Task Book Report Generated on: 04/26/2024

Fixed   Years	Fiscal Year:	FY 2008	Task Last Undeted	FY 07/20/2007
Project Title:   Mechanisms of Ocular Catanocts			rask Last Opuateu.	11 0//20/2007
Division Name: Human Research Program/Discipline: HLMAN RESEARCH Program/Discipline- Rement/Subdiscipline: HUMAN RESEARCH-Radiation health Rement/Subdiscipline: HUMAN RESEARCH-Radiation health Ruman Research Program Elements: (1) SR/Spuce Radiation Human Research Program Risks: (1) SR/Spuce Radiation Human Research Program Risks: (1) Cardiavascular Adoptations Contributing to Adverse Mission Performance and Health culcions: Space Biology Flement: None Space Biology Special Category: None PI Email: childrocourbia edu Fax: FY 212-305-3229 PI Email: childrocourbia edu Fax: FY 212-305-3229 PI Organization Type: UNIVERSITY Phone: 212-305-660 Organization Name: Columbia Linversity PI Address 1: 630 West 168th Street PI Address 2: Courter for Radiological Research PI Web Page: Intro/Spancet columbia edu City: New York State: NY Zip Code: 10032 Congressional Distric: 15 Comments:  Project Type: GROUND Solicitation / Funding Sources; 100-30000000000000000000000000000000000				
Program/Discipline: Flogram/Discipline- Element/Subdiscipline: Joint Agency Name: None Space Biology Cross-Element None Space Biology Cross-Element None Space Biology Cross-Element None Space Biology Special Category: None Space Biology Sp	Troject rine.	ivicenanishis of Octual Catalacts		
Program/Discipline-  Element/Subdiscipline-  Distribute-  No	Division Name:	Human Research		
	Program/Discipline:	HUMAN RESEARCH		
Human Research Program Elements: (1) SR:Space Radiation  Human Research Program Risks: (1) Cardiovascular-Risk of Cardiovascular Adaptations Contributing to Adverse Mission Performance and Health Outcomes  Space Biology Cross-Element: None  Space Biology Cross-Element: None  Space Biology Special Category: None  PI Email: sih föcolumbia edu Fax: FY 212-305-3229  PI Organization Type: UNIVERSITY Phone: 212-305-5660  Organization Type: Outribui University  PI Address 1: G30 West 168th Street  PI Address 2: Center for Radiological Research  PI Web Page: http://cpmenet.columbia.cdu/  City: New York State: NY  Zip Code: 10032 Congressional District: 15  Comments:  Project Type: GROUND Solicitation / Funding Source: NNN04ZUU005N  Start Date: 1004/2005 End Date: 0930-2009  No. of Post Docs: 0 No. of Phot Degrees: 0  No. of Post Docs: 0 No. of Master' Degrees: 0  No. of Master's Candidates: 0 No. of Master' Degrees: 0  No. of Monitoring Center: NASA JSC  Contact Monitor: Contact Honitor: Similary Columbia University Similenov, Lubomir (Columbia University) S		HUMAN RESEARCHRadiation health		
Human Research Program Risks:  Space Biology Element:  None  Space Biology Cross-Element  None  Space Biology Special Category:  None  Space Biology Special Category:  None  PI Email:  Gibt Geolumbia cdn  PI Coganization Type:  UNIVERSITY  Phone: 212-305-35690  Organization Type:  UNIVERSITY  Plone: 212-305-36690  Organization Name:  Columbia University  PI Address 1:  630 West 168th Street  PI Web Page:  Intro/Comment columbia cdn/  Tity:  New York  New York  Tip Gode:  10032  Congressional District:  I5  Comments:  Project Type:  GROUND  Solicitation / Funding Source:  Project Type:  GROUND  Solicitation / Funding Source:  No. of Post Ducs:  No. of Post Ducs:  No. of Post Ducs:  No. of Master' Degrees:  No. of Master's Candidates:  0  No. of Master's Candidates:  0  No. of Master's Candidates:  Contact Monitor:  Contact Monitor:  Contact Email:  Flight Program:  Flight Program:  Flight Program:  Flight Program:  Flight Rasiganment:  Key Personnel Changes/Previous PI:  Personnel Columbia University    Seminenov, Lubomir (Columbia University)  Skiemen, Noman (Columbia University)	Joint Agency Name:		TechPort:	No
