, March 2021. **Apart from first/lead and last/senior author, all other authors are listed in alphabetical order.*
8. **Fecho, K**, Bizon C, Miller FW, Schurman S, Schmitt C, Xue W, Wang P, Morton K, Cox S, Tropsha A. Use of the open ROBOKOP knowledge graph–based application to provide mechanistic explanations for observed associations between environmental exposures and immune-mediated diseases. AMIA 2020 Virtual Annual Symposium, November 2020.
9. **Fecho K***, Bizon C*, Cox S, Balhoff J, Kebede Y, Wang P, Morton K, Ahalt SC, Tropsha A. Application of a biomedical question-answering system to support reasoning on MCAT questions. AMIA 2020 Virtual Annual Symposium, November 2020. *Authors contributed equally to the work.
10. Cox S, Xu H, **Fecho K**, Bizon C, Tropsha A, Ahalt S. TranQL: a query language and interactive visualization tool for reasoning across clinical and biomedical knowledge graphs. AMIA 2020 Virtual Annual Symposium, November 2020.
11. Pfaff ER, Champion J, Cox S, Xu H, **Fecho K**, Krishnamurthy A, Chute CG, Overby Taylor C, Ahalt S. All roads lead to FHIR: an extensible clinical data conversion pipeline. AMIA 2019 Annual Informatics Summit, March 25-28, 2019, San Francisco, CA, USA.

