

A.

Dr. Jason T. Duskey

Recent Work Information:

Department of Life Sciences
University of Modena and Reggio Emilia
Modena, MO
Italy
Google Scholar: Jason Duskey
Orcid: <https://orcid.org/0000-0003-2204-1981>

Personal information:

Birthdate: 23.01.1985
Email: jasonthomas.duskey@unimore.it
US Citizen



Short Profile

- Ph.D. in Medicinal and Natural Products Chemistry (Pharmacy)
 - Peptide nanoparticle design for DNA/siRNA tumor targeting
- Career earnings of ~€500,000 in personal or collaborative funding
- 25 + publications in high tier peer-reviewed journals
- Postdoctoral fellowships at University of Basel and Modena and Reggio Emilia
 - Designed smart polymeric nanoparticles to deliver active biological compounds and characterization and optimization of PLGA nanoparticles for the delivery of enzymes
- Experienced in bioconjugate and polymer formulations for small drug, DNA, and siRNA payloads, peptide synthesis, and bio-conjugate chemistry
- Expert knowledge in cell culture and extensive knowledge in mouse models
- Trained and experienced with *in vivo* mouse handling and testing
- Extensive training with radiation and biohazard materials
- Supervised 23 students (8 bachelors, 5 masters, and 10 Ph.D.)
- Organized Courses
- Familiar/active in both Italian and German, Mother Language English
- >15 lectures at international conferences (10 invited guest speaker) and many posters
- International collaborations/network including France, Ireland, Switzerland, Australia, Italy, Germany, Columbia, Uruguay, and United States
- **13/04/2021 Abilitation awarded** (BANDO D.D. 2175/2018, SETTORE CONCORSUALE 03/D2 TECNOLOGIA, SOCIOECONOMIA E NORMATIVA DEI MEDICINALI)

B. Professional Experience

B1. Positions Officially held

13/04/2021 Abilitation awarded (BANDO D.D. 2175/2018, SETTORE CONCORSUALE 03/D2 TECNOLOGIA, SOCIOECONOMIA E NORMATIVA DEI MEDICINALI)

01.07.2022 -Present

RTD-B University of Modena and Reggio Emilia DSV CHM09

16.04.2021- 30.06.2022

Senior Research position (assegno di ricerca) University of Modena and Reggio Emilia in Conjunction with the Creutzfeldt–Jakob disease Foundation CJDF.

Ottimizzazione del delivery al cervello mediato da nanoparticelle di una porfirina tetracationica con potenti attività anti-prionica.

This project was designed to analyse an active porpherin against Prions disease, that has already shown to have curative effects *in vitro*, and its inhibitory effects on targeting of already established g7 and other BBB targeting ligands in order to increase their brain targeting efficiency for improved and therapeutic *in vivo* treatments. This project will use NMR to analyse targeting peptides in solution with the novel porpherin in order to determine which moieties are binding and inhibiting the targeting capacity of the surface modified NMeds. Further experiments will be performed to validate new BBB targeting peptides that avoid this inhibitory effect and testing their ability to target the porpherin encapsulated in polymeric nanoparticles to the brain.

01.06.2020 – Present

6-month pilot project grant. Collaboration with the Bernal institute and the University of Limerick, Nmeds for improved GBM targeting, Unit participant, main author of project proposal.

This project was a short term preliminary study (extended due to Covid) in order to study the cell binding and uptake of various different novel and potential BBB and GBM specific ligands for improved NMed therapeutics.

01.04.2020- 30.03.2021

Post-Doctoral Research, University of Modena and Reggio Emilia/Fondazione Umberto Veronesi: “Glioblastoma Targeting with Nanotechnological Approaches”:

Improved GBM targeted NPS

This project revolves around my design and testing of new targeting ligands to improve NP delivery both across the BBB and specifically to GBM cells for safer and more efficient brain cancer treatments.

01.09.2019-30.03.2020

Junior Research position (assegno di ricerca) University of Modena and Reggio Emilia

Advanced NMed design for delivery of drugs with a wider range of physical characteristics

I am designing and formulating novel NMed utilizing both polymer, sterol, and hybrid components in order to increase the versatility for the encapsulation of novel drugs of various chemical properties. This includes the encapsulation of small molecules, peptides, proteins, and enzymes for various diseases. A special focus is being placed on new anti-glioblastoma drugs/diagnostic agents and incorporating ligands for their targeted delivery to the brain. This involves the design, conjugation, formulation, and in vitro testing of uptake and killing potential of novel NMed to create not only a treatment method but an early-stage diagnostic agent.

04.09.2019 - 3.10.2019

Unimore DSV Mobility Grant with the Biosciber labs University of Limerick.

Improved GBM Targeting

01.04.2019- 31.08.2019

Collaborazione coordinate continuative, University of Modena and Reggio Emilia

Nanoparticles for the delivery of bioactive agents

This project had three major aims. 1) Formulation of nanomedicine carriers for delivery of anti-prion disease pharmaceuticals. 2) Optimization of methods to better evaluate the biodistribution (formulation and extraction from animal tissues) of lipidic and polymeric nanoparticles for in vivo biodistribution studies. 3) Formulation of targeted nanomedicine carriers targeted to Glioblastoma.

01.04.2018 - 30.03.2019

Post-Doctoral Research (Borsista), University of Modena and Reggio Emilia/Fondazione Umberto Veronesi: “Targeted PLGA Nanoparticles for Gene Therapeutic Treatment of Krabbe Disease.”

Design, Formulation, and characterization of brain targeted nanoparticles for enzyme replacement therapy, and gene therapy of lysosomal storage diseases

I optimized targeted PLGA nanoparticles against lysosomal storage disease. The goal is to increase stability, binding, and delivery of enzyme or plasmid DNA loaded nanoparticles *in vitro* and *in vivo*.