Space Biology Element:   None   None   Space Biology Cross-Element   Discipline:   Space Biology Cross-Element   Space Biology Special Category:   None   Space Biology Special Category:   Space Biology Space Biology Special Category:   Space Biology Space B	<b>Human Research Program Elements:</b>	(1) SR:Space Radiation		
Space Biology Cross-Element Discipline:         None           PI Email:         spin [2] (columbia edu)         Fax:         FY 212-305-3229           PI Organization Type:         UNIVERSITY         Phone:         212-305-5660           Organization Name:         Columbia University         Phone:         212-305-5660           PI Address 1:         630 West 168th Street         Fraction Rediological Research           PI Web Page:         Intri/Cenneted columbia edu/         State:         NY           City:         New York         State:         NY           Zip Code:         10032         Congressional District:         15           Comments:         Froject Type:         GROUND         Solicitation / Funding Source:         2004 Radiation Biology NNH04ZUU005N           Start Date:         10704/2005         End Date:         09/30/2009           Start Date:         10704/2005         End Date:         09/30/2009           No. of Psh D Candidates:         0         No. of Psh D Egrees:         0           No. of Bachelor's Candidates:         0         No. of Bachelor's Degrees:         0           No. of Bachelor's Candidates:         0         No. of Bachelor's Degrees:         0           Contact Email:         Fight Program:         Fight Program: <td>Human Research Program Risks:</td> <td></td> <td>Adaptations Contributing to Adver</td> <td>se Mission Performance and Health</td>	Human Research Program Risks:		Adaptations Contributing to Adver	se Mission Performance and Health
Discipline:   None   None   Space Biology Special Category:   Space Biology Space Biology Special Category:   Space Biology Spa	Space Biology Element:	None		
PI Email:   cih   Gocolumbia edu   Fax: FY 212-305-3229     PI Organization Type:   UNIVERSITY   Phone: 212-305-5660     PI Organization Name:   Columbia University     PI Address 1:   630 West 168th Street     PI Address 2:   Center for Radiological Research     PI Web Page:   http://epmenet.columbia.edu/     City:   New York   State: NY     Project Type:   GROUND   Solicitation / Funding Source: 2004 Radiation Biology NNIH04/ZUU005N     State:   10:04/2005   End Date: 09:30/2009     No. of Post Does:   0   No. of Master' Degrees: 0     No. of Pho Candidates:   0   No. of Master' Degrees: 0     No. of Master's Candidates:   0   No. of Bachelor's Degrees: 0     No. of Bachelor's Candidates:   0   Monitoring Center: NASA JSC     Contact Monitor:   Contact Phone:     Contact Monitor:   Contact Phone:     Flight Assignment:   Flight Assignment:   Flight Assignment:   NROSH138G     COI Name (Institution):   Reconcelled     Breaner, David Ph.D. (Columbia University)   Smilenov, Lubomir (Columbia University)   Kleiman, Norman (Columbia University)     Grant/Contract No.:   NNJ05H138G   Performance Goal No.:		None		
Pl Organization Type:   UNIVERSITY   Phone: 212-305-5660	Space Biology Special Category:	None		
