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## Colon Cancer Patient Information Seeking and the Adoption of Targeted Therapy for On-Label and Off-Label Indications

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### Abstract

**Background**—Despite the rise in publicly available cancer information little is known about the association between patient information seeking and the adoption of cancer technologies. We investigated the relationship between patient information seeking and awareness about and receipt of novel targeted therapy (TT) for colon cancer among patients for whom therapy is FDA approved and for whom therapy is not FDA approved.

**Methods**—A retrospective population-based survey of 633 colon cancer patients identified through the Pennsylvania Cancer Registry. Outcome measures were self-reported awareness about and receipt of TT (Avastin<sup>tm</sup> and Erbitux<sup>tm</sup>).

**Results**—After adjusting for sociodemographic characteristics, high levels of treatment information seeking were strongly associated with hearing about TT (odds ratio [OR] 2.83; 95% confidence interval [CI] 1.49-5.38) and receiving TT (OR 3.22; 95% CI, 1.36-7.62). These associations were present for patients with metastatic disease where use of TT is FDA approved and for patients with localized disease where use of TT is not FDA approved (p-value for interactions 0.29). Internet and newspaper/magazine use was associated with hearing about TT (OR 2.88; 95% CI 1.40-5.94; OR 3.44; 95% CI 1.34-8.84). Seeking information from non-treating doctors was associated with hearing about and receiving TT (OR 1.95; 95% CI, 1.03-3.68; OR 2.64; 95% CI, 1.16-5.97).

**Conclusion**—Patient information seeking is related to the adoption of TT for colon cancer in both appropriate and inappropriate clinical settings. These findings emphasize the importance of exploring patient influence on physician prescribing patterns and understanding the impact of information seeking on cancer outcomes.

### Keywords

cancer survivor; communication; information seeking; diffusion and adoption; targeted therapy; off-label drug use

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In the last 40 years patients have become more involved in their health care as the doctor-patient relationship has shifted from a largely paternalistic model to an emphasis on patient autonomy.<sup>1-5</sup> At the same time, there has been unprecedented growth in the amount of health information that is available to patients. Widespread access to communication technologies such as the internet has made health information almost ubiquitous.<sup>6-7</sup> This increased access is reflected in widespread health information seeking by lay individuals. For example, approximately 45% of people report looking for cancer information and approximately 39% of cancer patients seek cancer information on the internet.<sup>6-8</sup>

If patients' use of health information is increasing, it remains unclear how these phenomena will influence medical outcomes. Patient access to information may erode components of the doctor-patient relationship, however increased access may lead to more informed patients and improved shared decision making.<sup>9-12</sup> Additionally, patient information seeking may produce adverse effects such as an increased demand for cancer related therapies and technologies. Increased patient access to medical information may also directly influence population health by influencing health behaviors and reducing disparities in information access.<sup>6-7, 13</sup>

Theories suggest that access to health information may impact the diffusion and adoption of new medical technologies. Diffusion of innovation is a complex process that is influenced by factors as diverse as pricing, government regulation, patient, physician and technology characteristics, and physician interpersonal networks.<sup>14-21</sup> Patterns of adoption of new technologies are also strongly influenced by exposure to information.<sup>15-22</sup> Physicians commonly encounter information in a professional context but there is evidence that media coverage influences physician attitudes about scientific discoveries and amplifies the impact of publications in the research community.<sup>23-24</sup> Patients may learn about novel therapies from sources such as the media and the internet. This phenomenon may be particularly important for cancer treatment when new therapies are rapidly developed and receive considerable media attention.