01.04.2017- 30.03.2018

Post-Doctoral Research (Borsista), University of Modena and Reggio Emilia/Fondazione Umberto Veronesi: “Targeted PLGA Nanoparticles for Gene Therapeutic Treatment of Krabbe Disease.”

Design, Formulation, and characterization of brain targeted nanoparticles for enzyme replacement therapy, and gene therapy of lysosomal storage diseases

I optimized targeted PLGA nanoparticles against lysosomal storage disease. The goal is to increase stability, binding, and delivery of enzyme or plasmid DNA loaded nanoparticles *in vitro* and *in vivo*.

05.04.2016- 31.03.2017

Assegnista, University of Modena and Reggio Emilia funded by ELA

Nanoparticles for the delivery of Enzymes to Treat Lysosomal storage diseases

For the efficient delivery of enzymes to the brain, special techniques were designed to encapsulate an increased amount of large molecule enzymes into PLGA nanoparticles utilizing methodology much less destructive for the enzyme to form the nanoparticles. This included the increased encapsulation of GALc (the enzyme lacking in Krabbe’s disease and its in vitro testing for the ability to recover cell toxicity in lysosomal disease cell models, in collaboration with the NEST institute Pisa.

01.01.2014- 31.01.2016

Post-Doctoral Research, University of Basel:

Design, formulation, and in vitro characterization of polymer-based nanoparticles and nanoreactors for improved therapeutics

I explored Cellular uptake and stability of polymer nanoparticles for improved delivery into cells. The ultimate goal was to produce nanoparticles that could have targeted delivery, but also encapsulate triggerable activation of the cargo to create multifunctional nanoreactors. This includes the rational design and formulation of multifunctional (targeted, reducible, pH-sensitive, etc.) polymer nanoparticles for improved delivery and functional use in cells.

10.02.2009 – 05.09.2013

Ph.D. University of Iowa Thesis Title:

“The Development and Biological Evaluation of Octreotide Containing Peptides for Receptor Mediated Non-Viral Gene Delivery”

Targeted gene delivery peptides were designed to contain the somatostatin receptor 2 ligand Octreotide, a DNA binding peptide, and a PEG stealthing moiety. This involved me synthesizing peptides leading to advanced peptide bioconjugates by the use of orthogonal protecting groups. Formulations with these peptides were made by complexing with DNA or siRNA and analyzed for polyplex size, charge, shape, and toxicity. *In vitro* testing was performed to determine the biological activity of these compounds to bind somatostatin receptor 2 and create gene expression.

Extended Project University of Iowa (06.09.2013- 15.12.2013)

In Vivo Analysis of Gene Delivery Systems

I assessed the *in vivo* characteristics of polycationic peptides for their ability to increase circulatory half-life by decreasing serum interaction and first-pass clearance from the blood. This includes the handling of animals to perform biodistribution studies of radio-iodinated polyplexes, long term pharmacokinetic analysis, and live animal imaging of luciferase gene expression of these compounds. Current research is also being performed to generate live animal pharmacokinetic analysis techniques to dramatically decrease the difficulty, cost, and the number of mice required for statistically significant pharmacokinetic analysis.

26.08.2007-04.09.2009

Masters Work, University of Iowa:

“The Development and Biological Evaluation of Octreotide Containing Peptides for Receptor Mediated Non-Viral Gene Delivery”

Targeted gene delivery peptides were designed to contain the somatostatin receptor 2 ligand Octreotide, a DNA binding peptide, and a PEG stealthing moiety. This involved me synthesizing peptides leading to advanced peptide bioconjugates by the use of orthogonal protecting groups. Formulations with these peptides were made by complexing with DNA or siRNA and analyzed for polyplex size, charge, shape, and toxicity. *In vitro* testing was performed to determine the biological activity of these compounds to bind somatostatin receptor 2 and create gene expression.

01.07.2006 - 31.07.2007

Cargill Corn Milling Cedar Rapids:

Internship in QA and product testing

I was in charge of quality assurance and testing in plant products such as feed, high fructose corn syrup, slurry, gluten, and other corn products. I was responsible for the continual quality check to ensure that all processes were running appropriately, and customers were getting products in the required specification range. Also, I was put in charge of designing and calibrating the first FTIR based mill sample calibration which has since become operational cutting sample testing times down from 24 hours to in-line sample testing in the matter of seconds.

B2. Involvement in other projects and Collaborations

01-07-2019 - Present

Co-Funded AGAPI Grant collaboration for researchers under 40

Flow- dependant regulation of Angiopoietin-2 and the role of Genistein in modulating the Angiogenic potential and Immunomodulation abilities of mesenchymal stem cells isolated from dental pups

01-01-2019 - Present

Progetti di ricerca scientifica e tecnologica di grande rilevanza, Ministero degli Esteri (MAECI)

Progetti di ricerca scientifica e tecnologica di grande rilevanza, Ministero degli Esteri (MAECI),
Progetti Italy-USA in collaboration with the Prestigious Princeton University, Nanomedicine for BBBcrossing in CNS oncologic pathologies. Role: Unit Participant. Which led to the publications:
10.3390/pharmaceutics12010072, 10.3390/molecules25204593, 10.3389/fphar.22.00574,
10.3390/polym12040823, 10.1016/j.nano.2020.10.2226, 10.3390/pharmaceutics11110572,
10.2217/nmm-2019-0367, 10.1080/17425247.2020.1698544, 10.1016/j.ijpharm.2019.118655.