Organization Name:         Columbia University           PI Address 1:         630 West 168th Street           PI Address 2:         Center for Radiological Research           PI Web Page:         http://epmenet.columbia.edu/           City:         New York         State: NY           Zip Code:         10032         Congressional District: 15           Comments:         Forganization / Funding Source: 2004 Radiation Biology NH04ZUU005N           Start Date:         1004/2005         End Date: 09/30/2009           No. of Pst Does:         0         No. of PhD Degrees: 0           No. of PhD Candidates:         0         No. of Master' Degrees: 0           No. of Master's Candidates:         0         No. of Bachelor's Degrees: 0           No. of Bachelor's Candidates:         0         No. of Bachelor's Degrees: 0           Contact Monitor:         Contact Phone:         Contact Phone:           Contact Email:         Fight Program:         Fight Program:           Flight Program:         Fight Assignment:         Fight Assignment:           Key Personnel Changes/Previous PI:         Personnel unchanged           Enemer, David Ph.D. (Columbia University)         Kleiman, Norman (Columbia University)           Kleiman, Norman (Columbia University)         ND. (Columbia University)	PI Email:	ejh1@columbia.edu	Fax:	FY 212-305-3229
PI Address 1: 630 West 168th Street  PI Address 2: Center for Radiological Research  PI Web Page: http://epmenet.columbia.edu/  City: New York State: NY  Zip Code: 10032 Congressional District: 15  Comments:  Project Type: GROUND Solicitation / Funding Source: 2004 Radiation Biology NNH04ZUU005N  Start Date: 10/04/2005 End Date: 09/30/2009  No. of Post Docs: 0 No. of PhD Candidates: 0 No. of PhD Degrees: 0  No. of Master's Candidates: 0 No. of Master' Degrees: 0  No. of Master's Candidates: 0 No. of Bachelor's Degrees: 0  No. of Bachelor's Candidates: 0 Monitoring Center: NASA JSC  Contact Monitor: Contact Email:  Flight Program:  Flight Assignment:  Key Personnel Changes/Previous PI: Personnel unchanged  Brenner, David Ph.D. (Columbia University)  Smilenov, Lubomir (Columbia University)  Kleiman, Norman (Columbia University)  Kleiman, Norman (Columbia University)  Kleiman, Norman (Columbia University)  From the Contact No.: NNJ05H138G	PI Organization Type:	UNIVERSITY	Phone:	212-305-5660
PI Address 2: Center for Radiological Research PI Web Page: http://cpmcnet.columbia.edu/ City: New York State: NY  Zip Code: 10032 Congressional District: 15  Comments:  Project Type: GROUND Solicitation / Funding Source: 2004 Radiation Biology NNH04ZUU005N Start Date: 10/04/2005 End Date: 09/30/2009 No. of Post Docs: 0 No. of PhD Degrees: 0 No. of Post Docs: 0 No. of Master' Degrees: 0 No. of Master's Candidates: 0 No. of Master' Degrees: 0 No. of Bachelor's Candidates: 0 No. of Bachelor's Degrees: 0 No. of Bachelor's Candidates: 0 Monitoring Center: NASA JSC Contact Monitor: Contact Honitor: Contact Email: Flight Assignment: Key Personnel Changes/Previous PI: Personnel unchanged  Brenner, David Ph.D. (Columbia University) Kleiman, Norman (Columbia University) Reformance Goal No.:	Organization Name:	Columbia University		
PI Web Page: http://cpmcnet.columbia.edu/ City: New York State: NY Zip Code: 10032 Congressional District: 15 Comments: Project Type: GROUND Solicitation / Funding Source: 2004 Radiation Biology NNH04ZUU005N Start Date: 10/04/2005 End Date: 09/30/2009 No. of Post Docs: 0 No. of PhD Degrees: 0 No. of PhD Candidates: 0 No. of Master' Degrees: 0 No. of Master's Candidates: 0 No. of Bachelor's Degrees: 0 No. of Bachelor's Candidates: 0 No. of Bachelor's Degrees: 0 No. of Bachelor's Candidates: 0 Monitoring Center: NASA JSC Contact Monitor: Contact Phone: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: Personnel unchanged COI Name (Institution): Brenner, David Ph.D. (Columbia University) Smilenov, Lubomir (Columbia University) Kleiman, Norman (Columbia University) Kleiman, Norman (Columbia University) Reformance Goal No.:	PI Address 1:	630 West 168th Street		