Although several studies have demonstrated that people who look for health information have improved knowledge, engage in more cancer-prevention behaviors and take more active roles in decision making, little published work exists that examines the relationship between cancer information seeking and cancer treatment.<sup>25-27</sup> In one study, 47% of patients referred for participation in a prominent phase I drug trial first learned about the trial from media sources and 51% of those patients subsequently contacted their doctor for more information.<sup>28</sup>

Here we report the results of a study examining the relationship between cancer patient information seeking and awareness about and use of novel targeted therapy for colon cancer. We focused on treatments with targeted therapy, bevacizumab (Avastin<sup>tm</sup>) and cetuximab (Erbix<sup>tm</sup>), because of their clinical importance, significant media coverage and recent FDA approval. We investigated awareness and use of targeted therapy in both on-label and off-label indications because we thought that there might be both positive and negative associations of information seeking on drug use. We hypothesized that there would be a relationship between information seeking and awareness of targeted therapies for all colon cancer patients because information on bevacizumab and cetuximab is widely available and would likely be encountered during treatment information seeking, regardless of whether targeted therapy would be indicated. Additionally, because treatment information seeking may lead patients to inquire about specific medications and subsequently receive those medications, we hypothesized that information seeking would be associated with the use of targeted therapy with a greater effect in patients for whom targeted therapy is approved by the FDA.

## Methods

### Study Design

We conducted a retrospective population based survey of 633 colorectal cancer patients to identify the association between cancer information seeking and awareness about and receipt of targeted therapy for colon cancer. We obtained institutional board approval from the University of Pennsylvania.

### Subjects

We surveyed a randomly chosen sample of colon cancer patients from a list obtained from the Pennsylvania Cancer Registry (PCR). Subjects were eligible if they were diagnosed with colorectal cancer between January 2005 and December 2005 in Pennsylvania. In order to have the statistical power to estimate large differences in cancer information seeking by racial and stage groups, we set recruiting goals for stage and racial sub-groups prior to data collection. We evaluated response rates after the first wave of data collection and subsequently over-sampled stage IV cancer patients and African American patients because these groups were found to have lower response rates than other sub-groups. Subjects were excluded from the study if they were unable to provide informed consent.

### Data Collection

We mailed surveys to 1581 potential subjects in 2006; 1305 in the initial sample and 276 in the over-sample. The mailing procedures were based on Dillman's method for mail surveys<sup>29</sup>. The American Association for Public Opinion Research (AAPOR) response rate 4 for the initial sample was 60% and for the over-sample was 32%.<sup>30</sup> Of the 682 respondents in the total sample, 633 had complete stage data and were included in our analyses.

### Survey Instrument

We developed the survey based on literature review and expert consultation and used validated measures when possible. The survey was pilot tested with 29 cancer patients. After the pilot, the questionnaire was revised and retested with a small number of respondents. No pilot data were included in the analysis.

## Measures

### Sociodemographic and Health Characteristics

We obtained self-reported information about age, race/ethnicity, education, marital status and health status through survey questions. We obtained information about cancer type, sex, and cancer stage from the PCR database. We generated a AJCC/UICC TNM stage by combining PCR data on tumor characteristics, lymph node involvement, and metastasis. Based on the FDA approved indications for bevacizumab and cetuximab use in 2005, subjects were included in the on-label group if they had metastatic disease. All other subjects were included in the off-label group.

### Measures

The cancer information seeking measure and our two outcome measures are displayed in Table 1. We used the cancer information seeking measure to create an index of information seeking breadth based on number of sources that subjects used to look for treatment information. Earlier work by our group has found that cancer patients actively seek information from all listed sources, including TV and radio (i.e. patients deliberately watching shows that they know will discuss cancer). The index ranged from 0 (no seeking)

to 11 (seeking from 11 source categories) and did not include seeking information from the treating doctor. Subjects were categorized into three groups: non-seekers (0 sources used), low-seekers (1-2 source categories used) and high-seekers (3 or more source categories used). Awareness about and receipt of targeted therapy, were measured with two questions. Subjects were categorized as aware of targeted therapy if they reported having heard of “Avastin or Erbitux”. Subjects were categorized as having received targeted therapy if they reported receiving “Avastin or Erbitux”. Targeted therapy options for colon cancer in 2005 included cetuximab and bevacizumab. Based on pilot-test feedback, we used the trade names rather than the generic names in the survey in order to minimize subject confusion.

