UC San Diego
SCHOOL OF MEDICINE

Department of
BioMedical Informatics

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Risk Factors of Young Onset Peritoneal Carcinomatosis from Colorectal Cancer

This research was supported by UCSD HSI-DDI

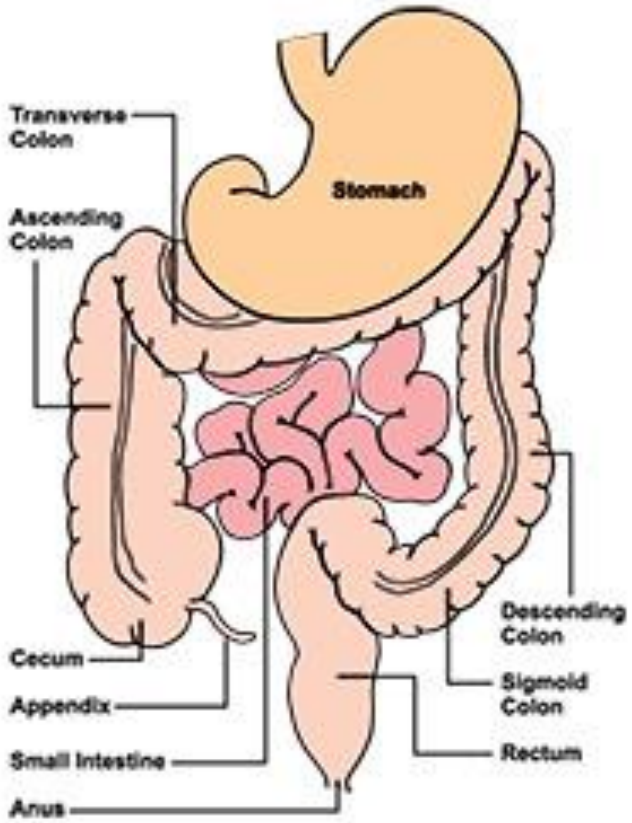
About Me

- Rising 4th Year at UC San Diego
- Majoring in Human Health Psychology and Minoring in Computer Science
- Interest in digital health and healthcare informatics

This research was supported by UCSD HSI-DDI

Introduction

Colorectal Cancer (CRC)



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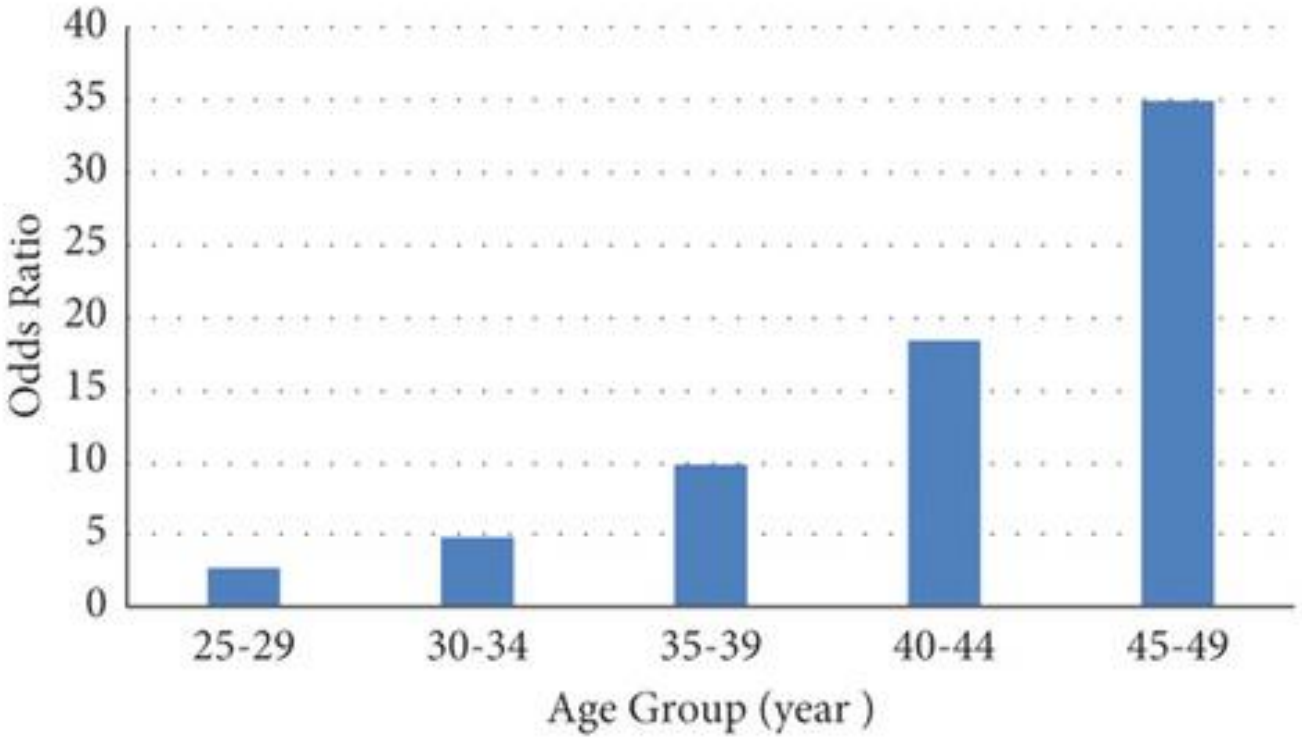
Risk Factors of CRC



