CARRIE A. **FRANZEN**

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**Summary**

Highly experienced laboratory-trained scientist, with over 20 years of expertise in cancer research, including solid tumors and hematological malignancies, with a strong focus on tumor-microenvironment interactions. Familiarity with immunology research related to celiac disease and Crohn’s disease. Proven leadership in managing the daily operations of a CAP-accredited biorepository, overseeing teams of up to seven personnel. Skilled in translational research, cell imaging, cell-ECM and cell-cell interactions, SOP development, and ensuring CAP compliance. Enthusiastic and detail-oriented, with a passion for advancing scientific discovery and operational excellence.

**Skills**

**Laboratory & Research Techniques**

* Molecular biology techniques
* Tissue culture, including primary and tumor derived cells, primary tumor organoids, cell lines, and co-culture models
* Fixed (wide-field, confocal, and deconvolution) and live cell imaging
* Gene manipulation, including CRISPR-Cas9
	+ Cell based assays, including cell-matrix and cell-cell adhesion, cell migration, cell invasion, MTT assays, and ELISA assays
* Flow cytometry – surface and intracellular staining with up to 30 markers
* PCR & qPCR

**Biorepository & Compliance**

* CAP accreditation & compliance
* Standard Operating Procedures (SOP) development
* Sample processing & storage
* Biospecimen quality control

**Data Analysis & Software**

* Image analysis (e.g., ImageJ, Imaris)
* Statistical analysis (e.g., GraphPad Prism)
* FlowJo

**Leadership & Management**

* Team leadership & mentoring (Managed up to 7 people)
* Laboratory operations management
* Grant writing & scientific communication
* Project coordination

**Relevant Experience**

**Principal Scientist, Biological Modeling Lab 04/2023 to 01/2025**

**Tempus AI**

* **Head of the Tempus Biorepository**
	+ Oversaw daily operations of the Tempus Modeling Lab biorepository, including inventory management, specimen processing, and quality assurance for over 5000 samples.
	+ Managed and trained a team of up to 7 staff members, ensuring compliance with regulatory standards and fostering a collaborative work environment.
	+ Led weekly CAP biorepository meetings and monthly QC meetings.
	+ Maintained CAP-related documentation (including SOPs, deviations non-conformance reports, CAPAs), ensuring adherence to CAP standards.
	+ Implemented process improvements to optimize biorepository workflows, reducing turnaround time and enhancing efficiency.
	+ Reviewed tumor organoid panels for commercial projects, ensuring the use of only high-quality lines to maintain research integrity and reliability. Directed and trained team members in proper cell line maintenance to support project success.
	+ Ensured compliance with all regulatory and safety protocols, maintaining the highest standards for sample integrity and data security.

**Senior Scientist, Biological Modeling Lab 10/2021 to 04/2023**

**Tempus AI**

* **Head of the Tempus Biorepository**
	+ Oversaw the end-to-end biorepository process, from tumor tissue receipt to biobanking tumor organoid lines, ensuring high-quality sample preservation.
	+ Collaborated with the quality team to maintain CAP accreditation, conducting monthly QC meetings and regularly reviewing documentation for compliance.
	+ Developed, write, and revise **Standard Operating Procedures (SOPs)** for the entire biorepository workflow to optimize efficiency and adherence to regulations.
	+ Led **weekly CAP biorepository meetings**, driving process improvements and regulatory alignment.
	+ Managed and mentor **two direct reports**, ensuring smooth day-to-day operations and professional development.
	+ **Directed a project implementing CRISPR gene editing** in human tumor organoid lines, advancing research capabilities and scientific innovation.

