

# Curriculum Vitae

## YANGUANG (CARTER) CAO, PhD

### A. PERSONAL

Yanguang (Carter) Cao Ph.D.  
Associate Professor at UNC at Chapel Hill  
Division of Pharmacotherapy and Experimental Therapeutics  
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### B. EDUCATION

- 2009-2013 Postdoc Fellow, Department of Pharmaceutical Science, State University of New York at Buffalo.
- 2006-2009 Doctor of Philosophy, Pharmaceutical Sciences, China Pharmaceutical University.
- 2004-2009 Master in Pharmacokinetics, School of Pharmacy, China Pharmaceutical University.
- 2000-2004 Bachelor in Pharmacology, School of Pharmacy, China Pharmaceutical University

### C. PROFESSIONAL EXPERIENCE

#### Positions and Appointments

- 2021-Now Associate Professor, University of North Carolina at Chapel Hill
- 2015-2021 Assistant Professor, University of North Carolina at Chapel Hill
- 2015-Now Member at Lineberger Cancer Center, UNC at Chapel Hill
- 2015-2019 Early Career Reviewer (ECR) at the Center for Scientific Review (CSR), NIH
- 2015-Now Adjunct Assistant Professor at University at Buffalo, SUNY
- 2013-2015 Research Assistant Professor, University at Buffalo, Buffalo, NY.
- 2012-2013 Teaching Assistant, Pharmaceutical Science, University at Buffalo, Buffalo, NY
- 2005-2006 Teaching Assistant, Pharmaceutical Sciences, China Pharmaceutical University

### D. HONORS

- 2019 UNC ESOP Academic Excellence Award

2017	ACoP8 Quality Abstract Award
2016	Outstanding Investigator Award – NIH-NIGMS MIRA Award
2016	ACoP7 Quality Abstract Award
2015	Researcher in Quantitative Methods and Modeling in Regulatory Science – US. FDA
2009	Top Graduate Student, China Pharmaceutical University, Nanjing, China

## E. BIBLIOGRAPHY and PRODUCTS OF SCHOLARSHIP

### **Book Chapter:**

1. Cao Y, Jusko WJ. Mechanistic Physiologically Based Pharmacokinetic: Models in Development of Therapeutic Monoclonal Antibodies. In: Zhou H, Theil F-P, eds. ADME and Translational Pharmacokinetics / Pharmacodynamics of Therapeutic Proteins: Applications in Drug Discovery and Development. Hoboken, New Jersey: John Wiley & Sons; 2015:159-172.

### **Refereed Papers/Articles.** # corresponding author

1. Zhou J, Cipriani A, Liu Y, Fang G, Li Q, Cao Y#. Mapping Inpatient Response Heterogeneity and Lesion-specific Relapse Dynamics in Metastatic Colorectal Cancer | Research Square (preprint). doi: <https://doi.org/10.21203/rs.3.rs-1447896/v1>
2. Qi T Cao Y#. Identification of non-small cell lung cancer (NSCLC) patients who benefit from treatment beyond progression with pembrolizumab from individual lesion response dynamics| medRxiv doi: <https://medrxiv.org/cgi/content/short/2022.05.09.22274626v1>.
3. Qi T, Vincent BG, Cao Y#. Longitudinally modeling anti-neoantigen immunity under paradigms of immunodominance | bioRxiv doi: <https://doi.org/10.1101/2022.02.10.479985>
4. Liu C, Zhou J, Kudlacek S, Qi T, Dunlap T, Cao Y#. Immunological Synapse Dynamics Induced by Bispecific T-cell Engagers Predict Clinical Pharmacodynamics and Tumor Evolution across Anatomical Sites | bioRxiv doi: <https://doi.org/10.1101/2022.04.18.488626>
5. Tang Y and Cao Y#. Visualizing cell-cell interactions between immune effector and tumor cells induced by antibodies using a proximity-dependent biosensor system. | bioRxiv doi: <https://doi.org/10.1101/2022.05.04.490615>
6. Salgado E, Cao Y#. A Physiologically Based Pharmacokinetic Framework for Quantifying Antibody Distribution Gradients from Tumors to Tumor-Draining Lymph Nodes. *Antibodies (Basel)*. 2022;11(2). Epub 2022/04/26. doi: 10.3390/antib11020028. PubMed PMID: 35466281.
7. Dunlap T, Cao Y#. Physiological Considerations for Modeling in vivo Antibody-Target Interactions. *Front Pharmacol*. 2022;13:856961. Epub 2022/03/15. doi: 10.3389/fphar.2022.856961. PubMed PMID: 35281913; PMCID: PMC8912916.
8. Talkington AM, Wessler T, Lai SK, Cao Y, Forest MG. Experimental Data and PBPK Modeling Quantify Antibody Interference in PEGylated Drug Carrier Delivery. *Bull Math Biol* 2021;83(12):123.
9. Liu C, Qi T, Milner JJ, Lu Y, Cao Y#. Speed and Location Both Matter: Antigen Stimulus Dynamics Controls CAR-T Cell Response. *Front Immunol*. 2021;12:748768.

