

Supplementary Online Content

Ramsey SD, Unger JM, Baker LH, et al. Prevalence of hepatitis B virus, hepatitis C virus, and HIV infection among patients with newly diagnosed cancer from academic and community oncology practices. *JAMA Oncol*. Published online January 17, 2019. doi:10.1001/jamaoncol.2018.6437

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This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. Definitions of HBV, HCV, and HIV Infection Based on Individual Viral Test Results

HBV Standard Test Results			HBV Infection
HBsAg	anti-HBc ¹	anti-HBs	
Positive	Positive/ Negative/ Not tested	Negative/ Not tested	Positive - chronic infection
Negative	Positive	Negative/ Positive/ Not tested	Positive - past infection
Not tested	Positive	Not tested	Positive – past infection (probable)
Negative/ Not tested	Negative	Positive	Negative; immune ²
Negative/ Not tested	Negative/ Not tested	Negative/ Not tested	Negative (probable)

HBV Testing Description: Complete testing for HBV infection specified testing for each of the following tests: hepatitis B surface antigen (HBsAg), hepatitis B core antibody (anti-HBc) and hepatitis B surface antibody (anti-HBs). Complete testing was not available on all patients; therefore, HBV viral status is based on key testing components, as shown in the table above.

HCV Standard Test Results		HCV Infection
Anti-HCV Screening Test ³	HCV RNA	
Positive/ Not tested	Detectable	Positive ⁴
Positive/ Negative/ Not tested	Undetectable	Negative
Negative	Not done (not needed)	Negative
Positive	Not tested	Unknown

HCV Testing Description: Complete testing for HCV infection specified a screening test (anti-HCV) followed by a confirmatory test (HCV RNA) if the screening test was positive; a negative screening test was sufficient to indicate negative HCV status. Complete testing was not available on all patients; therefore, HCV viral status is based on key testing components, as shown in the table above.

HIV Standard Test Results			HIV Infection
HIV Screening Test ⁵	Western Blot	HIV RNA	
Positive/ Not tested	Positive/ Not tested	Detectable	Positive ⁶
Negative	Negative/ Not tested	Undetectable/ Not tested	Negative
Positive/ Not tested	Not tested	Undetectable	Negative

HIV Testing Description: Complete testing for HIV infection specified an antibody and/or antigen screening test followed by a confirmatory test (Western Blot) if the screening test was positive; a negative screening test was sufficient to indicate negative HIV status. Complete testing was not available on all patients; therefore, HIV viral status is based on key testing components, as shown in the table above.

1 – Total or IgG anti-HBc

2 – Includes one patient with missing HBsAg and anti-HBc results with positive anti-HBs result.

3 – CIA, EIA or other screening test (per standard of care at the clinic)

4 – Includes one patient classified as chronic HCV status after direct acting antiviral therapy with subsequent negative HCV RNA, and one patient classified as chronic HCV based on ability to perform HCV genotyping.

5 – Antibody and/or antigen screen (per standard of care at the clinic)

6 – Includes 32 patients with a documented history of HIV, regardless of current screening or HIV RNA results.

CIA, chemiluminescence immunoassay; EIA, enzyme immunoassay

eTable 2. Demographic and Cancer Characteristics for Registered vs Patients Evaluated for Participation