01-07-2018 - Present

IMI EU Grants

Investigating Mechanisms and Models predictive of accessibility of therapeutics (IM2PACT) Into the Brain. Collaboration with 23 international partners (im2pact.org) Unit Participant: Progetti di ricerca scientifica e tecnologica di grande rilevanza, Ministero degli Esteri,
Progetti Italy-USA in collaboration with the prestigious Princeton University, Nanomedicine for BBBcrossing in CNS oncologic pathologies. Which produced the publications: 10.3390/pharmaceutics12010072,
10.1016/j.nano.2020.102226, 10.2217/nmm-2019-0367, 10.1080/17425247.2020.1698544,
10.1016/j.ijpharm.2018.03.061

01-01-2018 - Present

Project Regionale PorFESr:Mat2Rep

Progetto Regionale PorFesr:Mat2Rep Biomateriali multifunzionali per l'autoriparazione di tessuti ed organi. In collaboration with 10 international research institutes and companies (mat2rep.it) Role: Unit Participant: Which led to publications: 10.3389/fphar.2020.00574, 10.3390/polym12040823

01-12-2017 - Present

Telethon and Ministero della Salute in collaboration with the Mario Negri Institute Nps for the in vivo delivery of a novel porphyrin with anti-prion therapeutic activity

05-04-2016 a 01-04-2017

ELA Research Foundation

European Leukodystrophy Association (ELA) Research Foundation: Development of a novel, nanovector-mediated enzyme replacement therapy for Globoid Cell Leukodystrophy (GLD) in collaboration with the NEST Research Center Pisa Italy, Role: Unit Participant which produced the publications: 10.1016/bs.irm.2017.08.006

01-01-2016 - 04-04-2016

FAR UNIMORE grant: Single Particle Tracking: nanomedicine and quantum dots, Role: Independent Researcher

B3. Teaching

- a. **Mount Mercy College 2005- 2007-** student center for excellence tutor. The University paid me to do a work-study helping tutor any student who arrived at the help center in science and math.
- b. **University of Iowa 26.08.2007 – 05.09.2013**
Wrote, proctored, and graded exams for 150 pharmacy students each year
- c. **University of Basel 01.05.2015- 31.01.2016**
Organized, managed, and taught Physical chemistry lab practicum for 150 bachelor level students
- d. **University of Modena 01.05.2016 – present**

- Aid in the lab practicum for the biotechnology bachelor level students
- e. **University of Modena and Reggio Emilia 2020-present**
Nanomedicine Doctoral course

C. Education

13/04/2021	Abilitation awarded (BANDO D.D. 2175/2018, SETTORE CONCURSUALE 03/D2 TECNOLOGIA, SOCIOECONOMIA E NORMATIVA DEI MEDICINALI)
04.09.2009 - 05.09.2013	Ph.D. Pharmacy, College of Pharmacy, University of Iowa, Iowa City Iowa USA. Supervisor: Professor Kevin G. Rice The department of Pharmacy hosted a PhD in medicinal and natural products chemistry that combined the masters and PhD into one degree.
26.08.2007 - 04.09.2009	Ph.D. Pharmacy, College of Pharmacy, University of Iowa, Iowa City Iowa USA. Supervisor: Professor Kevin G. Rice The department of Pharmacy hosted a PhD in medicinal and natural products chemistry that combined the masters and PhD into one degree.
20.08.2003 - 18.05.2007	B.S. Biology and Chemistry. Mount Mercy College, Cedar Rapids, Iowa USA.
19.08.1999 - 22.05.2003	High school diploma, Widefield High School, Colorado Springs, CO USA

D. Publications:

I have published 26 peer-reviewed scientific articles and two book chapter in high profile journals in the field with citations of 320 to date and an h-index of 11 and growing. These are listed below with the journal impact factor and citations per article.