**Laboratory Manager/Research Professional 06/2019 to 10/2021**

**University of Chicago Chicago, Illinois, IL**

* **Laboratory Management & Operations**
	+ Managed **weekly ordering and budgeting** for a research lab of 20 members, ensuring efficient resource allocation.
	+ Scheduled **regular and emergency maintenance** for critical lab equipment, including Fortessa X-20, Canto, Sorvall tabletop centrifuges, refrigerators, and freezers.
	+ Negotiated **service contracts and maintained active relationships** with suppliers and service providers to optimize cost and efficiency.
	+ Oversaw **lab safety compliance**, ensuring all lab members were up to date on training and adhered to safety protocols.
	+ Served as **Lab Safety Contact**, developing and enforcing the **COVID-19 research resumption plan**, conducting **weekly safety inspections**.
	+ Assigned and enforced **lab responsibilities**, fostering accountability and organization within the research team.
* **Clinical Trial Research – Immuno-Pharmacogenomics in Crohn’s Disease (IPUB)**
	+ Processed and analyzed **Crohn’s disease patient samples**, isolating **lamina propria lymphocytes (LPLs)** from inflamed and non-inflamed colonic biopsies for **10X RNA-seq** and multi-parametric flow cytometry.
	+ Stained LPLs using a **30-color flow cytometry panel** and analyzed samples on the **Cytek Aurora.**
	+ Conducted **multidimensionality reduction analysis** to interpret complex flow cytometry data.
	+ Processed **luminal aspirates and stool samples** for **microbiome and metabolomics studies,** contributing to translational research insights.
* **Secondary Research Projects**
	+ **Celiac Disease RNA-seq Study:** Isolated **RNA and DNA from duodenal biopsies** for transcriptomic analysis.
	+ **TCRγδ Receptor Mutations in Celiac Disease:** Created mutant **TCRγδ receptors** to study **in vivo signaling** and identify potential ligands.
	+ lncRNA Role in Celiac Disease:
		- Isolated **intraepithelial lymphocytes (IELs)** and LPLs from duodenal biopsies.
		- Stained and sorted **IELs and LPLs** for downstream analysis.
		- Conducted **stimulation experiments** and isolated **RNA from cell lines** to investigate non-coding RNA function in disease pathogenesis.

**Research Professional I**

**University of Chicago 01/2017 to 06/2019**

 **Chicago, Illinois, IL**

* **Major Research Project:**
	+ Studied the ability of live CLL cells to reside inside bone marrow fibroblasts using time lapse confocal microscopy and Image J and Imaris analysis tools
	+ Investigated the effects of **FDA-approved drugs (ibrutinib and venetoclax)** - both as monotherapy and combination therapy - on **tumor-stroma interactions** using an **ex vivo co-culture model (CLL/bone marrow stroma)** and **time-lapse microscopy**.
* **Secondary Research Project**
	+ Characterized discrete **CLL sub-populations** that exhibit selective drug responsiveness and evaluated the efficacy of **combinatorial therapies** on drug-resistant cells.
* **Achievements and Leadership:**
	+ **Published two peer-reviewed papers**, with one additional manuscript in preparation.
	+ Delivered **one oral presentation** at the **Lymphoma Research Foundation National Meeting (2018)** and contributed to **three abstract submissions**.
	+ Assisted in the **preparation of NIH funding applications**, supporting research grant development.
	+ Presented research findings **annually** to research staff, fostering collaboration and discussion.
	+ Maintained **close partnerships with clinical laboratories and cell imaging facilities** to advance research efforts.
* **Mentorship & Training:**
	+ **Mentored technicians and postdoctoral fellows** in experimental design, data analysis, and manuscript writing.
	+ Provided hands-on training in **laboratory techniques, imaging methodologies, and research best practices** to support project execution.

**Postdoctoral Fellow 07/2012 to 07/2015**

**Loyola University Maywood, IL**

* **Major Research Project:**
	+ - * Investigated **tumor-promoting effects** of **bladder cancer urinary exosomes** on primary urothelial cells, demonstrating their role in **epithelial-mesenchymal transition (EMT).**
			* Designed and optimized **protocols for exosome isolation, analysis, and utilization** from both cell lines and patient-derived samples.
		- **Secondary Research Project:**
			* Developed a **novel method** to characterize the uptake of **bladder cancer exosomes** by cancer cells, advancing understanding of tumor progression mechanisms.
		- **Achievements & Leadership:**
			* Published **eight peer-reviewed papers**, including **two first-author research articles** and **one first-author review article**.
			* Submitted **four abstracts** and presented a **poster at a national extracellular vesicles conference (2013).**
			* Assisted in the **preparation of funding applications**, contributing to grant writing efforts.
			* Collaborated closely with the **flow cytometry core** to enhance research capabilities.
		- **Mentorship & Training:**
			* + **Mentored one medical student and two medical residents** in **experimental design, data analysis, and manuscript preparation**, fostering research skills and academic development.
		- **Laboratory Management:**
			* Oversaw **laboratory ordering** and maintained supply inventory to support research operations.
			* Established and maintained **vendor relationships**, ensuring seamless procurement of essential laboratory materials.

# **Postdoctoral Research Fellow 09/2006 to 06/2012**

**Northwestern University Chicago, IL**

* **Major Research Project:**
	+ - * Discovered and analyzed the ability of the bioflavonoid, apigenin, to impair prostate cancer cell attachment, migration, and invasion.
		- **Secondary Research Project**:
			* Determined a novel role for the desmosomal protein Plakoglobin in the regulation of prostate cancer cell adhesion and motility.

