Colorectal Cancer Disparity

Balavenkatesh Kanna MD, MPH, FACP
Affiliate Dean
Lincoln Medical & Mental Health Center
at Weill Cornell Medical College
GME Research Director, LMMHC

“Despite notable progress in the overall health of the Nation.....
- there are continuing disparities in the burden of illness and death experienced by
- African Americans, Hispanics or Latinos, American Indians and Alaska Natives, and Native Hawaiian and Other Pacific Islanders, compared to the U.S. population as a whole.”

“The demographic changes anticipated over the next decade magnify the importance of addressing disparities in health status.”
Objectives

1. Review US epidemiologic information on ethnic disparities in cancer, especially colorectal cancer (CRC)
2. NYC & South Bronx health status related to CRC
3. The Lincoln Hospital experience
4. Carcinogenesis and tumor host interactions
African Americans have the highest death rate and shortest survival of any racial and ethnic group in the US for most cancers. Death rate for all cancers combined continued to be 33% higher in African American men and 16% higher in African American women than in white men and women, respectively.

Cancer survival rates are generally similar or lower among Hispanics compared to non-Hispanic whites.

For all cancers combined, and for the most common cancer (prostate, breast, colorectal, and lung) incidence and death rates are lower among Hispanics than among non-Hispanic whites.
Statistics are for 2000-2004, age-adjusted to the 2000 U.S. standard million population, and represent the number of new cases of invasive cancer and deaths per year per 100,000 men and women.

**Colorectal Cancer (CRC) Disparity**

**CRC Stage of distribution**

African Americans vs. Whites  
Hispanics vs. Whites
LMMHC service area

*the Broadway of the Bronx.*
Screening for CRC has increased by 300%*  
> 2000 colonoscopies per year  
Program  
Patient navigation  
Direct endoscopic referral system (DERS)  
GI suite modifications  
Improved screening by Colonoscopy from 5 to 15 % in the service area*  

“After the age of fifty the ‘c’ word means colonoscopy.”

CRC screening in Hunts point & Mott Haven

Will we reach this target?

TERP target
% Eligible Screened for CRC
Study of Colorectal tumors among minority New Yorkers

4,043 consecutive colonoscopies
2-year period
Age and gender distribution of colorectal tumor type, location, and stage of colorectal tumors among urban minorities
99% were Hispanic or African American
two-thirds were women

Colorectal tumors study

- 960 (23.7%), had adenomas, and 82 (2.0%) had colorectal cancer
- Gender related findings
  - Women had higher visit volume adjusted odds to undergo colonoscopy (OR 1.35; CI 1.26–1.44, \( P < .001 \))
  - Men had higher odds for both adenomas and cancers (OR 2.38, CI 2.0–2.82, \( P < .001 \)).
- Age related findings
  - The odds of colorectal cancers were higher at age greater than 70 years (OR 1.91; CI 1.09–3.27, \( P < .05 \)), specifically among men (OR 2.27, 95% CI 1.07–4.65, \( P < .05 \))
  - However, 38% of cancers were noted among the 50- to 59-year-old subjects.
- Ethnicity related findings
  - Significantly higher adjusted odds of Hispanic Americans undergoing colonoscopy compared to African Americans in our sample.
- Proximal location
  - 51% of all abnormalities and 35.4% of cancers were found proximal to splenic flexure
Ethnic disparity in mortality after diagnosis of colorectal cancer among inner city New Yorkers

- 5-year data on demographics and clinical features of CRC patients at LMMHC
- African Americans (AAs) and Hispanics
- Adjusted cancer-related deaths and early deaths (within 6 months of diagnosis) were compared

CRC Ethnic disparity study

- 202 CRC subjects
- Hispanics, 148 (73%); AAs, 54 (27%)
- Women, 107 (53%)
- Mean age, 64.5 years
- CRC was diagnosed by colonoscopy in 157 (78%) and by surgery in 45 (22%) cases
- One hundred twenty-two (60%) had stage 0-2 CRC
- 69 (34%) had proximal colonic lesions.
CRC Ethnic disparity study

- Fifty-four of 202 (20%) patients died
- 24 (11.9%) were early deaths (within 6 months of follow-up)
- Study period (median, 27 months)

Total participants
N = 202

Cases
(African Americans)
N = 54
Survivors = 28

Controls
(Hispanics)
N = 148
Survivors = 120
CRC Ethnic disparity study

There were no differences in
- demographic,
- clinical features,
- or treatment
between Hispanics and AAs
($p = \text{NS}$)