1. Fernandez CA, Baumhover NJ, **Duskey JT**, Khargharia S., Kizzire K., Ericson MD, Rice KG Metabolically Stabilized Long-Circulating PEGylated Polyacridine Peptide Polyplexes Mediate Hydrodynamically Stimulated Gene Expression In Liver. *Gene Therapy*. 2011; 18(1): 23-27 (3.227, cited 23 times)
2. **Duskey JT**. "The development and biological evaluation of Octreotide containing peptides for receptor mediated nonviral gene delivery." PhD (Doctor of Philosophy) thesis, University of Iowa, 2013. <http://ir.uiowa.edu/etd/4965>. N/A
3. **Duskey JT**, Rice KG Nanoparticle Ligand Presentation for targeting solid Tumors. *AAPS PharmSciTech*, 2014; 15(5): 1345-1354 (2.608, cited 18 times)
4. Khargharia S, Baumhover NJ, **Duskey JT**, Crowley S, Rice KG The uptake Mechanism of PEGylated DNA Polyplexes by the Liver Influences Gene Expression. *Gene Therapy*. 2014; 21(12): 1021-1028 (3.227, cited 8 times)
5. Liu J, Crowley ST, **Duskey JT**, Khargharia S, Wu M, Rice KG Miniaturization of Gene Transfection Assays in 384 and 1536-Well Microplates. *Anal. Biochem*, 2015; 470: 14-21 (3.286, cited 7 times)
6. Car A; Baumann P; **Duskey JT**; Chami M, Bruns N; Meier W pH-responsive PDMS-b-PDMAEMA micelles for intracellular anticancer drug delivery. *Biomacromolecules*. 2014; 15(9): 3235-3245 (5.667, cited 68 times)
7. Richard PU, **Duskey JT**, Stolarov S, Spulber M, Palivan CG New concepts to fight oxidative stress: 3D supramolecular antioxidant nano-assemblies. *Expert Opin. Drug. Deliv*. 2015; 12(9): 1527-1545 (5.40, cited 14 times)
8. Najer A, Thamboo S, **Duskey JT**, Palivan CG, Beck HP, Meier W Analysis of Molecular Parameters Determining the Antimalarial Activity of Polymer-Based Nanomimics. *Macromolecular Rapid Communications*. 2015; 36(21): 1923-1928 (4.441, cited 4 times)
9. Liu J, Postupalenko V, **Duskey JT**, Palivan CG, Meier W pH-triggered reversible multiple protein-polymer conjugation based on molecular recognition. *J. Phys. Chem. B*. 2015; 119(36): 12066-12073 (2.923, cited 1 time)
10. Sigg SJ, Postupalenko V, **Duskey JT**, Palivan CG, Meier W Stimuli-Responsive Codelivery of Oligonucleotides and Drugs by Self-Assembled Peptide Nanoparticles. *Biomacromolecules*. 2016; 17(3): 935-945 (5.667, cited 21 times)
11. Baumhover NJ, **Duskey JT**, Khargharia S, White CW, Crowley ST, Allen RJ, Rice KG Structure–Activity Relationship of PEGylated Polylysine Peptides as Scavenger Receptor Inhibitors for Non-Viral Gene Delivery. *Mol. Pharmaceutics*. 2015; 12(12), 4321–4328 (4.396, cited 13 times)
12. Nussbaumer MG, Rother M, Renggli K, Chami M, Postupalenko V, **Duskey JT**, Bruns N Chaperonin-Dendrimer. Conjugates for siRNA Delivery. *Advanced Science*. 2016; 3(10) (12.441, cited 18 times)
13. Dinu IA, **Duskey JT**, Car A, Palivan CG, Meier W Engineered non-toxic cationic nanocarriers with photo-triggered slow-release properties. *Polymer Chemistry*. 2016; 7(20): 3451-3464 (4.760, cited 14 times)
14. **Duskey JT**, Belletti D, Pederzoli F, Vandelli MA, Forni F, Ruozi B, Tosi G Current Strategies for the Delivery of Therapeutic Proteins and Enzymes to Treat Brain Disorders. *International Review of Neurobiology*. 2017; 137: 1-28 (2.371, cited 1 time)
15. Belletti D, Grabrucker AM, Pederzoli F, Menrath I, Vandelli MA, Tosi G, **Duskey JT**, Forni F, Ruozi B Hybrid nanoparticles as a new technological approach to enhance the delivery of cholesterol into the brain. *Int J Pharm*. 2018; 543(1-2): 300-310 (4.213)
16. Tosi G, Pederzoli F, Belletti D, Vandelli MA, Forni F, **Duskey JT**, Ruozi B Nanomedicine in Alzheimer's disease: Amyloid beta targeting strategy. *Prog Brain Res*. 2019; 245(2): 57-88 (3.174 cited 1 time)
17. Rigon L, Salvalaio M, Pederzoli F, Legnini E, **Duskey JT**, D'Avanzo F, De Filippis C, Ruozi B, Marin O, Vandelli MA, Ottonelli I, Scarpa M, Tosi G, Tomanin R Targeting Brain Disease in MPSII: Preclinical Evaluation of IDS-Loaded PLGA Nanoparticles. *Int J Mol Sci*. 2019; 20(8) (4.183)
18. Pederzoli F, Ruozi B, **Duskey JT**, Hagemeyer S, Sauer AK, Grabrucker S, Oddone N, Daini E, Zoli M, Vandelli MA, Tosi G, Grabrucker AM Nanomedicine against A β aggregation by β -sheet breaker peptide delivery: in vitro evidences. *Pharmaceutics* 2019; 11(11) (3.746)
19. Oddone N, Pederzoli F, **Duskey JT**, De Benedictiis, CA, Grabrucker AM, Forni, F, Vandelli MA, Ruozi B, Tosi G ROS-responsive "smart" polymeric conjugate: Synthesis, characterization and proof of concept study. *Inter. J. Pharm*. 2019; 570. (4.213)
20. **Duskey JT**, Baraldi C, Gamberini MC, Ottonelli I, Da Ros F, Tosi G, Forni F, Vandelli MA, Ruozi B Investigating Novel Syntheses of a Series of Unique Hybrid PLGA-Chitosan Polymers for Potential Therapeutic Delivery Applications. *Polymers*. 2020; 12(4): 823 (3.164)