City: New York State: NY  Zip Code: 10032 Congressional District: 15  Comments:  Project Type: GROUND Solicitation / Funding Source: 2004 Radiation Biology NNH04ZUU005N  Start Date: 10/04/2005 End Date: 09/30/2009  No. of Post Docs: 0 No. of PhD Degrees: 0  No. of PhD Candidates: 0 No. of Master' Degrees: 0  No. of Master's Candidates: 0 No. of Bachelor's Degrees: 0  No. of Master's Candidates: 0 Monitoring Center: NASA JSC  Contact Monitor: Contact Phone:  Contact Email:  Flight Program:  Flight Assignment:  Key Personnel Changes/Previous PI: Personnel unchanged  COI Name (Institution): Smilenov, Lubomir (Columbia University) Smilenov, Lubomir (Columbia University) Kleiman, Norman (Columbia University)  Grant/Contract No.: NNJ05H138G	PI Address 2:	Center for Radiological Research		
Zip Code: 10032 Congressional District: 15  Comments:  Project Type: GROUND Solicitation / Funding Source: 2004 Radiation Biology NNH04ZUU005N  Start Date: 10/04/2005 End Date: 09/30/2009  No. of Post Docs: 0 No. of PhD Degrees: 0  No. of PhD Candidates: 0 No. of Master' Degrees: 0  No. of Master's Candidates: 0 No. of Bachelor's Degrees: 0  No. of Bachelor's Candidates: 0 Monitoring Center: NASA JSC  Contact Monitor: Contact Phone:  Contact Email:  Flight Program:  Flight Assignment:  Key Personnel Changes/Previous PI: Personnel unchanged  COI Name (Institution): Smilenov, Lubomir (Columbia University)  Smilenov, Lubomir (Columbia University)  Kleiman, Norman (Columbia University)  Grant/Contract No.: NNJ05H138G	PI Web Page:	http://cpmcnet.columbia.edu/		
Comments:  Project Type: GROUND Solicitation / Funding Source: 2004 Radiation Biology NNH04ZUU005N  Start Date: 10/04/2005 End Date: 09/30/2009  No. of Post Docs: 0 No. of PhD Degrees: 0  No. of PhD Candidates: 0 No. of Master' Degrees: 0  No. of Master's Candidates: 0 No. of Bachelor's Degrees: 0  No. of Bachelor's Candidates: 0 Monitoring Center: NASA JSC  Contact Monitor: Contact Phone:  Contact Email:  Flight Program:  Flight Assignment:  Key Personnel Changes/Previous PI: Personnel unchanged  COI Name (Institution): Brenner, David Ph.D. (Columbia University) Smilenov, Lubomir (Columbia University) Kleiman, Norman (Columbia University)  Grant/Contract No.: NNJ05H138G	City:	New York	State:	NY
Project Type: GROUND Solicitation / Funding Source: 2004 Radiation Biology NNH04ZUU005N  Start Date: 10/04/2005 End Date: 09/30/2009  No. of Post Docs: 0 No. of PhD Degrees: 0  No. of PhD Candidates: 0 No. of Master' Degrees: 0  No. of Master's Candidates: 0 No. of Bachelor's Degrees: 0  No. of Bachelor's Candidates: 0 Monitoring Center: NASA JSC  Contact Monitor: Contact Phone:  Contact Email:  Flight Program:  Flight Assignment:  Key Personnel Changes/Previous PI: Personnel unchanged  COI Name (Institution): Brenner, David Ph.D. (Columbia University) Smilenov, Lubomir (Columbia University)  Kleiman, Norman (Columbia University)  Grant/Contract No.: NNJ05H138G  Performance Goal No.:	Zip Code:	10032	<b>Congressional District:</b>	15
Start Date: 10/04/2005 End Date: 09/30/2009  No. of Post Docs: 0 No. of PhD Degrees: 0  No. of PhD Candidates: 0 No. of Master' Degrees: 0  No. of Master's Candidates: 0 No. of Master's Degrees: 0  No. of Bachelor's Candidates: 0 Monitoring Center: NASA JSC  Contact Monitor: Contact Phone:  Contact Email:  Flight Program:  Flight Assignment:  Key Personnel Changes/Previous PI: Personnel unchanged  COI Name (Institution): Brenner, David Ph.D. (Columbia University)  Smilenov, Lubomir (Columbia University)  Grant/Contract No.: NNJ05HI38G  Performance Goal No.:	Comments:			