12. Heroux MA, Allen G. Computational Science and Engineering Software Sustainability and Productivity (CSESSP) Challenges Workshop Report. Networking and Information Technology Research and Development (NITRD) Program. Arlington, VA, September 2016. [**Fecho K**, contributing author, Section titled “Economics of Software Tools”]
13. **Fecho K**, Kirschbaum K, Rask J, Ballard D, McFarlane C, Boysen P, Farrell T, Bitar R. Invitational rhetoric as a tool for improving communication between anesthesiologists and surgeons. Presented at the annual meeting of the American Society of Anesthesiologists, 2009.
14. **Fecho K**, Kopp V. ASA PS classification system differentiates miscellaneous complications. Presented at the annual meeting of the American Society of Anesthesiologists, 2009.
15. Harrell M, Nanda M, Meyer H, **Fecho, K**. An evaluation of nerve block duration and patient satisfaction. Presented at the annual meeting of the American Society of Anesthesiologists, 2009.
16. Rusak K, Newton T, Blau W, Coombs R, **Fecho K**. Postoperative pain management during and after continuous epidural infusion. Presented at the annual meeting of the American Society of Anesthesiologists, 2009.
17. McCulloch S, Hardman D, **Fecho K**. Regional anesthesia in a patient with end-stage renal disease: Balancing local anesthetic toxicity and block efficacy. Presented at the annual meeting of the American Society of Anesthesiologists, 2009.
18. Veneracion M, Hardman D, **Fecho K**. Distinguishing fact from fiction: delayed recognition and treatment of profound hypotension in a patient undergoing cervical spine surgery in the prone position. Presented at the annual meeting of the American Society of Anesthesiologists, 2009.
19. Hardman D, McCulloch S, **Fecho K**. Ultrasound guided brachial plexus anesthesia in a patient with end stage renal disease (ESRD): vascular structures and local anesthetic toxicity. Presented at the XXVIII Annual ESRA Congress, 2009.
20. Hardman D, Runkle D, **Fecho K.** Symptomatic phrenic nerve paralysis after ultrasound guided interscalene brachial plexus block (ISBPB): An unusual presentation. Presented at the XXVIII Annual ESRA Congress, 2009.
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22. **Fecho K**, Joyner L, Pfeiffer D. Code Blue emergencies and opioids. Discussion Poster. *Anesthesiology* 2008:109:A34.
23. Jackson F, Tyler E, Kim W, **Fecho K**, Spielman, F. Code Blue: Who responds, and which drugs and equipment are used, in academic anesthesia programs. Presented at the annual meeting of the International Anesthesia Research Society, March 2008.
24. Judge A, Winchester B, **Fecho, K**. Postoperative lateral antebrachial cutaneous neuropathy after general anesthesia. Presented at the annual meeting of the American Society of Anesthesiologists, October 2008.
25. Marroquin B, Neighbors J, **Fecho, K**, Salo-Coombs V, Spielman FJ. Can parturients identify midline during neuraxial block placement? *Anesthesiology* 2008;109:A1127.
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27. Wilson S, Meyer H, **Fecho, K.** Postoperative nausea and vomiting after breast surgery: Incidence and effects of midazolam. *Anesthesiology* 2008;109:A1262.
28. Blau WS, Longphre KM, **Fecho K,** Herald C. Why does continuous epidural infusion of analgesics often fail to provide effective postoperative pain control? Presented at the annual meeting of the International Association for the Study of Pain, World Congress on Pain, August 2008.
29. Vanterpool SG, **Fecho K**, Salo-Coombs V, Coombs RF. Continuous epidural infusion vs. extended-release epidural morphine after lower extremity arthroplasty. Presented at the annual meeting of the American Society of Regional Anesthesia & Pain Medicine, May 2008.
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33. Merritt SA, Miller NR, Klauber-DeMore N, McKenney SA, Hultman S, Lee CN, Blau WS, Norfleet, EA, **Fecho K**. Acute and chronic pain after lumpectomy, mastectomy or reconstructive breast surgery. Presented at the annual meeting of the Center for Women's Health Research, UNC-CH, April 2007.
34. **Fecho K.** Moore CG, Lunney AT, Norfleet EA, Boysen PG Intraoperative adverse events associated with inpatient and outpatient procedures. *Anesthesiology* 2006;105:A1388.
35. **Fecho K**, Faison JM, Valtschanoff, JG., Manning EL, Nackley AG, Maixner, W. Lewis and Fischer 344 rats differ in basal, acute inflammatory and neuropathic pain. Program No. 748.21. *2005 Abstract Viewer/Itinerary Planner*. WDC: Society for Neuroscience, 2005.
36. Nackley AG, Faison JM, Lambeth BL, **Fecho K**, Diatchenko L, Maixner W. Catechol-O-methyltransferase modulates pain behavior and cytokine production via $\beta$2/3-adrenergic receptor mechanisms. Program No. 393.14, *2005 Abstract Viewer/Itinerary Planner.* WDC: Society for Neuroscience, 2005.
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44. **Fecho K**, Lysle DT. Impact of morphine administration on the activity and trafficking of leukocytes: Implications for health and disease. Presented at the 8$^{th}$ annual statewide conference of the N.C. Governor's Institute on Alcohol and Substance Abuse, Inc., February 1999.
45. **Fecho K**, How T, Lysle DT. Effects of acute morphine treatment on leukocyte subpopulations in the spleen. Presented at the 17$^{th}$ Summer Symposium in Molecular Biology, Immune-Neuro-Endocrine Interactions: Cellular and Molecular Mechanisms, July 1998.
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48. **Fecho K**, Dykstra, LA, Lysle, DT. Macrophage-derived nitric oxide and mechanisms of suppression of mitogenic responsiveness in splenocyte cultures from morphine-treated rats. Presented at the Substance Abuse and the Brain-Immune Axis Symposium of the annual meeting of the College on Problems of Drug Dependence, June 1994.
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53. **Fecho K**, Maslonek KA, Dykstra L, Lysle DT. Sympathetic nervous system involvement in the immunomodulatory effects of morphine. Presented at the Research Perspectives in Psychoneuroimmunology IV meeting, Abstract No. 29, April 1993.
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**INTERNAL CONSORTIUM PUBLICATIONS**[1]