21. Tosi G, **Duskey JT**, Kreuter J Nanoparticles as Carriers for Drug Delivery of Macromolecules Across the Blood-Brain Barrier. *Expert Opin Drug Deliv.* 2020 17(1):23-32 (4.84)
22. Oddone N, Boury F, Garcion E, Grabrucker AM, Martinez C, Da Ros F, Janaszewska A, Forni F, Vandelli MA, Tosi G, Ruozi B, **Duskey JT** Synthesis, Characterization, and In Vitro Studies of an Reactive Oxygen Species (ROS)-Responsive Methoxy Polyethylene Glycol-Thioketal-Melphalan Prodrug for Glioblastoma Treatment. *Front Pharmacol.* 2020; 11: 574. (4.4)
23. Hoyos-Ceballos GP, Ruozi B, Ottonelli I, Da Ros F, Vandelli MA, Forni F, Daini E, Vilella A, Zoli M, Tosi G, **Duskey JT***, López-Osorio BL Drug delivery across the blood–brain barrier: recent advances in the use of nanocarriers PLGA-PEG-ANG-2 Nanoparticles for Blood–Brain Barrier Crossing: Proof-of-Concept Study. *Pharmaceutics.* 2020; 12(1): 72. (4.773)
24. **Duskey JT**, Ottonelli I, DA Ros F, Vilella A, Zoli A, Kovachka S, Spyraakis F, Vandelli MA, Tosi G, Ruozi B Novel peptide-conjugated nanomedicines for brain targeting: In vivo evidences. *Nanomed. Nanotech. Biol. Med.* 2020; 28. 10.1016/j.nano.2020.102226 (5.57)
25. **Duskey JT**, Da Ros F, Ottonelli I, Zambelli B, Vandelli MA, Tosi G, Ruozi, B Enzyme Stability in Nanoparticle Preparations Part 1: Bovine Serum Albumin Improves Enzyme Function. *Molecules.* 2020. doi: 10.3390/molecules25204593
26. Birolini, Giulia, Valenza, Marta, Ottonelli, Ilaria, Passoni, Alice, Favagrossa, Monica, **Duskey, JT**, Bombaci, Mauro, Vandelli, Maria Angela, Colombo, Laura, Bagnati, Renzo, Caccia, Claudio, Leoni, Valerio, Taroni, Franco, Forni, Flavio, Ruozi, Barbara, Salmona, Mario, Tosi, Giovanni, Cattaneo, Elena. Insights into kinetics, release, and behavioral effects of brain-targeted hybrid nanoparticles for cholesterol delivery in Huntington's disease. *JOURNAL OF CONTROLLED RELEASE.* 2021; 330. doi: 10.1016/j.jconrel.2020.12.051(3.267)
27. Musumeci T., Bonaccorso A., Carbone C., Impallomeni G., Ballistreri A., **Duskey JT.**, Puglisi G., Pignatello R. Development and biocompatibility assessments of poly(3-hydroxybutyrate-co-ε-caprolactone) microparticles for diclofenac sodium delivery. *JOURNAL OF DRUG DELIVERY SCIENCE AND TECHNOLOGY.* 2020;60. doi: 10.1016/j.jddst.2020.102081 (2.734)
28. Sgarbi V, Ruozi B, Pederzoli F, **Duskey JT**, Ottonelli I, Oddone N, Vandelli MA, Forni F, Tosi G Glioblastoma: state of art of treatments and application of polymeric and lipidic nanomedicines. Book: *Nanotherapy for Brain Tumor Drug Delivery; Neuromethod series.* Ed. Springer Nature Publishers. 2021 10.1007/978-1-0716-1052-7_1
29. Cano A, Turowski P, Ettcheto M, **Duskey JT**, Tosi G, Sánchez-López E, García ML, Camins A, Souto EB, Ruiz A, Marquié M, andBoada M.Nanomedicine-based technologies and novel biomarkers for the diagnosis and treatment of Alzheimer's disease: from current to future challenges. *J. Nanobiotechnol.* 2021 19:122. <https://doi.org/10.1186/s12951-021-00864-x>.
30. Alastra G, Aloe L, Baldassarro AV, Calzà Lara, Cescatti M, **Duskey JT**, Focarete ML, Giacomini D, Giardino L, Giraldi V, Lorenzini L, Moretti M, Parmeggiani I, Sannia M, Tosi G. Nerve Growth Factor Bidelivery: a limiting step in moving toward extensive clinical application? *Front Neurosci.* 2021; 15: 695592. doi: 10.3389/fnins.2021.695592
31. Ottonelli I, Grazioli MV, Rinaldi A, Parmeggiani I, Vandelli MA, Tosi G, Ruozi B, and **Duskey JT.** Optimization to Formulate Therapeutic PLGA-Chol Hybrid NPs with microfluidics for their Potential Scale-Up and Commercial Production. *Pharmaceutics.* 2021. 17;13(9):1495. doi: 10.3390/pharmaceutics13091495.
32. **Duskey JT**, Ottonelli I, Rinaldi A, Parmeggiani I, Zambelli B, Vandelli MA, Tosi G, and Ruozi B. Enzyme Stability in Nanoparticle Preparations Part 2: Tween®-enzyme Complexes Increase Enzyme Activity of PLGA Nanoparticles. In Submission, *Nanomaterials* 2021.09.10
33. Sgarbi, V.; **Duskey, J. T.**; Ottonelli, I.; Da Ros, F.; Oddone, N.; Vandelli, M. A.; Forni, F.; Tosi, G.; Ruozi, B. Glioblastoma: State of the Art of Treatments and Applications of Polymeric and Lipidic Nanomedicines; Book: *Nanotherapy for Brain Tumor Drug Delivery; Neuromethod series.* Ed. Springer Nature Publishers. 2021 10.1007/978-1-0716-1052-7
34. Duskey, J.T.; Ottonelli, I.; Rinaldi, A.; Parmeggiani, I.; Zambelli, B.; Wang, L.Z.; Prud'homme, R.K.; Vandelli, M.A.; Tosi, G.; Ruozi, B. Tween® Preserves Enzyme Activity and Stability in PLGA Nanoparticles. *Nanomaterials* 2021, 11, 2946, doi:10.3390/nano11112946.
35. Ottonelli, I.; Caraffi, R.; Tosi, G.; Vandelli, M.A.; Duskey, J.T.; Ruozi, B. Tunneling Nanotubes: A New Target for Nanomedicine? *International Journal of Molecular Sciences* 2022, 23, 2237, doi:10.3390/ijms23042237
36. Rinaldi A.,Caraffi R., Grazioli M.V., Oddone N., Giardino L., Tosi G., Vandelli M.A., Calzà L., Ruozi B. and Duskey J.T., Applications of the ROS responsive Thioketal linker for the production of smart nanomedicines, *Polymers* 2022, 14, doi: 10.3390/polym14040687

37. Duskey, J.T.; Rinaldi, A.; Ottonelli, I.; Caraffi, R.; De Benedictis, C.A.; Sauer, A.K.; Tosi, G.; Vandelli, M.A.; Ruozi, B.; Grabrucker, A.M. Glioblastoma Multiforme Selective Nanomedicines for Improved Anti-Cancer Treatments. *Pharmaceutics* 2022, 14, 1450, doi:10.3390/pharmaceutics14071450.