# **Achievements & Leadership:**

* + - * Published four peer-reviewed papers, including two first-author research articles.
			* Presented three abstracts as poster presentations at Cytoskeleton Signaling in Cancer national meeting (2007), AACR annual meting (2012), and Aspen Cancer Conference (2012).
			* Presented research updates to fellow research staff annually.
			* Awarded the American Cancer Society Postdoctoral Fellowship (2010-2012).
			* Recognized for best oral presentation at the Northwestern Department of Pathology retreat (2010).
			* Received the Ruth L. Kirschstein National Research Service Award (2006-2007).
			* Maintained **close partnerships with the cell imaging facility, Dr. Kathleen Green's and Dr. Bartosz Grzybowsky's laboratories.**
		- **Mentorship & Training:**
			* Mentored three graduate students in experimental design, data analysis, and manuscript preparation, fostering research skills and academic development.

**Graduate Research Assistant** **07/1999 to 08/2006**

**University of Illinois Chicago, Illinois, IL**

* **Major Research Project:**
	+ - * Investigated the ability of the ECM protein, CCN1, to enhance the tumor-killing

properties of TRAIL through the engagement of integrin receptors on prostate cancer cells.

* + - * Designed experiments to quantitate cell apoptosis, study cell-ECM adhesion, genetically manipulate CCN1 expression, examine the surface expression of integrin and TRAIL receptors, and use chemical inhibitors to ascertain the signaling cascade involved in this effect.
		- **Achievements & Leadership:**
			* Published one first-author peer-reviewed research article.
			* Presented one abstract as a poster presentation at the AACR annual meeting (2006).
			* Presented research updates to fellow research staff annually.
			* Awarded first place in the UIC College of Medicine Student Research Forum (2006)
			* Awarded an honorable mention at the Sigma Xi research competition at UIC (2006)

**Education and Training**

**Ph.D.**: **Molecular Genetics 2006**

University of Illinois at Chicago Chicago, IL, US

Thesis: CCN1(CYR61)-TRAIL mediated apoptosis in prostate carcinoma cells

**Bachelor of Arts**: **Biological Sciences 1999**

Augustana College Rock Island, IL, US

* Member of the Aristeia Honor Society at Augustana College, 1997
* Award for academic excellence at Augustana, 1997
* Magna cum laude graduate

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**Public Service/Institutional Service**

* + American Cancer Society Postdoctoral Fellowship, 2010-2012
	+ Award for best oral presentation at the Northwestern University Department of Pathology retreat, 2010
	+ Co-director of Northwestern Calandra Forum, 2007-2008
	+ Judge at the UIC College of Medicine student research forum, 2007
	+ Institutional Ruth L. Kirschstein National Research Service Award, 2006-2007
	+ Honorable Mention at Sigma Xi competition, UIC, 2006
	+ First place winner of the UIC College of Medicine student research forum
	+ Member of the Aristeia Honor Society at Augustana College, 1997