1. **Fecho K**. Translator Challenge Question of the Month: ATP1A3. *Translator Gazette*, October 2022.
2. **Fecho K**. Translator Challenge Question of the Month: Psoriatic Arthritis. *Translator Gazette*, August 2022.
3. **Fecho K**. Translator Challenge Question of the Month: SRI-37330. *Translator Gazette*, July 2022.
4. **Fecho K**. Translator Challenge Question of the Month: Cannabidiol and Valproic Acid. *Translator Gazette*, May 2022.
5. **Fecho K**. Translator Challenge Question of the Month: β-sitosterol and COVID-10. *Translator Gazette*, April 2022.
6. **Fecho K**. Translator Challenge Question of the Month: Valproic Acid and ALAS1. *Translator Gazette*, March 2022.
7. **Fecho K**. Calling All Translators … Announcing Translator Question of the Month Challenge. *Translator Gazette*, February 2022.
8. Korn D, Thieme AJ, Alves V M, Yeakey M, Borba JVVB, Capuzzi SJ, **Fecho K**, Bizon C, Edwards SW, Chirkova R, Colvis CM, Southall NT, Austin CP, Muratov EN, Tropsha A. Defining clinical outcome pathways [recap]. *Translator Gazette*, March 2022.
9. **Fecho K**, Krishnamurthy A, Ahalt S. Frontiers in artificial intelligence, special topic issue on biomedical informatics applications in rare diseases: leveraging open electronic health record data and environmental exposures data to derive insights into rare pulmonary disease [recap]. *Translator Gazette*, June 2022.
10. **Fecho K**. Open Multivariate Analysis Using ICEES. *Translator Gazette*, October 2021.
11. **Fecho K**. Relay Meeting Update from the Clinical Data Committee. *Translator Gazette*, June 2021.
12. **Fecho K**. Clinical Data Committee Snippet. *Translator Gazette*, February 2021.

**PHARMACEUTICAL AND TECHNICAL INDUSTRY PUBLICATIONS AND PRODUCTS**[2]

1. Simon J, Derogatis L, Portman D, Brown L, Yuar J, Kissling R. An open-label safety study of flibanserin in the treatment of hypoactive sexual desire disorder. *J Sex Med.* 2018 Mar;15(3):387-395. doi: 10.1016/j.jsxm.2017.12.016.
2. Belbuca® (buprenorphine buccal film), BioDelivery Sciences International, Inc., Raleigh, NC, Systematic Literature Review and Summary Tables, 2016.
3. Berinert® (C1 esterase inhibitor, human), CSL Behring LLC, King of Prussia, PA. Strategic Communications Plan, “Kidney Transplant”, 2016.
4. Xifaxan® (rifaximin), Salix Pharmaceuticals, Bridgewater, NJ. Educational Slide Deck, “Xifaxan (rifaximin) 550 mg. A Twice Daily Tablet to Reduce the Risk of Overt Hepatic Encephalopathy (HE) Recurrences”, 2016.

[1] Select examples are provided

[2] *>100 total; proprietary industry publications and products are not listed here*

5. Durlaza® (acetylsalicylic acid capsule), New Haven Pharmaceuticals, Inc., North Havent, CT, Sales Training Module, “Secondary Prevention of Cardiovascular Events and The Role of Aspirin”, June 2015.
6. Axial Exchange, Inc. Privacy Policy and Standard Operating Procedures, 2015.
7. Lanoxin® (digoxin tablets), DSM Pharmaceuticals, Inc., Greenville, NC, Standard Response Letter, 2014.
8. Xyrem® (sodium oxybate, oral solution), Jazz Pharmaceuticals, Inc., Palo Alto, CA, Wikipedia page update. 2014.
9. Prialt® (ziconotide intrathecal infusion), Jazz Pharmaceuticals, Inc., Palo Alto, CA, Promotional Slide Deck, “Pain Pathophysiology and Chronic Refractory Pain”, 2014.
10. Singla N, Barrett T, Sisk L, Kostenbader K, Young J, Giuliani M. “Open-Label Extension of a Randomized, Double-Blind, Placebo-Controlled, Phase 3 Study of the Safety and Analgesic Efficacy of MNK-795 Controlled-Release Oxycodone/Acetaminophen Tablets (CR OC/APAP) in an Acute Pain Model”. Annual Meeting of the American Academy of Pain Medicine, Phoenix, AZ, 2014.
11. Ping H, Morton T, Brunelle R, Devarakonda K. “Half-Value Duration Analysis for Oxycodone After Single and Multiple Doses of Oral MNK-795 (Oxycodone/Acetaminophen) Tablets”. PAINWeek 2013, Las Vegas, NV, 2013.
12. Rhiner M, Slatkin N, Stearns L, Dillaha L, Parikh N. “Patient Satisfaction Associated With Use of Fentanyl Sublingual Spray for the Management of Breakthrough Pain in Patients With Cancer of Different Types and Stages”. Annual Meeting of the American Pain Society, Honolulu, HI, 2012.