### Statistical Analysis

Our primary focus was on whether information seeking was related to awareness of and use of TT for those who did and did not have an FDA indication. We used logistic regression to examine the unadjusted associations between patient characteristics, FDA indication group and seeking with hearing about or receiving targeted therapy. We then used multiple logistic regression to adjust the associations between seeking and hearing about or receiving targeted therapy for potential confounding variables. All hypothesis tests were two-tailed and used a significance level of  $p=0.05$ . Missing data comprised less than 15% of all data and were excluded from the analysis. We used post-stratification weights, which adjust the distribution of respondents to match the colon cancer population from the PCR on marital status, race, cancer stage, age and sex, to account for the oversample and for non-response. All statistical analysis was conducted in STATA 10 (Stata Corp. College Station, Tex).

### Results

Subject characteristics are reported in Table 2. Fourteen percent of all colon cancer subjects had heard of targeted therapy and 10% reported receiving targeted therapy. Fifty-one percent of metastatic patients and 3% of non-metastatic patients reported receiving targeted therapy. However, given that 84% of respondents had non-metastatic disease around 25% of those who reported receiving the drugs were receiving it for non-FDA indications. Overall, 69% of patients reported actively looking for treatment information.

The frequency of source use for seeking treatment information is reported in Table 3. We present the unadjusted associations between patient characteristics, treatment information seeking and hearing about or receiving targeted therapy in Table 4. After adjusting for sociodemographic characteristics, health status, and FDA indication, high levels of treatment information seeking were strongly associated with both hearing about and receiving targeted therapy for cancer OR 2.83 (95% CI, 1.49-5.38) and OR 3.22 (95% CI, 1.36-7.62) respectively (Table 5).

We then conducted a series of analyses in order to determine whether the associations between information seeking and outcome differed between subjects in the on-label and off-label groups. There was no significant interaction between information seeking and FDA indication ( $p$ -value=0.29). However, subgroup results are shown in Table 6 in order to show the strength of association in each group.

Additionally, we investigated whether or not information seeking was significantly associated with awareness of targeted therapy in the subgroup of patients who did not receive targeted therapy. The association between information seeking and awareness of targeted therapy trended toward significance among patients who did not receive targeted therapy (OR 2.19; 95% CI, 0.85-5.65,  $p=0.10$ ; analysis not shown).

When examining the associations between specific source use and outcomes (Table 7), we found that those who sought information from the internet and newspapers/magazines had higher odds of hearing about targeted therapy than non-seekers. Subjects who reported seeking treatment information from other doctors or health professionals had significantly higher odds of both hearing about and receiving targeted therapy than non-seekers from those sources.

## Discussion

This is the first study to report the relationship between cancer information seeking and treatment-related behaviors in a large, population-based sample. Our findings suggest that cancer patient treatment information seeking is common and that it is associated with both awareness about and receipt of novel targeted therapies for colon cancer. These results have several implications for clinical practice and future research in this area.

One compelling finding is that high levels of information seeking were associated with both hearing about and receiving targeted therapy even after controlling for potential confounders. The primary question that this finding raises is whether information seeking leads to more treatment or if receiving treatment leads to information seeking. We tried to decrease recall bias by asking subjects to report seeking behavior that they engaged in while making treatment decisions. Additionally, we have some evidence that the association between seeking and awareness about targeted therapy may be present even in patients who did not receive targeted therapy, though this association was not statistically significant. However, it is also possible that information seekers are more likely to recall the names of the specific therapies that they have received and therefore may be more likely to recall receiving targeted therapy than low or non-information seekers. While causal order is difficult to determine in a cross-sectional study, there is a body of literature that has shown that when patients request specific medications they are more likely to obtain prescriptions for those medications.<sup>31-33</sup> Patient inquiry might be particularly influential in the case of targeted therapies where there is considerable variation in physician experience. Physicians that have limited experience with new drugs might not automatically prescribe them but could be persuaded to do so at a patient's request.