**List of Abstracts**

1. W. Wang, **C.A. Franzen**, M. Sukhanova, G. Venkataraman, M. Ming, A. Guo, P. Lu, D. Sheng, A. Gao, C. Xia, J. Li, X. Zhou, and Y. L. Wang. RAC2 mediates the link between B-Cell Receptor signaling and cell adhesion in mantle cell lymphoma. Lymphoma Research Foundation Mantle Cell Lymphoma Workshop, Atlanta, 2018, *Oral Presentation*.
2. W. Wang, **C.A. Franzen**, M. Sukhanova, G. Venkataraman, M. Ming, A. Guo, P. Lu, D. Sheng, A. Gao, C. Xia, J. Li, X. Zhou, and Y. L. Wang. RAC2 links B-cell receptor signaling and cell adhesion in mantle cell lymphoma. American Society for Hematology, Atlanta, 2017, *Poster presentation*.
3. **C.A. Franzen**, K.A. Greco, R.H. Blackwell, K.E. Foreman, G.N. Gupta. Urothelial cells undergo epithelial to mesenchymal transition after exposure to muscle invasive bladder cancer exosomes. American Urological Association annual meeting, New Orleans, 2015, *Poster presentation.*
4. A.F. Van Huis, **C.A. Franzen**, and G.N. Gupta. Exosome-Mediated Regulation of PTEN Expression in Bladder Cancer. American Urological Association annual meeting, Orlando, 2014, *Poster presentation.*
5. K.A. Greco, **C.A. Franzen**, P.C. Kuo, R.C. Flanigan, and G.N. Gupta. PLK1 Silencing in Bladder Cancer by siRNA Delivered with Exosomes. American Urological Association annual meeting, Orlando, 2014, *Poster presentation*.
6. **C.A. Franzen**, P. Simms, K.E. Foreman, and G.N. Gupta. Novel Method Of Exosome Quantification and Cellular Uptake Using The Amnis ImageStreamX. International Society for Extracellular Vesicles meeting, Boston, 2013, *Poster presentation*.
7. **C.A. Franzen**, V. Todorović, J.C. Pelling, R.C. Bergan. Apigenin regulates prostate cancer matrix composition, cell attachment, and cell motility through an integrin alpha 1 dependent pathway. Aspen Cancer Conference, Aspen, 2012, *Poster presentation*.
8. **C.A. Franzen**, V. Todorović, J.C. Pelling, R.C. Bergan. Apigenin regulates prostate cancer matrix composition, cell attachment, and cell motility through an integrin alpha 1 dependent pathway. American Association for Cancer Research, Chicago, 2012, *Poster presentation.*
9. **C.A. Franzen**, S. Mirzoeva, R.C. Bergan, K.J. Green, and J.C. Pelling. Apigenin inhibits PC3-M cell motility through the FAK/Src signaling pathway. Cytoskeleton Signaling in Cancer meeting, San Diego, 2008, *Poster presentation*.
10. **C.A. Franzen**, R.I. Monzon, and L.F. Lau. The extracellular matrix protein CCN1 (CYR61) sensitizes prostate carcinoma cells to TRAIL-induced apoptosis. American Association for Cancer Research, Washington D.C., 2006, *Poster presentation.*

**List of Publications**

1. W. Wu, W. Wang, **C.A. Franzen**, H. Guo, J. Lee, Y. Li, M. Sukhanova, D. Sheng, G. Venkataraman, M. Ming, P. Lu, A. Gao, C. Xia, J. Li, L.L. Zhang, V.C. Jiang, M.L. Wang, J. Andrade, X. Zhou, and Y. L. Wang. Inhibition of B-cell receptor signaling disrupts cell adhesion in mantle cell lymphoma via RAC2. Blood Advances 2021 Jan; 5 (1): 185–197.
2. P. Lu, S. Wang, **C.A. Franzen**, G. Venkataraman, R. McClure, L. Li, W. Wu, N. Niu, M. Sukhanova, J. Pei, D.A. Baldwin, R. Nejati, M.A. Wasik, N. Khan, Y. Tu, J. Gao, Y. Chen, S. Ma, R.A. Larson & Y.L. Wang. Ibrutinib and venetoclax target distinct subpopulations of CLL cells: implication for residual disease eradication. Blood Cancer Journal 2021 February; 11(39): 1-14.
3. K.A. Greco, **C.A. Franzen**, K.E. Foreman, R.C. Flanigan, P.C. Kuo, G.N. Gupta. PLK-1 Silencing in Bladder Cancer by siRNA Delivered with Exosomes. Urology 2016 May: 91(241), e 1-7.
4. **C.A. Franzen**, R. H. Blackwell, K.E. Foreman, P.C. Kuo, G.N. Gupta. Urinary Exosomes: The Potential for Biomarker Utility, Intercellular Signaling, and Therapeutics in Urologic Malignancy.

Invited Review for Journal of Urology 2016 May; 195(5): 1331-9. .

1. **C.A. Franzen,** R.H. Blackwell, V. Todorovic, K.A. Greco, K. E. Foreman, R.C. Flanigan, P.C. Kuo, and G.N. Gupta. Urothelial Cells Undergo Epithelial to Mesenchymal Transition After Exposure to Muscle Invasive Bladder Cancer Exosomes. Oncogenesis 2015 Aug 17.
2. J. Driver, C.E. Weber, J.J. Callaci, A. Kothari, M.A. Zapf, P.K. Roper, D. Borys, **C.A. Franzen**, G.N. Gupta,

P.Y. Wai, J. Zhang, P.C. Kuo, Z. Mi. Alcohol Inhibits Osteopontin Dependent Transforming Growth Factor-β1 Expression in Human Mesenchymal Stem Cells. Journal of Biological Chemistry 2015 Apr 17; 290(16).