E. Awards and Funding

- 30.04.2004 - Freshman Chemist of the Year Award (Mount Mercy College) (**\$100**)
- 24.01.2012 - MNPC Graduate Student Travel Award – (**\$200**)
- 01.01.2016 - FAR UNIMORE grant: Single Particle Tracking: nanomedicine and quantum dots, Role: Independent Researcher (**Project budget 33,000 Euro**)
- 05.04.2016 - ELA Research Foundation: Development of a novel, nanovector-mediated enzyme replacement therapy for Globoid Cell Leukodystrophy (GLD), Role: Independent Researcher (**Project budget 50,000 euros**)
- 01.04.2017 - Fondazione Umberto Veronesi Research Fellow (~**30,000 euro**)
Targeted PLGA Nanoparticles for Gene Therapeutic Treatment of Krabbe Disease
- 01.04.2018 - Fondazione Umberto Veronesi Research Fellow (~**30,000 euro**)
Targeted PLGA Nanoparticles for Gene Therapeutic Treatment of Krabbe Disease
- 10.05.2018- Travel award 20th Herrenalber Barrier- and Transporter Meeting (**Full travel cost and registration ~500 euro**)
- 01.07.2019 Co-funded AGAPI Grant collaboration for Researchers under 40 (**Project Budget €80,000**)
- 07-11-2019 In vivo evidence for Novel Brain Targeted Peptide-Conjugated Nanomedicines". Best Poster Award, CRS Italy Section Catania
- 01.09.2019- University of Modena and Reggio Emilia Travel Grant Initiating a collaboration with BIUL (**€3,000**)
- 01.04.2020- Fondazione Umberto Veronesi Research Fellow (~**30,000 euro**)
Improved nanomedicines for targeting Glioblastoma
- 01.06.2020- 6 month pilot project grant. Collaboration with the Bernal institute and the University of Limerick Nmeds for improved GBM targeting (**3,000 euro**)
- 13/04/2021 Abilitation awarded** (BANDO D.D. 2175/2018, SETTORE CONCORSUALE 03/D2 TECNOLOGIA, SOCIOECONOMIA E NORMATIVA DEI MEDICINALI)

F. Conference Presentations (* bold titles indicate invited speaker)

- 10.02.2009 - Synthesis and Evaluation of Liver Selective Cholesterol Lowering Thyroid Hormone Analogues (University of Iowa)
- 25.01.2011 - Gene Delivery with Synthetic Bioconjugate Peptides (University of Iowa)
- 10.04.2011 - Synthesis of DNA Binding Bioconjugate Peptides Containing the Somatostatin Receptor Ligand Octreotide (University of Kansas)
- 03.08.2013 - The Development and Biological Evaluation of Octreotide Containing Peptides for Receptor Mediated Non-Viral Gene Delivery (University of Iowa)
- 04.05.2015 - Photo-Sensitive Cationic Polymers for Non-Toxic Stimulated Release and Delivery of Small Molecules (Paul Scherrer Institute)
- 27.08.2017 - Protein, Enzyme, and Gene Delivery in Nanoscience (Nannoinnovations, Rome Invited Speaker)**
- 28.08.2017 - Challenges in the Development of Nanoparticle-Based Systems for Enzyme Delivery to the Brain (Nannoinnovations, Rome Invited Speaker)**
- 07.05.2018 - Recent Attempts to Surpass the BBB to treat Brain Disorders (Bad Herrenalb Transporter Days Invited Speaker)**
- 12.06.2019 - Nanomedicine for Brain Diseases: preclinical application (Nannoinnovations, Rome Invited Speaker)**
- 30.09.2019- Reaching Towards Improved Polymeric/Hybrid Nanoparticle Versatility for CNS Targeted Therapeutics Against Brain Diseases. Bernal Institute and University of Limerick (Seminar Series Department of Biological Sciences, BioSciber Group, Bernal Institute, Invited Speaker)**
- 20.11.2019- Advancing Smart NMED's Against Brain Diseases from Conception to Completion University of Princeton USA (Seminar Series, Department of Chemical and Biological Engineering Invited Speaker)**
- 23.06.2020- Tailored Nanomedicines for Drug Delivery to the Brain (Nanoworld Virtual Conference, Boston Invited Speaker)**
- 16-09-2020- Invited Guest Speaker, Oral Presentation, Nannoinnovations, Rome Italy, "Brain Targeted Nanomedicine:More Than Just Crossing the BBB"**
- 14-10-2020- Invited Speaker from selected Abstracts: ETPN 2020 virutal conference Pitch me up session, "Completing Targeted Nanomedicine Systems For Improved GBM Treatment Options."**
- 12-11-2020- Seminar per studenti di LM Biotecnologie, "Nanomedicine: Researching to create improved treatments for Central Nervous System (CNS) diseases."**

Posters-

- 04-03-2017** A. Del Grosso, J. T. Duskey, L. Angella, E. Petri, I. Tonazzini, M. Allegra, F. Pederzoli, B. Ruozi, M.A. Vandelli, F. Forni, M.. Caleo, G. Tosi, M. Cecchini "Moving towards a novel nanovector-mediated enzyme replacement therapy for Globoid Cell Leukodystrophy (GLD)". Gordan Conference, Lucca Italy.
- 01-10-2017** D. Belletti, F. Pederzoli, J. Keller, J. Duskey, N. Oddone, MA. Vandelli , G. Tosi, AM. Grabrucker, B. Ruozi "Curcumin loaded nanoparticles in Alzheimer's disease." CRS--macromolecules in Drug Delivery; Fisciano University, Salerno Italy.
- 01-10-2017** F. Pederzoli, D. Belletti, R. Tomanin, J. Duskey, N. Oddone, F. Forni, MA. Vandelli, B. Ruozi, G. Tosi, "Challenges in the development of enzyme loaded nanoparticles." Aitun, Bologna Italy, CRS Macromolecules in Drug Delivery.
- 10-05-2018** F. Pederzoli, J. Duskey, M.A. Vandelli, F. Forni, B. Ruozi. G. Tosi "Enzyme Replacement Therapy (ERT): an open challenge of nanomedicine" 12th Aitun Bologna, Italy.
- 12-05-2018** J. Duskey, MA. Vandelli, F. Forni, E. Marcolini, B. Ruozi, G. Tosi, R. Chiesa "PLGA Nanoparticles as Nanoparticle Carriers for Molecules Against Prion Disease" 12th Aitun, Bologna Italy.