Our data supported our hypothesis that that there would be a relationship between information seeking and awareness of targeted therapy in all colon cancer patients. We also found evidence that the association between treatment information seeking and use of targeted therapy is seen in both subjects for whom therapy would be FDA approved and in subjects for whom therapy would not be approved. Previous work has shown that off-label drug use is common in many fields of medicine, including oncology.<sup>34-36</sup> Kocs et. al. evaluated rituximab (a targeted therapy for non-Hodgkins lymphoma) use between 1998-2001 and found that it was administered 75% of the time for off-label indications and off-label use was not associated with clinical trials.<sup>36</sup> Bevacizumab and cetuximab are considered part of the standard of care for palliative treatment of advanced colon cancer but current data do not support routine use of these drugs in the adjuvant setting.<sup>37-40</sup> Adjuvant use of targeted therapy is an area of active research but some experts fear that oncologists might inappropriately consider using adjuvant targeted therapy in selected patients.<sup>40</sup> While off-label drug use is legal, it is often done in the absence of good supporting data.<sup>34-41</sup> Kocs et. al. suggest that the diffusion of information may be a key factor in off-label use and that media exposure and direct to consumer advertising (DTCA) may alter the demand for new technologies. Specifically, they suggest that DTCA may lead to a "relative expansion in the utilization of interventions for off-label indications, due to a likely 'spillover' effect from approved indications".<sup>36</sup>

If patient information seeking is related to treatment choices, there are several implications worth considering. First, if patients are influencing the diffusion and adoption of medical technologies, one must consider how direct patient demand might influence the quality of care patients receive and the cost of care at a population level. If patient information seeking increases access to targeted therapy in indicated situations, there might be an overall improvement in the quality of care. But, if patient information seeking leads to an increase in inappropriate access, we might find overall reductions in quality care or worse still, an increase in patient harm. Significant concerns have already been raised about the possible relationships between heavy marketing, inappropriate drug use and patient harms in the setting of erythropoiesis-stimulating agents and cox-2 inhibitors.<sup>42-43</sup> In addition cetuximab and bevacizumab are extremely expensive. Bevacizumab has a projected societal cost of 1.5 billion dollars a year when used for metastatic colon cancer and as a society we have not yet determined how to deal with these costs.<sup>44</sup> If patient demand for targeted therapy influences utilization, then it too, may need to be addressed as we work to strike a balance between access to innovation and cost control.

Our study also suggests that different sources of information may play different roles in the dissemination of information related to targeted therapy for cancer. Two source categories, the internet and newspapers/magazines, were associated with awareness but not receipt of targeted therapy. While our study may be underpowered to find differences for specific sources, these data provide some evidence that disparate utilization of information technology, the “digital divide”, may not necessarily impact the therapies that patients receive.<sup>45-46</sup> However, other studies have shown that health information seeking is less common in males, Hispanics and in people who are less educated, older, and of lower socioeconomic status.<sup>25-26-47-49</sup> More work is needed to determine whether or not information seeking relates to or exacerbates cancer disparities.

Additionally, our analysis suggests that information from other doctors (as distinguished from the patient's treating doctor) is associated with both hearing about and receiving targeted therapy for colon cancer. Bevacizumab and cetuximab were approved in 2004 and patients who needed targeted therapy in 2005 might have had to get it from a specialized oncologist who had novel drug experience. Work by Mellink et al. has shown that patients who seek a second opinion are motivated by a high need for information about their disease, possible treatments and prognosis.<sup>50</sup> “Second opinions” are important in oncology and have been shown to produce discrepant conclusions from the original consultation in 16-32% of cases and produce significant changes in prognostic or clinical management in 2-5% of cases.<sup>51-52</sup> Information seeking in the form of “second opinions” should be further evaluated as possible factor in the early adoption of medical technologies.

Our study has several limitations. The first limitation, noted earlier, is that it is a retrospective cross-sectional study and therefore causal order is ambiguous. Only a prospective study that links cancer patients' information seeking and therapies received will be able to determine whether information seeking leads to an increased use of targeted therapy. The second limitation is that our seeking index does not adequately allow us to determine the intensity of seeking from any specific source. For example, a patient who sought heavily from the internet but not from other sources would rate lower on our seeking scale than someone who sought a little from two or three sources. The current scale may underestimate the actual amount of information that subjects sought. The third limitation is that we are relying on self-reported treatment data. While there are a paucity of data on self-reported treatment data in cancer, other authors have found that self-reported treatment data has moderate to excellent validity in other chronic diseases.<sup>53-55</sup> Another limitation is that while this is a large, population based sample, all of our participants were diagnosed in Pennsylvania and therefore these results may not generalize to other populations. Finally,

while our measures of treatment information seeking were generated after a careful literature review, expert consultation and pilot testing with cancer patients, they have not been validated by other groups.