Source: Danial D, Youssef ED, Maryam BM, Mohammad A, Moein BM, Liliane D. Risk Factors of Young-Onset Colorectal Cancer: Analysis of a Large Population-Based Registry. Can J Gastroenterol Hepatol. 2022 Feb 16;2022:3582443. doi: 10.1155/2022/3582443. PMID: 35223684; PMCID: PMC8866030.

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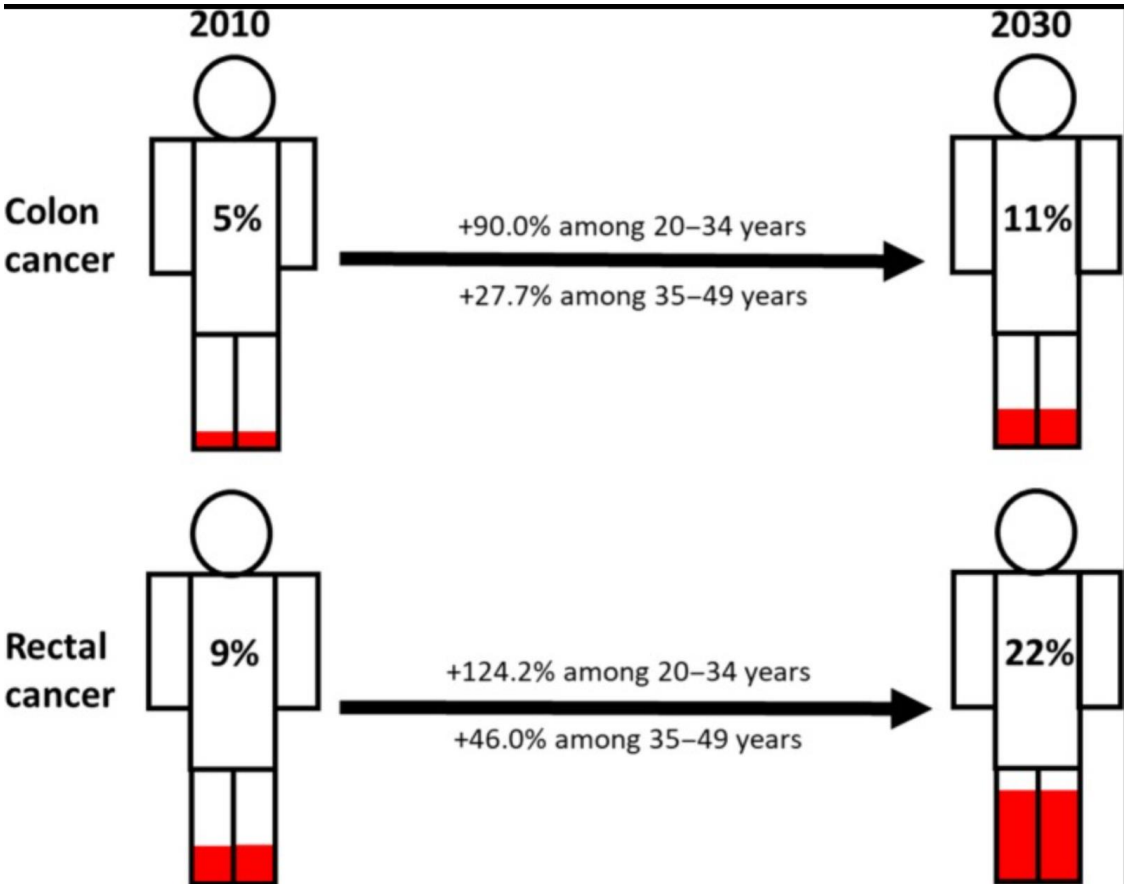
Early-onset colorectal cancer prediction