10. Scholz EMB, Cao Y, Kashuba ADM. A cross-species comparison of antiretroviral penetration into lymph nodes using novel physiologically based pharmacokinetic models. *J Antimicrob Chemother.* 2021;76(11):2890-2893
11. Li Z, Du X, Li Y, Wang R, Liu C, Cao Y, Wu W, Sun J, Wang B, Huang Y. Pharmacokinetics of gallic acid and protocatechuic acid in humans after dosing with Relinqing (RLQ) and the potential for RLQ-perpetrated drug-drug interactions on organic anion transporter (OAT) 1/3. *Pharm Biol.* 2021;59(1):757-768.
12. Tang Y, Li X, Cao Y#. Which factors matter the most? Revisiting and dissecting antibody therapeutic doses. *Drug Discov Today.* 2021;26(8):1980-1990.
13. Qi T, Cao Y#. In Translation: FcRn across the Therapeutic Spectrum. *Int J Mol Sci.* 2021;22(6):3048.
14. Tang Y, Cao Y#. Modeling Pharmacokinetics and Pharmacodynamics of Therapeutic Antibodies: Progress, Challenges, and Future Directions. *Pharmaceutics.* 2021;13(3):422.
15. Zhou J, Li Q, Cao Y#. Spatiotemporal Heterogeneity across Metastases and Organ-Specific Response Informs Drug Efficacy and Patient Survival in Colorectal Cancer. *Cancer Res.* 2021;81(9):2522-2533.
16. Salgado E, Cao Y#. Pharmacokinetics and pharmacodynamics of therapeutic antibodies in tumors and tumor-draining lymph nodes. *Math Biosci Eng.* 2020;18(1):112-131.
17. Lv C, Yuan D, Cao Y#. Downregulation of Interferon-  $\gamma$  Receptor Expression Endows Resistance to Anti-Programmed Death Protein 1 Therapy in Colorectal Cancer. *J Pharmacol Exp Ther.* 2021 Jan;376(1):21-28.
18. Tang Y, Cao Y#. Modeling the dynamics of antibody-target binding in living tumors. *Sci Rep.* 2020;10(1):16764.
19. Liu C, Ayyar VS, Zheng X, Chen W, Zheng S, Mody H, Wang W, Heald D, Singh AP, Cao Y#. Model-Based Cellular Kinetic Analysis of Chimeric Antigen Receptor-T Cells in Humans. *Clin Pharmacol Ther.* 2021;109(3):716-727.
20. Jermain B, Hanafin PO, Cao Y, Lifschitz A, Lanusse C, Rao GG. Development of a Minimal Physiologically-Based Pharmacokinetic Model to Simulate Lung Exposure in Humans Following Oral Administration of Ivermectin for COVID-19 Drug Repurposing. *J Pharm Sci.* 2020 Dec;109(12):3574-3578.
21. Konicki R, Weiner D, Patterson H, Gonzalez D, Kashuba, A, Cao Y, Powell R, Rivaroxaban Precision Dosing Strategies for Real World Atrial Fibrillation Patients. *Clinical and Translational Science.* 2020 (in press)
22. Zhou J, Liu Y, Zhang Y, Li Q, Cao Y#. Modeling tumor evolutionary dynamics to predict clinical outcomes for patients with metastatic colorectal cancer: a retrospective analysis. *Cancer Res.* 2019 (in press).
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24. Yuan D, Rode F, Cao Y#. A systems pharmacokinetic/pharmacodynamic model for concizumab to explore the potential of anti-TFPI recycling antibodies. *Eur J Pharm Sci.* 2019
25. Tang Y, Parag-Sharma K, Amelio AL, Cao Y#. A Bioluminescence Resonance Energy Transfer-Based Approach for Determining Antibody-Receptor Occupancy In Vivo. *iScience.* 2019;15:439-451. *Highlighted in Drug Discovery News.* <https://www.ddn-news.com/index.php?newsarticle=13559>.
26. He H, He H, Liu C, Liu Y, Liu X, Wu Y, Fan J, Zhao L, Cao Y#. Mathematical modeling of the heterogeneous distributions of nanomedicines in solid tumors. *Eur J Pharm Biopharm.* 2019. 142:153-164.