No. of Post Docs:  No. of PhD Degrees: 0  No. of PhD Candidates:  No. of Master' Degrees: 0  No. of Master's Candidates:  No. of Bachelor's Degrees: 0  No. of Bachelor's Candidates:  No. of Bachelor's Candidates:  Contact Monitor:  Contact Monitor:  Contact Email:  Flight Program:  Flight Assignment:  Key Personnel Changes/Previous PI:  Brenner, David Ph.D. (Columbia University)  Smilenov, Lubomir (Columbia University)  Kleiman, Norman (Columbia University)  Grant/Contract No.:  NNJ05HI38G  Performance Goal No.:	Project Type:	GROUND	Solicitation / Funding Source:	2004 Radiation Biology NNH04ZUU005N
No. of PhD Candidates:  0	Start Date:	10/04/2005	End Date:	09/30/2009
No. of Master's Candidates:  No. of Bachelor's Degrees:  No. of Bachelor's Candidates:  O  Monitoring Center: NASA JSC  Contact Monitor:  Contact Email:  Flight Program:  Flight Assignment:  Key Personnel Changes/Previous PI:  Brenner, David Ph.D. (Columbia University)  Smilenov, Lubomir (Columbia University)  Kleiman, Norman (Columbia University)  Grant/Contract No.:  NNJ05HI38G  Performance Goal No.:	No. of Post Docs:	0	No. of PhD Degrees:	0
No. of Bachelor's Candidates:  Contact Monitor:  Contact Email:  Flight Program:  Flight Assignment:  Key Personnel Changes/Previous PI:  Brenner, David Ph.D. (Columbia University)  Smilenov, Lubomir (Columbia University)  Kleiman, Norman (Columbia University)  Grant/Contract No.:  NNJ05HI38G  Performance Goal No.:	No. of PhD Candidates:	0	No. of Master' Degrees:	0
Contact Monitor:  Contact Email:  Flight Program:  Flight Assignment:  Key Personnel Changes/Previous PI: Personnel unchanged  COI Name (Institution): Brenner, David Ph.D. (Columbia University)  Smilenov, Lubomir (Columbia University)  Kleiman, Norman (Columbia University)  Grant/Contract No.: NNJ05HI38G  Performance Goal No.:	No. of Master's Candidates:	0	No. of Bachelor's Degrees:	0
Contact Email:  Flight Program:  Flight Assignment:  Key Personnel Changes/Previous PI: Personnel unchanged  COI Name (Institution): Smilenov, Lubomir (Columbia University)  Kleiman, Norman (Columbia University)  Grant/Contract No.: NNJ05HI38G  Performance Goal No.:	No. of Bachelor's Candidates:	0	<b>Monitoring Center:</b>	NASA JSC
Flight Assignment:  Key Personnel Changes/Previous PI: Personnel unchanged  COI Name (Institution): Brenner, David Ph.D. (Columbia University) Smilenov, Lubomir (Columbia University) Kleiman, Norman (Columbia University) Grant/Contract No.: NNJ05HI38G Performance Goal No.:	Contact Monitor:		Contact Phone:	
Flight Assignment:  Key Personnel Changes/Previous PI: Personnel unchanged  COI Name (Institution): Brenner, David Ph.D. (Columbia University) Smilenov, Lubomir (Columbia University) Kleiman, Norman (Columbia University)  Grant/Contract No.: NNJ05H138G  Performance Goal No.:	Contact Email:			
Key Personnel Changes/Previous PI: Personnel unchanged  COI Name (Institution): Brenner, David Ph.D. (Columbia University) Smilenov, Lubomir (Columbia University) Kleiman, Norman (Columbia University)  Grant/Contract No.: NNJ05HI38G  Performance Goal No.:	Flight Program:			
COI Name (Institution):  Brenner, David Ph.D. (Columbia University) Smilenov, Lubomir (Columbia University) Kleiman, Norman (Columbia University)  Grant/Contract No.:  NNJ05HI38G  Performance Goal No.:	Flight Assignment:			
COI Name (Institution): Smilenov, Lubomir (Columbia University) Kleiman, Norman (Columbia University)  Grant/Contract No.: NNJ05HI38G  Performance Goal No.:	Key Personnel Changes/Previous PI:	Personnel unchanged		
Performance Goal No.:	COI Name (Institution):	Smilenov, Lubomir (Columbia University		
	Grant/Contract No.:	NNJ05HI38G		
Performance Goal Text:	Performance Goal No.:			