## SOFTWARE TECHNOLOGIES

1. **Translator System**: contributor to the development of the open-source Biomedical Data Translator System as a federated, knowledge graph–based, data ecosystem designed to generate mechanistic insights into clinical and laboratory observations (About Translator; Translator UI; Translator GitHub Organization)
2. **Biolink Model**: contributor to the development of the community-created Biolink Model as a universal schema and data model that formalizes the relationships between biomedical data structures and supports harmonization across data sources and ontologies (Biolink Model; Biolink Model GitHub Organization).
3. **ROBOKOP (Reasoning Over Biomedical Objects linked in Knowledge Oriented Pathways)**: contributor to the development of ROBOKOP as an open-source, modular, biomedical, knowledge graph (KG)–based system comprised of several key components: the ROBOKOP KG; a user interface; and a variety of supporting resources, including tools and services to support deep exploration of the ROBOKOP KG and the >50 underlying knowledge sources and ontologies (ROBOKOP application; ROBOKOP GitHub Organization).
4. **BioBricks–Open Knowledge Graph**: contributor to the development of the BioBricks–Open Knowledge Graph collection of KGs specialized in cheminformatics and chemical safety (BioBricks.ai; BioBricks GitHub Organization).
5. **ICEES (Integrated Clinical and Environmental Exposures Service)**: co-leading the development of ICEES as an open-source, regulatory-compliant platform and approach for exposing and analyzing sensitive patient data that have been integrated at the patient level with environmental exposures data (ICEES Asthma Instance; ICEES PCD Instance; ICEES COVID Instance; ICEES DILI Instance; ICEES API GitHub Repository).
6. **CAMP FHIR (Clinical Data Mapping Program for Fast Healthcare Interoperability Resources)**: contributor to the development of CAMP FHIR as an open-source software application designed to convert patient data from common data models (e.g., i2b2, PCORnet, OMOP) to FHIR files, coupled with reverse mappings (CAMP FHIR GitHub Repository).
7. **FHIR PIT (Fast Healthcare Interoperability Resources Patient data Integration Tool)**: co-leading the development of FHIR PIT as an open-source geospatial and spatiotemporal software data integration pipeline designed to integrate FHIR files with other sources of geospatial and spatiotemporal data (FHIR PIT GitHub Repository).
8. **Airborne Pollutant Exposures Service**: co-leading the development of an open application programming interface (OpenAPI) that returns US EPA estimates of exposure to airborne particulate matter ($PM_{2.5}$) and ozone

in response to input of a geocode(s) (latitude, longitude) and time period(s) of interest (Airborne Pollutant Exposures user interface; Airborne Pollutant Exposures GitHub Repository).

9. **Roadway Exposures Service**: co-leading the development of an OpenAPI that returns US DOT estimates of distance in meters from the nearest major roadway or highway in response to input of a geocode(s) (latitude, longitude) (Roadway Exposures user interface; Roadway Exposures GitHub Repository).
10. **Socioeconomic Exposures Service**: co-leading the development of an OpenAPI that returns US Census Bureau estimates of exposures to socioeconomic indicators such as poverty and access to health insurance in response to input of a geocode(s) (latitude, longitude) and time period(s) of interest (Socioeconomic Exposures user interface; Socioeconomic Exposures Service GitHub Repository).
11. **TranQL (Translator Query Language)**: contributed to the development of TranQL as an open-source web interface and visualization environment designed to integrate clinical and non-clinical biomedical knowledge graphs (TranQL user interface; TranQL GitHub Repository).