- 12-05-2018** G. Tosi*, F. Pederzoli, D. Belletti, J. Duskey, N. Oddone, MA. Vandelli, F. Forni, B. Ruozi "Nanomed. in Neurodegen. Disorders." ICONAN Roma Italy.
- 12-09-2018** D. Belletti, F. Pederzoli, J. Duskey, N. Oddone, MA. Vandelli, F. Forni, G. Tosi*, B. Ruozi "Nanomed. in protein and enzyme del. to the brain." ICONAN Roma Italy.
- 12-09-2018** N. Oddone, D. Belletti, F. Pederzoli, J. Duskey, MA. Vandelli, F. Forni, B. Ruozi, G. Tosi , "Innov. in smart drug del. systems." ICONAN Roma Italy.
- 14-10-2018** J. Duskey, F. Forni, G. Tosi, MA. Vandelli, B. Ruozi, R. Chiesa, "Delivery of a Novel Prion Disease Inhibitor with CNS Targeted PLGA Nanoparticles." CRS Adv. Drug Del. and Biomat.: facts and vision, Padova Italy.
- 14-10-2018** F. Pederzoli, B. Ruozi, N. Oddone, R. Tomanin, MA. Vandelli, J. Duskey, F. Forni, G. Tosi, "Enzyme loaded PLGA nanoparticles." CRS Adv. Drug Del. and Biomat.: facts and vision, Padova Italy.
- 11-06-2019** N. Oddone, F. Pederzoli, AM. Grabrucker, JT. Duskey, F. Forni, MA. Vandelli, Ruozi B, G. Tosi "ROS- responsive "smart" polymer prodrugs...." AFI, Rimini, Italy.
- 18-06-2019** F. Pederzoli, B. Ruozi, J.T. Duskey, I. Ottonelli, S. Hagemeyer, AK. Sauer, S. Grabrucker, N. Oddone, E. Daini, M. Zoli, MA. Vandelli, AM. Grabrucker, G. Tosi "New strategies for delivery of a β -sheet breaker peptide against β -amyloid aggregation." Istituto superiore della sanità Rome, Italy.
- 18-06-2019** N. Oddone, F. Pederzoli, AM. Grabrucker, JT. Duskey, F. Forni, MA. Vandelli, B. Ruozi, G. Tosi "ROS-responsive "smart" polymer prodrugs: synthesis, characterization and proof of concept study" Istituto superiore della sanità Rome.
- 18-06-2019** F. Pederzoli, G. Tosi, JT. Duskey, N. Oddone, F. Forni, M. Valenza, E. Cattaneo, MA. Vandelli, B. Ruozi "NanoTechnological proposal for Chol-brain delivery nanomedicines as therapeutic approach." Istituto superiore della sanità, Rome Italy.
- 07-11-2019** JT. Duskey, F. Pederzoli, MA. Vandelli, F. Forni, B. Ruozi, G. Tosi, R. Chiesa "In vivo evidence for Novel Brain Targeted Peptide-Conjugated Nanomedicines". Best Poster Award: CRS Italy Catania Section, Catania Italy.
- 11-12-2019** Federica Da Ros¹, Jason Thomas Duskey¹, Giovanni Tosi¹, Barbara Ruozi¹ Natalia Oddone¹, Andreas Grabrucker¹, Maria Vandelli¹, Flavio Forni¹ "GLIOBLASTOMA-TARGETED NANOMEDICINES, School of Nanomedicine." Poster author: School of Nanomedicine, Trieste Italy.
- 11-12-2019** I. Ottonelli¹, G. Tosi^{1*}, N. Oddone¹, J. T. Duskey¹, A. Vilella², S. Kovachka³, F. Spyraakis³, M. A. Vandelli¹, B. Ruozi, "NEW PEPTIDES FOR BRAIN TARGETING IN NANOMEDICINE" School of Nanomedicine, Trieste Italy.
- 17-12-2019** I. Ottonelli^{a,b}, G. Tosia^{*}, N. Oddone^{a,b}, J. T. Duskey^a, A. Vilella^c, S. Kovachka^d, F. Spyraakis^d, M. A. Vandelli^a, B. Ruozi^{a*} "NANOMEDICINE FOR BRAIN TARGETING." Giornata della Chimica dell'Emilia Romagna, Modena Italy.
- 17-12-2019** Federica Da Ros¹, Jason Thomas Duskey¹, Giovanni Tosi¹, Barbara Ruozi¹ Natalia Oddone¹, Andreas Grabrucker¹, Maria Vandelli¹, Flavio Forni¹ Giornata della Chimica dell'Emilia Romagna, Modena Italy. "TAILORING POLYMERIC NANOPARTICLES FOR BLOOD-BRAIN CROSSING AND GLIOBLASTOMA TARGETING."
- 01-10-2020** Ilaria Ottonelli, Giulia Birolini, Federica Da Ros, Jason Duskey, Giovanni Tosi, Maria Angela Vandelli, Flavio Forni, Marta Valenza, Elena Cattaneo, Barbara Ruozi "Hybrid Cholesterol

Nanoparticles to treat Huntington's Disease" - Workshop on glial cells-neuron crosstalk in CNS health and disease.

15-09-2020 Federica Da Ros 1,2, Jason Duskey1,3, Vito Antonio Baldassarro 4, Iliaria Ottonelli1,5, Giovanni Tosi1, Maria Angela Vandelli1, Flavio Forni1, Barbara Ruozi1. "Ibuprofen and T3 polymeric NPs for spinal injury Treatment" Nanoinnovation, Rome Italy.