Demographic	Registered Patients n (%)	Screened Patients n (%)
TOTAL	3092 (100%)	15,666 (100%)
GENDER		
Female	1864 (60%)	8839 (59%)
Male	1228 (40%)	6159 (41%)
Unknown	0	668
RACE		
White	2308 (75%)	10108 (77%)
Black or African American	561 (18%)	2127 (16%)
Asian	103 (3%)	676 (5%)
Pacific Islander	12 (0%)	58 (0%)
Native American or Alaska Native	20 (1%)	98 (1%)
Multi-racial	9 (0%)	13 (0%)
Unknown	79	2586
ETHNICITY		
Hispanic	569 (18%)	1831 (15%)
Not Hispanic	2507 (81%)	10569 (85%)
Unknown	16	3266
AGE		
18-29	66 (2%)	263 (2%)
30-39	175 (6%)	626 (4%)
40-49	401 (13%)	1539 (10%)
50-59	841 (27%)	3446 (23%)
60-69	965 (31%)	4674 (31%)
70 and greater	644 (21%)	4426 (30%)
Unknown	0	692
CANCER TYPE		
Bladder	62 (2%)	321 (2%)
Breast	1072 (35%)	4350 (28%)
Colon/colorectal	366 (12%)	1473 (9%)
Endometrial	25 (1%)	283 (2%)
Kidney	31 (1%)	253 (2%)
Leukemia	75 (2%)	257 (2%)
Liver	63 (2%)	365 (2%)
Lung	363 (12%)	1721 (11%)
Lymphoma	232 (8%)	753 (5%)
Melanoma	32 (1%)	219 (1%)
Non-melanoma skin	11 (0%)	119 (1%)
Prostate	102 (3%)	748 (5%)
Thyroid	9 (0%)	110 (1%)
Other	642 (21%)	4600 (29%)
Missing	7	94

eTable 3. S1204 Cancer Types for "Other" Cancers, per Cancer Therapy Evaluation Program (CTEP) Category

CTEP CATEGORY	Number of patients
AIDS-related Malignancy and Condition	6
Bone Neoplasm	10
Breast Neoplasm	2
CNS Neoplasm (Primary Tumor)	16
Endocrine Neoplasm	45
Eye Neoplasm	1
Germ Cell Neoplasm	28
Hematopoietic Neoplasm (excluding Leukemia)	2
Kidney Neoplasm	31
Lung, Mediastinal and Pleural Neoplasm	4
Miscellaneous Neoplasm	16
Reproductive System Neoplasm, Female	100
Reproductive System Neoplasm, Male	6
Skin Neoplasm	43
Soft Tissue Neoplasm	21
Urothelial Tract Neoplasm	61
TOTAL	392

eTable 4. HBV, HCV, and HIV Prevalence Estimates with 95% CI by Cancer Type

	Chronic HBV		Past HBV		HCV		HIV	
	Rate (n/d)	95% CI	Rate (n/d)	95% CI	Rate (n/d)	95% CI	Rate (n/d)	95% CI
All patients	0.6% (19/3050)	0.4%-1.0%	6.5% (197/3050)	5.6%-7.4%	2.4% (71/2990)	1.9%-3.0%	1.1% (34/3045)	0.8%-1.6%
Previously diagnosed	0.4% (11/3050)	0.2%-0.6%	0.8% (25/3050)	0.5%-1.2%	1.6% (49/2990)	1.2%-2.2%	1.1% (32/3045)	0.7%-1.5%
Newly diagnosed	0.3% (8/3050)	0.1%-0.5%	5.7% (172/3050)	4.9%-6.5%	0.7% (22/2990)	0.5%-1.1%	0.1% (2/3045)	0.0%-0.2%
By Cancer Type								
Blood/Marrow	0.5% (2/369)	0.1%-1.9%	4.3% (16/369)	2.5%-7.0%	2.5% (9/364)	1.1%-4.6%	1.9% (7/369)	0.8%-3.9%
Breast	0.4% (4/1058)	0.1%-1.0%	6.2% (66/1058)	4.9%-7.9%	0.9% (9/1046)	0.4%-1.6%	0.2% (2/1056)	0.0%-0.7%
Colorectal	0.6% (2/362)	0.1%-2.0%	5.0% (18/362)	3.0%-7.7%	2.0% (7/356)	0.8%-4.0%	1.4% (5/362)	0.4%-3.2%
Liver	6.5% (4/62)	1.8%-15.7%	8.1% (5/62)	2.7%-17.8%	17.3% (9/52)	8.2%-30.3%	0.0% (0/61)	0.0%-5.9%
GI, Other	1.3% (3/235)	0.3%-3.7%	9.4% (22/235)	6.0%-13.8%	1.3% (3/228)	0.3%-3.8%	2.1% (5/235)	0.7%-4.9%
Head & Neck	0.9% (1/111)	0.0%-4.9%	8.1% (9/111)	3.8%-14.8%	4.7% (5/106)	1.6%-10.7%	0.9% (1/111)	0.0%-4.9%
Lung	0.6% (2/356)	0.1%-2.0%	8.7% (31/356)	6.0%-12.1%	4.9% (17/347)	2.9%-7.7%	1.1% (4/356)	0.3%-2.8%
Prostate	0% (0/100)	0.0%-3.6%	12.0% (12/100)	6.4%-20.0%	3.1% (3/98)	0.6%-8.7%	1.0% (1/100)	0.0%-5.5%
Other	0.3% (1/392)	0.0%-1.4%	4.6% (18/392)	2.7%-7.2%	2.3% (9/388)	1.1%-4.4%	2.3% (9/390)	1.1%-4.3%
Missing	5				5		5	