Despite these limitations, these results provide strong evidence that most cancer patients are trying to engage with treatment information and that high levels of information seeking may be associated with both appropriate and inappropriate treatment. Given the enormous cost and potential benefit of novel targeted therapies in cancer, future research should be directed to understanding how and if variations in patient information seeking contribute to cancer outcomes.

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**Measures**

**Table 1**

<b>Information Seeking</b>	
Think back to the first few months after you were diagnosed with colon cancer. In making decisions about what treatments to choose, did you actively look for information about treatments from any sources? Check all that apply:	
<input type="checkbox"/>	I did not actively look for information about treatments.
<input type="checkbox"/>	I did <b>actively look</b> for information from:
<input type="checkbox"/>	My treating doctors
<input type="checkbox"/>	Other doctors or health professionals
<input type="checkbox"/>	Family members, friends, coworkers
<input type="checkbox"/>	Other cancer patients
<input type="checkbox"/>	Face-to-face support groups
<input type="checkbox"/>	On-line support groups
<input type="checkbox"/>	Telephone hotlines (e.g. from the American Cancer Society)
<input type="checkbox"/>	Television or radio
<input type="checkbox"/>	Books, brochures or pamphlets
<input type="checkbox"/>	Newspapers or magazines
<input type="checkbox"/>	Internet (other than personal email and on-line support groups)
<input type="checkbox"/>	Other
<b>Awareness of Targeted Therapy</b>	
Which of the following treatments for colon cancer have you heard of? Check all that apply:	
<input type="checkbox"/>	Surgery
<input type="checkbox"/>	Radiation therapy
<input type="checkbox"/>	Chemotherapy
<input type="checkbox"/>	Complementary and alternative therapy (e.g. herbal treatment)
<input type="checkbox"/>	Avastin or Erbitux
<b>Received Targeted Therapy</b>	
Which treatments have you received for your colon cancer? Check all that apply:	
<input type="checkbox"/>	Surgery
<input type="checkbox"/>	Radiation therapy
<input type="checkbox"/>	Chemotherapy
<input type="checkbox"/>	Complementary and alternative therapy (e.g. herbal treatment)
<input type="checkbox"/>	Avastin or Erbitux
<input type="checkbox"/>	Other
<input type="checkbox"/>	I don't know

## Participant Characteristics

Table 2

Characteristic	Percent (%) (n=633)
Age, years	
Median	70
Range	26-99
Cancer Stage	
Stage 0	15
Stage I	19
Stage II	26
Stage III	24
Stage IV	16
Education	
< High School Degree	22
High School or GED	43
Some College	19
College Degree (4 year)	7
> College Degree	9
Employment	
Employed	25
Homemaker	11
Retired	60
Other	4
Marital Status	
Married	56
Unmarried Couple	3
Single	7
Separated/Divorced	7
Widowed	27
Race*	
White	90
African American	10
Latino/Latina	3
Asian/Pacific Islander	1
Hispanic	3
Self Reported Health Status	
Poor	5
Fair	26
Good	43
Very Good	21
Excellent	5
Sex	

Characteristic	Percent (%) (n=633)
Male	50
Female	50
Heard of Targeted Therapy	
Heard of Avastin <sup>tm</sup> or Erbitux <sup>tm</sup>	14
Received Targeted Therapy	
On-Label Avastin <sup>tm</sup> or Erbitux <sup>tm</sup> (n=102)	51
Off-Label Avastin <sup>tm</sup> or Erbitux <sup>tm</sup> (n=527)	3

\* some cells may not add to 100 due to multi-racial identification

**Table 3**  
**Sources Used to Seek Treatment Information**

<b>Source Category Used</b>	<b>Percent (%) ( n=633 )</b>
Other physicians or health professionals	23
Family/Friends	35
Other Patients	19
Face to Face Support Groups	2
Online Support Groups	1
Telephone Hotlines	2
TV/Radio	9
Books/brochures or pamphlets	27
Newspapers/Magazines	13
Internet	14
Other	2
Mean number of sources used	1.48

