Applications for visualization of the relationship between serum vitamin D and colorectal cancer incidence

Circulating serum vitamin D (25(OH)D) of < 20 ng/mL is considered deficient1. Multiple reports indicate patients with colorectal cancer are vitamin D deficient or insufficient1,2,4,6. Based on these data, I sought to visualize the relationship between 25(OH)D levels between patients grouped by cancer, asking the question: how do vitamin D serum levels vary across types of colorectal cancer? To begin, I created data based on established literature. Specifically, the ranges of 25(OH)D were biologically significant, ranging from 0-85 ng/mL. I used ChatGPT to generate random values for each cancer type, ensuring that the average of the values fell within the appropriate range. I gathered types of colon cancer (melanoma, adenoma, squamous cell carcinoma, anal cancer, etc.) and their associated averages of 25(OH)D1. Using Excel and ChatGPT, I created a column titled “VD” for vitamin D levels in ng/mL and a column titled “cancer.” Within each, I listed the types of cancer and randomly generated values that averaged to their corresponding established reported levels of 25(OH)D within biologically relevant ranges. Next, I saved the Excel file as a .csv file and uploaded it to my Github directory for an easily accessible path on R. Moving to plots, I began by loading necessary packages, creating objects from the .csv data files, and made three plots. The first plot used data generated by ChatGPT comparing averages of 25(OH)D of non-cancerous individuals to patients with colorectal cancer. I used a box plot to visualize these data. Next, I created horizontal point range plot and grouped the cancer data previously described by mean 25(OH)D. I shaded the background of the plot with corresponding levels of vitamin D, red being deficient and green being sufficient. Finally, to better visualize the data, I created a ridge plot to show the distribution of vitamin D levels across cancer types.

References

1. Na,Soo-Youngetal.2022.VitaminDandColorectalCancer:Current Perspectives and Future Directions. Journal of Cancer Prevention. 27(3), 147- 156. https://doi.org/10.15430/JCP.2022.27.3.147
2. Kim,Yejinetal.Serum25-HydroxyvitaminDLevelsandRiskofColorectal Cancer: An Age-Stratified Analysis. Gastroenterology. 165(5), 920-  
   931. 10.1053/j.gastro.2023.06.029
3. Barber,LaurenEetal.2021.PredictedVitaminDStatusandColorectal Cancer Incidence in the Black Women's Health Study. Cancer Epidemiol Biomarkers Prev. 30(12), 2334-2341. 10.1158/1055-9965.EPI-21-0675
4. Ng K, Sargent DJ, Goldberg RM, Meyerhardt JA, Green EM, Pitot HC, Hollis BW, Pollak MN, Fuchs CS. Vitamin D status in patients with stage IV colorectal cancer: findings from Intergroup trial N9741. J Clin Oncol. 2011 Apr 20;29(12):1599-606. doi: 10.1200/JCO.2010.31.7255. Epub 2011 Mar 21. PMID: 21422438; PMCID: PMC3082978.
5. Klampfer L. Vitamin D and colon cancer. World J Gastrointest Oncol. 2014 Nov 15;6(11):430-7. doi: 10.4251/wjgo.v6.i11.430. PMID: 25400874; PMCID: PMC4229786.
6. McCullough, M. et al. Circulating Vitamin D and Colorectal Cancer Risk: An International Pooling Project of 17 Cohorts, JNCI: Journal of the National Cancer Institute, Volume 111, Issue 2, February 2019, Pages 158–169,