<table>
<thead>
<tr>
<th>Clinical feature</th>
<th>Cases (African Americans N=54)</th>
<th>Controls (Hispanics N=148)</th>
<th>OR (95% CI) P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (median, IQR) years</td>
<td>60 (56-72.5)</td>
<td>60 (57-73.5)</td>
<td>0.97 (0.97-1.02)</td>
</tr>
<tr>
<td>Women n (%)</td>
<td>28 (51.9)</td>
<td>67 (45.3)</td>
<td>1.3 (0.69-2.34)</td>
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<td>Insured n (%)</td>
<td>41 (76)</td>
<td>113 (76.3)</td>
<td>0.98 (0.47-2.03)</td>
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<tr>
<td>Active smokers n (%)</td>
<td>19 (35.2)</td>
<td>37 (25)</td>
<td>1.63 (0.85-3.19)</td>
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<tr>
<td>Family history cancer n (%)</td>
<td>3 (5.6)</td>
<td>2 (1.4)</td>
<td>4.29 (0.69-26.42)</td>
</tr>
<tr>
<td>Screening colonoscopy n (%)</td>
<td>9 (16.7)</td>
<td>35 (23.7)</td>
<td>0.65 (0.28-1.48)</td>
</tr>
<tr>
<td>Diagnosis by colonoscopy n (%)</td>
<td>42 (77.8)</td>
<td>119 (77.7)</td>
<td>1.00 (0.47-2.12)</td>
</tr>
<tr>
<td>Lesions proximal to hepatic flexure n (%)</td>
<td>22 (40.7)</td>
<td>47 (31.8)</td>
<td>1.48 (0.78-2.81)</td>
</tr>
<tr>
<td>Adenocarcinoma-in-situ n (%)</td>
<td>12 (22.2)</td>
<td>31 (21)</td>
<td>1.08 (0.51-2.29)</td>
</tr>
<tr>
<td>AJCC stage &lt; 2 n (%)</td>
<td>35 (64.8)</td>
<td>87 (58.8)</td>
<td>1.29 (0.67-2.54)</td>
</tr>
<tr>
<td>Metastatic disease n (%)</td>
<td>20 (37)</td>
<td>47 (31.8)</td>
<td>1.26 (0.66-2.40)</td>
</tr>
<tr>
<td>&gt; 12 lymph nodes resected during surgery n (%)</td>
<td>15 (27.8)</td>
<td>37 (25)</td>
<td>1.15 (0.57-2.31)</td>
</tr>
<tr>
<td>Appropriate Rx n (%)</td>
<td>49 (90.7)</td>
<td>128 (86.5)</td>
<td>1.53 (0.54-4.31)</td>
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<tr>
<td>Chemotherapy n (%)</td>
<td>14 (25.9)</td>
<td>44 (29.7)</td>
<td>0.83 (0.41-1.67)</td>
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<tr>
<td>Treatment complete n (%)</td>
<td>51 (94.4)</td>
<td>131 (91.2)</td>
<td>1.64 (0.45-5.93)</td>
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<tr>
<td>*Deaths n (%)</td>
<td>26 (48.2)</td>
<td>26 (18.9)</td>
<td>3.98 (2.03-7.81)</td>
</tr>
<tr>
<td>**Deaths in 6 months n (%)</td>
<td>15 (27.8)</td>
<td>9 (6.3)</td>
<td>5.94 (2.42-14.61)</td>
</tr>
<tr>
<td>***Deaths in 1 year n (%)</td>
<td>23 (43.1)</td>
<td>19 (13.8)</td>
<td>4.52 (2.08-9.86)</td>
</tr>
<tr>
<td>****Deaths in 3 years n (%)</td>
<td>28 (51.9)</td>
<td>28 (19.8)</td>
<td>3.43 (1.74-6.74)</td>
</tr>
</tbody>
</table>
CRC Ethnic disparity study

- Significantly higher odds of death (OR, 3.98; 95% CI, 2.03–7.81)

- Especially early death (OR, 5.94; 95% CI, 2.42–14.6) was observed among AAs

CRC Study Highlights

- First to compare inner city minority subjects with CRC
- Increased odds of death in AAs, despite similar clinical features and living environment
- Tumor behavior or host response among AAs could explain this difference
Colonic adenomas progress to adenocarcinomas (Morson 1974)
• Adenoma–carcinoma sequence has become established as a stepwise pattern of mutational activation of oncogenes and inactivation of tumour suppressor genes that result in cancer (Vogelstein et al. 1988)
The transition from normal epithelium to adenoma to carcinoma is associated with acquired molecular events

At least five to seven major deleterious molecular alterations may occur
  when a normal epithelial cell progresses in a clonal fashion to carcinoma.
Two major pathways by which these molecular events can lead to colorectal cancer.
  • 85% of colorectal cancers are due to chromosomal instability (CIN)
  • 15% are due to events that result in microsatellite instability (MSI or MIN, also known as replication error [RER])
The key characteristics of MSI cancers are
- a largely intact chromosome complement
- defects in the DNA mismatch repair system
- Mitotic instability of microsatellites is the hallmark of MSI cancers.
**MSI**

- The rate of adenoma-to-carcinoma progression appears to be faster in microsatellite-unstable tumors compared with microsatellite-stable tumors.
- Characteristic histologic changes such as increased mucin production can be seen in tumors that demonstrate MSI, suggesting that at least some molecular events contribute to the histologic features of the tumors.

**MSI – does not explain everything**

CRCs with MSI have a significantly better prognosis compared to those with intact mismatch repair.


Familial CRC can be divided into two groups: Tumors with high-level MSI and tumors with low-level or no MSI. However, tumors with low-level MSI show unfavorable pathological characteristics compared to tumors with no and tumors with high-level MSI. These differences suggest a distinct underlying biology of CRC with low-level MSI.  


Incidence of MSI-H tumors was 3-fold higher in this study group of AA patients

• The molecular events that drive the initiation, promotion, and progression of colorectal cancer occur on many interrelated levels.

• This dynamic process involves interactions among environmental influences, germ-line factors dictating individual cancer susceptibility, and accumulated somatic changes in the colorectal epithelium.
Contact

Balavenkatesh.Kanna@nychhc.org
Lincoln Medical & Mental Health Center Bronx NYC