15-09-2020 Iliaria Ottonelli, Giulia Birolini, Federica Da Ros, Jason Duskey, Giovanni Tosi, Maria Angela Vandelli, Flavio Forni, Marta Valenza, Elena Cattaneo, Barbara Ruozi "Cholesterol Nanoparticles to rescue Huntington's Disease Phenotype" Nanoinnovation, Rome Italy.

G. Organisation of Conferences

2008 + 2012 MIKI conference (rotating conference between the Minnesota, Iowa, Kansas, and Illinois Department of Pharmacy each year. (~300 students)

06.06.2014 Swiss Soft Days – Conference focused on Bioactive compounds and new delivery research (~300 Professors, PhD, masters, and postdoctoral fellows)

11.06.2018 NanoFAR – conference of PhD students and local/National industrial partners discussing nanomedicine (>80 participants from 15 countries)

14.09.2021 Nanomeet2021. International conference in presence and online of 35+ countries (Role: moderator)

H. Public Communication

18.03.2017 - Nanoscience and Targeted Delivery to the Brain Held a seminar each year for young students to increase recruitment of young students to science (Liceo Scientifico Modena)

21.04.2018 - Nanoscience and Targeted Delivery to the Brain Held a seminar each year for young students to increase recruitment of young students to science (Liceo Scientifico Modena)

18.07.2017 - TV interview, program “Detto tra Noi” highlighting Foreigners in Research and the local winners of the Umberto Veronesi Grant. (Local and national web broadcasts)

13.09.2020 - Targeted Nanomedicine Delivery to the Brain to treat Brain Cancer, to increase recruitment of young students to science (Liceo Scientifico Modena)

I. Transferable skills/knowledge

1. Techniques and skills

- a. **Formulation work:** Peptide polyplex formulation and polymeric nanoparticles for siRNA and DNA delivery, AON, protein, and enzyme delivery
- b. **DNA sample preparation:** expression, purification, partialization
- c. **siRNA sample preparation:** handling, formulation and knockdown experiments
- d. **Protein Purification and expression:** bacterial strain purification, and visualization (polyacrilimide gels, numerous staining techniques, and western blot analysis)
- e. **LSM and FCS:** cell uptake, *In vitro* nanoreactor studies, Co-localization, binding, and release studies
- f. **Peptide Synthesis:** solid-phase synthesis, bioconjugation, and PEGylation for *In vitro* and *in Vivo* use
- g. **Spectroscopy:** UV-Vis, Fluorescence, Atomic Force Microscopy, electrospray Ionization, Mass Spectrometry, Band shift assay (SDS PAGE), STEM.
- h. **Chromatography:** RP-HPLC ESI-MS, Size Exclusion Chromatography, Ion Exchange Chromatography/Fast Protein Liquid Chromatography, Affinity Chromatography
- i. **Animal handling (mice):** Tail Vein Dosing, Hydrodynamic Dosing, Hydrodynamic Stimulation, Biodistribution of Radio-Labeled Formulations, Liver Perfusion to Isolate Primary Hepatocytes and Kupffer Cells, Bioluminescent imaging, Jugular Vein Cannulation, Pharmacokinetics
- j. **Cell Culture:** Culture Mammalian Cells, Isolation of Primary Hepatocytes, Isolation of Stably Transfected Cells, Luciferase Gene Expression, Binding Assay, Competitive Binding Assays, 384 well and high throughput miniaturization of assays, Toxicity assay: MTS, MTT, comet assay
- k. **FACS Analysis:** protein and peptide charge separation techniques
- l. **Radiation Training:** DNA Iodination, Peptide Iodination, Autoradiography (Gels)
- m. **Cancer Targeting studies** – ligand binding, formulations, in vitro and in vivo assays for cancer detection and targeting by nanoparticle formulations

2. Transferable skills/Language skills: English mother language, German B1-B2, Italian B2 (professional experience).

- a. **Writing/proofreading:** Published 25 documents and have helped revise > 100 others. Due to being a native English speaker in two foreign labs, I was often looked upon to help read, revise, and edit documents and papers.
- b. **International collaborations:** I have worked with scientifically diverse labs from over 10 countries and 4 continents and will openly share collaboration opportunities and knowledge with the host.
- c. **IT Knowledge:** Operating Systems: All Windows operating systems, Microsoft Office, Word, Excel, Powerpoint, Outlook.
Imaging software: Adobe Photoshop and illustrator
Graphing and data analysis programs: Excel, origin, sigma plot.
Systems software: Familiar with Agilent and Shimadzu programming for HP-LC, IVIS live animal imaging software, and IGOR imaging software, Unicorn for FPLC, numerous analytical analysis software, and other
- d. **Teaching and Mentoring:** Experienced in project management and student training (See above)

J. Professional Memberships

2008-2014 Member of the American Society for Gene and Cell Therapy

2021 – present CRS Italy Chapter

K. Editorial Board or Associate/Review Editor

1. Guest Editor for the open access journal *Molecules* (ISSN 1420-3049).
2. Editor: Research Topic "Innovation in Nano-medicine: Brain Delivery".
3. Special Guest Editor in *Pharmaceutics*: nanomedicine across Barriers
4. Editorial board: *Journal of Nanomaterials and Molecular Nanotechnology*
5. Editor Board Member: *Journal of Current Trends in Pharmaceutical Sciences* (ISSN: 2321-3760)
6. In consideration for Executive Guest Editor for *Drug Delivery Letters*
7. Editorial Board Member: *Journal of Current Trends in Pharmaceutical Sciences*.
8. Editorial Board Member: *Journal of Nanotechnology Research*

Reviewer

1. *Pharmaceutics*
2. *Journal of Clinical Medicine* (MDPI)
3. MDPI general system
4. *Nanomaterials*