Source: Mauri G, Sartore-Bianchi A, Russo AG, Marsoni S, Bardelli A, Siena S. Early-onset colorectal cancer in young individuals. Mol Oncol. 2019 Feb;13(2):109-131. doi: 10.1002/1878-0261.12417. Epub 2018 Dec 22. PMID: 30520562; PMCID: PMC6360363.

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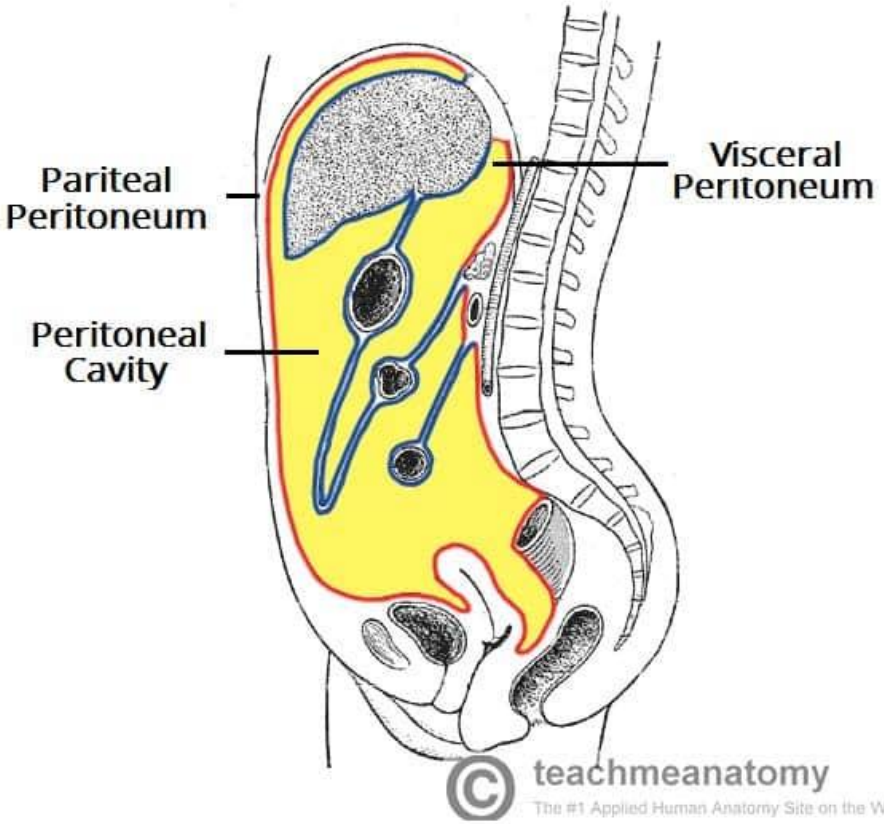
Introduction