1. R.H. Blackwell, **C.A. Franze**n, R.C. Flanigan, P.C. Kuo and G.N. Gupta. The untapped potential of urine shed bladder cancer exosomes: biomarkers, signaling, and therapeutics. Bladder 2014; 1(1)
2. Z. Mi , C.Weber, P. Wai, N. Li, J. Driver, **C.A. Franzen**, G.N. Gupta, J. Zhang, and P.C. Kuo. Osteopontin Mediates TGF-β1 Dependent Transformation Of Mesenchymal Stem Cells Into Cancer Associated Fibroblasts In Breast Cancer Oncogene 2014 Dec 22
3. C.E. Weber, J. Driver, **C.A. Franzen,** J.B. Mascarenhas, Z. Mi, G.N. Gupta, P.Y. Wai, and P.C. Kuo. The Constituents and Potential Targets of the Extracellular Matrix: Implications for Carcinogenesis and Cancer Treatment. Carcinogenesis and Mutagenesis 2013.
4. **C.A. Franzen**, P.E. Simms, A.F. Van Huis, K.E. Foreman, P.C. Kuo, and G.N. Gupta. Characterization of Uptake and Internalization of Exosomes by Bladder Cancer Cells. BioMed Research International 2014.
5. S. Mirzoeva, **C. A. Franzen**, and J. C. Pelling. Apigenin inhibits VEGF expression in human prostate carcinoma cells via a Smad- and Src-dependent mechanism. Molecular Carcinogenesis 2013.
6. **C.A. Franzen**, V. Todorović, B.V. Desai, K.J. Green, and J.C. Pelling. The desmosomal armadillo protein plakoglogin regulates prostate cancer cell adhesion and motility through vitronectin-dependent Src signaling PLoS One 2012 July; 7(7)
7. **C.A. Franzen**, E. Amargo, V. Todorovic, B.V. Desai, S. Huda, S. Mirzoeva, K. Chiu, B.A. Grzybowski, T-L Chew, K.J. Green, and J.C. Pelling. The chemopreventive bioflavonoid

apigenin inhibits PC3-M cell motility through the focal adhesion kinase (FAK)/Src signaling pathway. Cancer Prev Res. 2009 Sep;2(9):830-41.

1. Mirzoeva S., N.D. Kim, K. Chiu, **C.A. Franzen**, R.C. Bergan, and J.C. Pelling. Inhibition of HIF-1 alpha

and VEGF Expression by the Chemopreventive Bioflavonoid Apigenin is Accompanied by Akt Inhibition in Human Prostate Carcinoma PC3-M Cells. Mol Carcinog. 2008 Sep;47(9):686-700.

1. **Franzen, C.A.**, C.C. Chen, V. Todorović, V. Jurić, R.I. Monzon, and L.F. Lau. Integrin-Mediated Matrix Signaling Regulates TRAIL-Induced Apoptosis in Prostate Carcinoma Cells. Mol. Cancer Res. 2009 Jul; 7(7):1045-55

**MANUSCRIPTS IN REVIEW**

1. A. Vistarop\*, **C.A. Franzen\*,** A. Efimov, P. Lu, P. Patel, K. Carroll, E. Cukierman, M. Messmer, S. Ma, J. Franco-Barraza, J. Gao, and Y.L. Wang. Shelter in place: Live CLL cells inside the bone marrow fibroblasts and its implication in residual disease persistence.

**Presentations**

* Lymphoma Research Foundation Mantle Cell Lymphoma Workshop “RAC2 mediates the link between B-Cell Receptor signaling and cell adhesion in mantle cell lymphoma.” Oral Presentation, Atlanta, GA, 2018.
	+ Loyola University St. Albert's Day Research Forum, Maywood, IL 2014.
	+ Aspen Cancer Conference “Apigenin regulates prostate cancer matrix composition, cell attachment, and motility through an integrin alpha 1 dependent pathway.” Poster Presentation, Aspen, CO, 2012.
	+ American Association for Cancer Research Annual Meeting “Apigenin regulates prostate cancer matrix

composition, cell attachment, and motility through an integrin alpha 1 dependent pathway,” Poster presentation, Chicago, IL, 2012.

* + Northwestern University, Department of Pathology Annual Retreat “The chemopreventive bioflavonoid

apigenin inhibits PC3-M cell motility through the focal adhesion kinase (FAK)/Src signaling pathway,” Oral Presentation, Oak Brook, IL, 2010.

* + Northwestern University Posters and Wine, Poster presentation, 2008.
	+ Northwestern University Lewis Landsburg Research Day, Poster presentation, 2008.
	+ UIC student Research Forum, poster presentation, 2006.