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28. He H, Yuan D, Wu Y, Cao Y#. Pharmacokinetics and Pharmacodynamics Modeling and Simulation Systems to Support the Development and Regulation of Liposomal Drugs. *Pharmaceutics.* 2019;11(3).
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31. Beaudoin JJ, Bezencon J, Cao Y, Mizuno K, Roth SE, Brock WJ, Brouwer KLR. Altered Hepatobiliary Disposition of Tolvaptan and Selected Tolvaptan Metabolites in a Rodent Model of Polycystic Kidney Disease. *Drug Metab Dispos.* 2018 (in press)
32. Yuan D, He H, Wu Y, Fan J, Cao Y#. Physiologically Based Pharmacokinetic Modeling of Nanoparticles. *J Pharm Sci.* 2018. 108(1):58-72
33. Li X, Jusko WJ, Cao Y#. Role of Interstitial Fluid Turnover on Target Suppression by Therapeutic Biologics Using a Minimal Physiologically Based Pharmacokinetic Model. *J Pharmacol Exp Ther.* 2018 Oct;367(1):1-8
34. Maas B, Cao Y#. A Minimal Physiologically-Based Pharmacokinetic Model to Investigate FcRn-Mediated mAb Salvage: Effect of Kon, Koff, Endosome Trafficking, and Animal Species. *mAbs.* 2018; 10(8):1322-1331.
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### **Abstracts (Since 2015)**

1. Yuan D, Rode F, Cao Y. Mechanistic Small Systems Model to Explore the Pharmacokinetics and Pharmacodynamics of Concizumab. ACoP9; October 7-10, 2018; San Diego, CA
2. Ito K, Cao Y, Brouwer KLR. Development of a Minimal PBPK Model to Assess Hepatic Disposition of <sup>99m</sup>Tc-technetium-mebrofenin in Non-Alcoholic Steatohepatitis (NASH) Patient. Poster Session presented at: American Society for Clinical Pharmacology & Therapeutics 2018 Annual Meeting. Orlando, FL. March 21-24, 2018.
3. Beaudoin J, Bezencon, J, Cao Y, Mizuno K, Roth S, Brouwer KLR. Altered Hepatobiliary Disposition of Tolvaptan and Generated Metabolites in a Rodent Model of Polycystic Kidney Disease. Poster Session presented at: 21<sup>st</sup> North American ISSX Meeting. Providence, RI. September 24-28, 2017.
4. Mick E, Cao Y. A Systems Pharmacology Approach to Support Translational Research in Immuno-Oncology and Its Combinations with Chemotherapy. Podium Session presented at: The American Conference on Pharmacometrics 2017 (ACoP8). Fort Lauderdale, FL. October 15-18, 2017.
5. Liu C, Cao Y. Dynamic Metrics-based Biomarker to Predict Responders to Tumor Checkpoint Immunotherapy. Podium Session presented at: The American Conference on Pharmacometrics 2017 (ACoP8). Fort Lauderdale, FL. October 15-18, 2017.
6. Maas B, Cao Y. A Minimal Physiologically-Based Pharmacokinetic Model to Investigate FcRn-Mediated mAb recycling. Podium Session presented at: The American Conference on Pharmacometrics 2017 (ACoP8). Fort Lauderdale, FL. October 15-18, 2017.
7. He H, Cao Y. Physiologically-based Pharmacokinetic Model for Doxorubicin. Poster Session presented at: The American Conference on Pharmacometrics 2016 (ACoP7). Bellevue, WA. October 22-28, 2017.