Peritoneal Carcinomatosis (PC)



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Risk factors for PC from CRC

- Colonic cancer patients 77% higher risk of developing peritoneal carcinomatosis
- Advanced colonic cancer patients nearly 10x risk of developing peritoneal carcinomatosis
- Patients ages 70+ have a 31% lower risk developing peritoneal carcinomatosis
- Patients ages 49 and under have a 21% higher risk developing peritoneal carcinomatosis

Source: Segelman J, Granath F, Holm T, Machado M, Mahteme H, Martling A. Incidence, prevalence and risk factors for peritoneal carcinomatosis from colorectal cancer. Br J Surg. 2012 May;99(5):699-705. doi: 10.1002/bjs.8679. Epub 2012 Jan 27. PMID: 22287157.

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Project Goals/Aims

- Many studies focus on whole population
- Focus on younger patients is lacking
- Project Goal

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Methods

- NCDB 2004-2020 Database
- Data Clean
  - Colorectal Cancer patients
  - Patients ages <49
- Variables/Risk Factors
  - Age at diagnosis
  - Year of diagnosis
  - Gender
  - Race
  - Spanish/Hispanic
  - Insurance
  - Distance to Hospital
  - Charles-Deyo Score
  - Clinical Tumor Stage
  - Primary Site
  - Grade

Demographics of Data Set			
	No Carcinomatosis	Carcinomatosis	Total
Gender			
Male	23,184	7,430	30,614
Female	22,902	7,137	30,039
Race			
White	35,480	10,770	46,250
Black	7,257	2,762	10,019
Asian/Pacific Islander	223	68	291
Other/Unknown	3,126	967	4,093
Spanish/Hispanic Origin			
Yes	39,983	12,786	52,769
No	4,450	1,291	5,741
Unknown	1,653	490	2,143

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Methods

- Analysis
  - Univariable Logistic Regression
  - Multivariable Logistic Regression
- Tables
  - Odd Ratio (OR)
  - P-value

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Univariable Logistic Regression Results

Univariable Logistic Regression Results		
	OR 95% CI	P-Value
Age		
10 - 19 years	Reference	Reference
20 - 29 years	2.102 (1.470 - 3.005)	>0.001
30 - 39 years	2.929 (2.063 - 4.159)	>0.001
40 - 49 years	3.154 (2.225 - 4.471)	>0.001
Year of Diagnosis		
2008 - 2012	Reference	Reference
2013 - 2017	0.953 (0.919 - 0.990)	0.012
Gender		
Male	Reference	Reference
Female	0.972 (0.937 - 1.009)	0.141
Race		
White	Reference	Reference
Black	1.254 (1.194 - 1.317)	>0.001
Asian/Pacific Islander	1.005 (0.765 - 1.319)	0.974
Other/Unknown	1.019 (0.945 - 1.099)	0.623
Spanish/Hispanic		
No	Reference	Reference
Yes	0.907 (0.850 - 0.968)	0.003
Unknown	0.927 (0.836 - 1.027)	0.148
Insurance		
Private	Reference	Reference
Government	1.057 (0.966 - 1.157)	0.225
None	0.847 (0.785 - 0.913)	> 0.001
Other/Unknown	1.087 (1.025 - 1.152)	0.005

