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Our laboratory focuses on central nervous system control of energy balance during aging, in obesity-prone and -resistant and Parkinson's disease animal models. The goal of our laboratory is to understand brain mechanisms important in determining the propensity for age-related obesity development, and in Parkinson's disease. Our investigations involve study of neuropeptides that regulate feeding behavior and energy expenditure, including that related to physical activity, and in peripheral mechanisms that underlie alterations in adipose tissue mass. The most recent focus of our studies is on the role of the neuropeptide orexin, also known as hypocretin. Orexin is predominantly located in the lateral hypothalamus, and stimulation of orexin pathways (e.g. orexin neuron activation or receptor simulation) enhances physical activity and energy expenditure and prevents weight gain during overfeeding. We have also shown that this low-level physical activity and energy expenditure is important in resistance to obesity during aging. The laboratory techniques we use include stereotaxic surgery, immunohistochemistry, food intake and physical activity measurements, indirect calorimetry, body composition (EchoNMR) and molecular biology procedures, including RNA/DNA extraction, western blots, rtPCR, cDNA probe synthesis and random primer labeling. We also use optogenetics and designer receptors exclusively activated by designer drugs (DREADDs) to understand the specific role of orexin neurons in body weight control with aging. We actively collaborate with Research Triangle Institute on the development and use of novel small molecular weight orexin agonists, to allow for targeting of the orexin receptors.

Recent Publications:

1. Increasing diversity, equity, and inclusion in the fields of nutrition and obesity: A roadmap to equity in academia. Martin SL, Cardel MI, Carson TL, Hill JO, Stanley T, Grinspoon S, Stegar F, Blackman Carr LT, Ashby-Thompson M, Stewart D, Ard J; Nutrition Obesity Research Center Taskforce to Advance the Careers of Researchers from Groups Underrepresented in Academia; Stanford FC. Am J Clin Nutr. 2023 Feb 9:S0002-9165(23)01565-4. doi: 10.1016/j.ajcnut.2023.02.001.
2. Anatabine, Nornicotine, and Anabasine Reduce Weight Gain and Body Fat through Decreases in Food Intake and Increases in Physical Activity. Grebenstein PE, Erickson P, Grace M, **Kotz CM**. J Clin Med. 2022 Jan 18;11(3):481. doi: 10.3390/jcm11030481.PMID: 35159932
3. Changes in sensorimotor-cortical oscillatory activity by orexin-A in the ventrolateral preoptic area of the hypothalamus reflect increased muscle tone. Mavanji, V, Teske, JA, **Kotz, CM**, Pellizer, G. J Neurosci Res. 2023;00:1–19.
4. Behavioral plasticity: role of neuropeptides in shaping feeding responses. Levine AS, Jewett DC, **Kotz CM**, Olszewski PK. Appetite. 2022 Jul 1;174:106031. doi: 10.1016/j.appet.2022.106031. Epub 2022 Apr 6.PMID: 35395362
5. Orexin enhances neuronal synchronization in adult rat hypothalamic culture: A model to study hypothalamic function. Mavanji, V, Butterick, TA, Nixon, JP, Georgopoulos, A, **Kotz, CM**. Journal of Neurophysiology 2022 May 1;127(5):1221-1229. doi: 10.1152/jn.00041.2022. Epub 2022 Mar 30. PMID: 35353632

6. Orexin, serotonin, and energy balance. Mavanji V, Pomonis B, **Kotz** CM. (2021). WIREs Mech Dis. 2021;e1536. https://doi.org/10.1002/wsbm.1536 Review
7. COVID-19 Vaccines are Effective in People with Obesity: A Position Statement from The Obesity Society. Butsch WS, Hajduk A, Cardel MI, Donahoo WT, Kyle TK, Stanford FC, Zeltser LM, **Kotz CM**, Jastreboff AM. Obesity (Silver Spring). 2021 Jul 1. doi: 10.1002/oby.23251. Online ahead of print. PMID: 34212511
8. Discovery of Arylsulfonamides as Dual Orexin Receptor Agonists. Zhang D, Perrey DA, Decker AM, Langston TL, Mavanji V, Harris DL, **Kotz CM**, Zhang Y.J Med Chem. 2021 Jun 24;64(12):8806-8825. doi: 10.1021/acs.jmedchem.1c00841. Epub 2021 Jun 8. PMID: 34101446
9. Impact of Gut and Metabolic Hormones on Feeding Reward. Klockars A, Levine AS, Head MA, Perez-Leighton CE, **Kotz CM**, Olszewski PK. Compr Physiol. 2021 Feb 12;11(2):1425-1447. doi: 10.1002/cphy.c190042.PMID: 33577129
10. Inhibition of Orexin/Hypocretin Neurons Ameliorates Elevated Physical Activity and Energy Expenditure in the A53T Mouse Model of Parkinson's Disease. Stanojlovic M, Pallais JP, **Kotz CM**. Int J Mol Sci. 2021 Jan 14;22(2):795. doi: 10.3390/ijms22020795.PMID: 33466831
11. Synchronous neuronal interactions in rat hypothalamic culture: a novel model for the study of network dynamics in metabolic disorders. Mavanji V, Georgopoulos AP, **Kotz CM**. Exp Brain Res. 2021 Jan 3. doi: 10.1007/s00221-020-05977-7. Online ahead of print. PMID: 33388905
12. Brain site-specific regulation of hedonic intake by orexin and DYN peptides: role of the PVN and obesity P. Mattar , S. Uribe-Cerda , C. Pezoa , T. Guarnieri , **Kotz CM** , J. A. Teske , E. Morselli & C. Perez-Leighton Nutritional Neuroscience Published online: 05 Nov 2020 https://doi.org/10.1080/1028415X.2020.1840049

For a comprehensive list of recent publications, refer to https://pubmed.ncbi.nlm.nih.gov/?term=Kotz+c

Education:
BS Biology – University of Minnesota, St. Paul, MN 1984
MS Human Nutrition – University of Minnesota, St. Paul, MN 1990
PhD Nutritional Biochemistry – University of Minnesota, St. Paul, MN 1993
Minneapolis VA Medical Center – Neuroscience of Feeding, Minneapolis, MN 1993-96

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