**Table 4**  
**Unadjusted Associations between Patient Characteristics, Information Seeking and Hearing About or Receiving Avastin™ or Erbitux™**

Characteristic	Heard about Avastin™ or Erbitux™	Received Avastin™ or Erbitux™
	Odds Ratio (95%CI)	Odds Ratio (95%CI)
Age (each decade increase)	0.70 *** (0.58-0.84)	0.67 *** (0.56-0.81)
Race (vs. white)		
Black	0.91 (0.38-2.18)	1.09 (0.40-2.96)
Other	0.97 (0.26-3.57)	1.87 (0.56-6.23)
Married (vs. not)	1.37 (0.83-2.26)	1.41 (0.81-2.45)
Education (vs. ≤ high school)		
≥Some college	2.06 * (1.04-4.08)	2.07 (0.96-4.47)
≥College grad	4.72 *** (2.20-10.10)	3.06 * (1.29-7.24)
Health (≥v.good vs. ≤ good)	0.86 (0.50-1.50)	0.50 * (0.26-0.96)
Sex (female vs. male)	0.82 (0.52-1.31)	0.88 (0.52-1.48)
On-label Indication	12.90 *** (7.42-22.46)	31.49 *** (16.59-59.78)
Seeking (vs.non)		
Low	0.79 (0.39-1.63)	0.95 (0.44-2.08)
High	3.98 *** (2.27-7.00)	4.01 *** (2.12-7.57)

Abbreviations: CI, confidence interval; grad, graduate. Other race: Latino/Latina, Asian and Pacific Islander

\* p<0.05

\*\* p<.01

\*\*\* p<.001



**Table 5**  
**Logistic Regression Model for Hearing about or Receiving Avastin<sup>tm</sup> or Erbitux<sup>tm</sup>**

Characteristic	Heard about Avastin <sup>tm</sup> or Erbitux <sup>tm</sup>	Received Avastin <sup>tm</sup> or Erbitux <sup>tm</sup>
	Adjusted Odds Ratio (95%CI)	Adjusted Odds Ratio (95%CI)
Age (each decade increase)	0.79* (0.63-0.98)	0.74* (0.58-0.95)
Race (vs. white)		
Black	1.09 (0.46-2.60)	1.34 (0.45-3.95)
Other	0.63 (0.15-2.70)	1.14 (0.20-6.44)
Married (vs. not)	1.24 (0.62-2.49)	1.48 (0.66-3.33)
Education (vs. ≤ high school)		
≥Some college	1.95 (0.80-4.72)	2.12 (0.71-6.32)
≥College grad	3.62* (1.34-9.79)	2.83 (0.78-10.24)
Health (≥v.good vs. ≤ good)	1.10 (0.52-2.35)	0.65 (0.26-1.60)
Sex (female vs. male)	0.78 (0.43-1.40)	0.82 (0.40-1.67)
On-label Indication	14.52*** (7.84-26.89)	38.75*** (18.87-79.54)
Seeking (vs.non)		
Low	0.70 (0.30-1.61)	0.86 (0.34-2.17)
High	2.83** (1.49-5.38)	3.22** (1.36-7.62)

Abbreviations: CI, confidence interval; grad, graduate. Other race: Latino/Latina, Asian and Pacific Islander

\* p<0.05

\*\* p<.01

\*\*\* p<.001

**Table 6**  
**Logistic Regression Model for Hearing about or Receiving Avastin<sup>tm</sup> or Erbitux<sup>tm</sup> by Group**