Univariable Logistic Regression Results		
	OR 95% CI	P-Value
Distance to Hospital (Miles)		
0 - 4.3	Reference	Reference
4.3 - 9.4	1.070 (1.010 - 1.133)	0.022
9.4 - 21.1	1.088 (1.028 - 1.152)	0.003
21.1+	1.401 (1.325 - 1.481)	> 0.001
Charlson-Deyo Score		
Score 0	Reference	Reference
Score 1	0.940 (0.884 - 1.000)	0.049
Score 2	0.926 (0.797 - 1.076)	0.315
Score 3	1.337 (1.120 - 1.596)	0.001
Clinical Stage		
Stage I	Reference	Reference
Stage II	2.641 (1.513 - 4.609)	0.001
Stage III	2.406 (1.347 - 4.295)	0.003
Stage IV	3189.364 (2027.34 - 5017.439)	> 0.001
Unknown	4.244 (2.668 - 6.750)	> 0.001
Primary Site		
Appendix/Cecum	Reference	Reference
Right Colon	1.170 (1.107 - 1.237)	>0.001
Left Colon	1.296 (1.236 - 1.359)	>0.001
Unknown	3.612 (3.339 - 3.906)	>0.001
Grade		
Grade 1	Reference	Reference
Grade 2	1.975 (1.834 - 2.127)	>0.001
Grade 3	3.465 (3.193 - 3.759)	>0.001
Grade 4/Undifferentiated	2.800 (2.456 - 3.193)	>0.001
Unknown	6.024 (5.551 - 6.537)	>0.001

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Multivariable Logistic Regression Results

Multivariable Logistic Regression Results		
	OR 95% CI	P-Value
Age		
10 - 19 years	Reference	Reference
20 - 29 years	2.346 (1.045 - 5.265)	0.039
30 - 39 years	2.212 (1.006 - 4.863)	0.048
40 - 49 years	2.119 (0.968 - 4.638)	0.060
Year of Diagnosis		
2008 - 2012		Reference
2013 - 2017	0.224 (0.199 - 0.252)	> 0.001
Gender		
Male	Reference	Reference
Female	1.020 (0.929 - 1.119)	0.680
Race		
White	Reference	Reference
Black	1.150 (1.013 - 1.303)	0.030
Asian/Pacific Islander	1.237 (0.626 - 2.444)	0.540
Other/Unknown	1.044 (0.869 - 1.256)	0.645
Spanish/Hispanic		
No	Reference	Reference
Yes	0.877 (0.748 - 1.028)	0.106
Unknown	1.046 (0.792 - 1.380	0.753

Multivariable Logistic Regression Results		
	OR 95% CI	P-Value
Insurance		
Private	Reference	Reference
Government	0.620 (0.513 - 0.749)	>0.001
None	0.617 (0.521 - 0.732)	> 0.001
Other/Unknown	0.687 (0.594 - 0.796)	>0 .001
Charlson-Deyo Score		
Score 0	Reference	Reference
Score 1	0.948 (0.814 - 1.105)	0.495
Score 2	0.782 (0.552 - 1.107)	0.165
Score 3	1.061 (0.676 - 1.664)	0.798
Tumor Stage		
Stage I	Reference	Reference
Stage II	2.400 (1.374 - 4.193)	0.002
Stage III	2.070 (1.158 - 3.701)	0.014
Stage IV	5776.47 (3642.085 - 9161.676)	> 0.001
Unknown	4.734 (2.974 - 7.536)	> 0.001
Primary Site		
Appendix/Cecum	Reference	Reference
Right Colon	0.988 (0.859 - 1.137)	0.870
Left Colon	1.022 (0.905 - 1.154)	0.729
Unknown	1.255 (1.037 - 1.518)	0.019
Grade		
Grade 1	Reference	Reference
Grade 2	1.027 (0.853 - 1.236)	0.782
Grade 3	1.260 (1.027 - 1.547)	0.027
Grade 4/Undifferentiated	1.028 (0.742 - 1.424)	0.869
Unknown	0.887 (0.726 - 1.083)	0.237

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Conclusions

- Many factors effect possibility of developing PC
- Main risk factors
  - Increasing age
  - Black race
  - Private insurance
  - Increasing tumor stage

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Discussion

- Issues
  - Very few cases of young patients with PC
  - Analysis showed patients without insurance are at decreased risk of developing PC
- Future Direction
  - Original aim was to create a predictive model for young-onset PC
  - Convert risk factor variables into binary

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Takeaways from the Program

Skills

- R programming language
- R-Studio
- Data visualization
- Data cleaning on large datasets
- Independent troubleshooting/learning
- Communication

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Questions?

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