For each specified group of patients with a given cancer type, n = numerator and d = denominator.

eTable 5. Scheduled Treatments for Patients Diagnosed With Past, Chronic, and Negative HBV

Type of Scheduled Therapy	HBV Status % (n)		
	Past (n=197)	Chronic (n=19)	Negative (n=2834)
Cytotoxic chemotherapy	139 (70.6%)	13 (68.4%)	1931 (68.1%)
Steroids	22 (11.2%)	3 (15.8%)	329 (11.6%)
Radiation therapy	73 (37.1%)	6 (31.6%)	1005 (35.5%)
Immunotherapy	5 (2.5%)	0	48 (1.7%)
Biologic therapy	8 (4.1%)	4 (21.1%)	154 (5.4%)
Hormone therapy	45 (22.8%)	1 (5.3%)	525 (18.5%)
Surgery	55 (27.9%)	3 (15.8%)	917 (32.4%)
Bone marrow transplant	0	0	10 (0.4%)
Rituximab	6 (3.1%)	0	82 (2.9%)
Other antibody therapy	1 (0.5%)	0	3 (0.1%)

A greater proportion of patients with chronic HBV received biologic therapy compared to patients with past HBV ($p=.01$) and compared to negative HBV patients ($p=.02$). No other differences between groups were evident.

eTable 6. Six-month Treatment Outcomes for Viral-Positive Patients

	Any antiviral or antiretroviral drug use		Change in cancer treatments		Changed cancer treatments due to viral positive status		Changed cancer treatments due to viral positive status & added antiviral/antiretroviral therapy	
	Overall	Newly vs. previously diagnosed*	Overall	Newly vs. previously diagnosed*	Overall	Newly vs. previously diagnosed*	Overall	Newly vs. previously diagnosed*
Past HBV	11.8%	8.4% vs. 33.3% P=.004	59.2%	62.6% vs. 38.1% P=.05	7.9%	7.6% vs. 9.5% P=.67	5.3%	5.3% vs. 4.8% P=1.0
Chronic HBV	73.3%	50.0% vs. 88.9% P=.24	53.3%	55.0% vs. 55.6% P=1.0	13.3%	0% vs. 22.2% P=.49	13.3%	0% vs. 22.2% P=.51
HCV	8.2%	0% vs. 11.8% P=.30	55.1%	53.3% vs. 55.9% P=1.0	6.1%	0% vs. 8.8% P=.54	2.0%	0% vs. 2.9% P=1.0
HIV	66.7%	100% vs. 65.5% P=1.0	50.0%	0% vs. 51.7% P=1.0	16.7%	0% vs. 17.2% P=1.0	13.3%	0% vs. 13.8% P=1.0
Any virus	19.6%	9.5% vs. 32.7% P<.001	58.5%	65.1% vs. 50.0% P=.03	8.0%	6.3% vs. 10.2% P=0.33	6.3%	4.8% vs. 8.2% P=.40

* P-values derived from Fisher exact tests.

In total, 292 patients were viral positive for one or more viruses. Treatment outcome data were available for 224 (76.7%) at 6 months (11 did not have 6-month data submitted, and 57 indicated that 6 month data were not available).