Characteristic	On-Label Indication		Off-Label Indication	
	Heard about Avastin <sup>tm</sup> or Erbitux <sup>tm</sup>	Received Avastin <sup>tm</sup> or Erbitux <sup>tm</sup>	Heard about Avastin <sup>tm</sup> or Erbitux <sup>tm</sup>	Received Avastin <sup>tm</sup> or Erbitux <sup>tm</sup>
	Adjusted Odds Ratio (95%CI)	Adjusted Odds Ratio (95%CI)	Adjusted Odds Ratio (95%CI)	Adjusted Odds Ratio (95%CI)
Age (each decade increase)	0.79 (0.53-1.19)	0.86 (0.57-1.29)	0.77 (0.58-1.01)	0.63** (0.46-0.86)
Race (vs. white)				
Black	3.14 (0.80-12.31)	1.48 (0.33-6.60)	0.46 (0.13-1.64)	0.75 (0.14-3.97)
Other	0.36 (0.02-5.47)	0.46 (0.06-3.47)	1.13 (0.29-4.31)	2.65 (0.60-11.75)
Married (vs. not)	3.66 (1.0-13.39)	2.81 (0.93-8.47)	0.70 (0.29-1.68)	0.51 (0.16-1.67)
Education (vs. ≤ high school)				
≥Some college	5.14* (1.09-24.18)	4.10* (1.04-16.19)	0.85 (0.30-2.40)	0.54 (0.14-2.08)
≥College grad	10.17* (1.34-77.48)	10.26* (1.23-85.29)	1.51 (0.50-4.61)	0.38 (0.07-2.10)
Health (≥v.good vs. ≤ good)	0.18* (0.04-0.82)	0.31 (0.08-1.23)	1.75 (0.78-3.95)	1.44 (0.49-4.18)
Sex (female vs. male)	0.81 (0.23-2.84)	1.19 (0.39-3.65)	0.78 (0.37-1.64)	0.60 (0.22-1.67)
Seeking (vs.non)				
Low	0.26 (0.05-1.40)	0.62 (0.14-2.64)	1.37 (0.47-4.01)	1.92 (0.35-10.49)
High	3.09 (0.79-12.09)	2.56 (0.68-9.65)	4.09** (1.71-9.77)	7.32* (1.48-36.11)

Abbreviations: CI, confidence interval; grad, graduate. Other race: Latino/Latina, Asian and Pacific Islander

\* p<0.05

\*\* p<.01

\*\*\* p<.001

**Table 7**  
**Logistic Regression Model for Sources Used and Hearing about or Receiving Avastin<sup>tm</sup> or Erbitux<sup>tm</sup>**

Characteristic	Heard about Avastin <sup>tm</sup> or Erbitux <sup>tm</sup>	Received Avastin <sup>tm</sup> or Erbitux <sup>tm</sup>
	Adjusted Odds Ratio (95%CI)	Adjusted Odds Ratio (95%CI)
Age (each decade increase)	0.79 (0.62-1.01)	0.72 * (0.55-0.94)
Race (vs. white)		
Black	1.03 (0.40-2.63)	1.21 (0.36-4.01)
Other	0.48 (0.14-1.70)	0.91 (0.19-4.27)
Married (vs. not)	1.19 (0.59-2.39)	1.41 (0.62-3.20)
Education (vs. ≤ high school)		
≥Some college	1.78 (0.70-4.57)	2.00 (0.62-6.43)
≥College grad	2.64 (0.90-7.73)	2.40 (0.61-9.38)
Health (≥v.good vs. ≤ good)	1.10 (0.50-2.42)	0.69 (0.28-1.68)
Sex (female vs. male)	0.80 (0.43-1.47)	0.93 (0.45-1.94)
On-label Indication	15.88 *** (8.25-30.56)	43.58 *** (20.69-91.76)
Sources Used		
Other Doctor	1.95 * (1.03-3.68)	2.64 * (1.16-5.97)
TV or Radio	0.40 (0.14-1.18)	0.65 (0.19-2.16)
Books, Brochures or Pamphlets	0.88 (0.45-1.74)	0.81 (0.33-1.99)
Newspapers or Magazines	3.44 * (1.34-8.84)	2.12 (0.63-7.19)
Internet	2.88 ** (1.40-5.94)	1.91 (0.73-5.00)

Abbreviations: CI, confidence interval; grad, graduate. Other race: Latino/Latina, Asian and Pacific Islander

\* p<0.05

\*\* p<.01

\*\*\* p<.001