	Performance Goal Text:			

Task Book Report Generated on: 04/26/2024

Task Description:	Radiation standards in space have followed a somewhat different path from those on the ground. Exposures in space are potentially much higher than terrestrial irradiation due to galactic cosmic radiation, trapped radiation belts near the earth and solar particle events. Radiation exposures in space are relatively difficult to reduce and impossible to eliminate entirely. At the same time, other risks to humans in the hostile environment in space may be more acute or drastic than those of radiation. This puts a different perspective on radiation hazards and is one reason, together with the limited number of individuals involved, why larger annual dose limits have been tolerated for astronauts than are recommended for radiation workers on the ground, (though career limits of risk have been roughly equalized). The purpose of radiation protection is to prevent deterministic effects of clinical significance and limit stochastic effects to levels that are acceptable, modulated by societal concerns. The deterministic effect already observed in some astronauts is an earlier onset of ocular cataracts. The hypothesis upon which this proposal is based is that heavy ions mediate their cataractogenic effect through errors in differentiation resulting from damage and/or misrepair of irradiated cells. Aberrantly dividing and/or differentiating cells in the pre-equatorial region of the lens epithelium eventually migrate to the lens where they become opaque lens fiber cells. We propose to investigate the mechanisms of cataractogenesis by looking at cataract formation in animals haploinsufficient for one or more genes involved in DNA repair and/or checkpoint control.	
Rationale for HRP Directed Research	h:	
Research Impact/Earth Benefits:	The hypothesis upon which this proposal is based is that heavy ions mediate their cataractogenic effect through errors in differentiation resulting from damage and/or misrepair of irradiated cells. We propose to investigate the mechanisms of cataractogenesis by looking at cataract formation in animals haploinsufficient for one or more genes involved in DNA repair and/or checkpoint control, including Atm, rad9 and BRCA. The research impact of this study will be to provide information on the mechanism of cataract induction in radiosensitive subpopulations.	
Task Progress:	To date we have completed the first specific aim, namely to establish stocks of mice heterozygous for the Atm and BRCA1, and also to produce double heterozygotes, i.e. animals haploinsufficient for both Atm and BRCA1. Towards completion of the second specific aim, 287 mice have been enrolled in the study since the Spring 2006 BNL run. These include 28 double heterozygotes, 52 Atm heterozygotes, 46 Brca1 heterozygotes and 98 wild type controls. (Approximately half of the wild-type controls are being utilized for histological and immunohistological preparations.) 24 double heterozygotes, 39 Atm herozygotes, 42 Brca1 heterozygotes and 67 wild types were irradiated with either 5 or 25 cGy of 1,000 MeV/n 56Fe (approximately equal numbers of mice received each of the two doses). Mice are examined weekly by slit lamp examination and monthly by Scheimpflug examination. Cataract stage is scored for each mouse and the genotype or irradiation status of each animal is blinded to the observer. Examination will continue for up to 100 weeks post irradiation unless death and/or disease removes the animal from the study. At present, 103 mice have been examined for approximately 68 weeks, 121 mice for 54 weeks and 63 mice for 40 weeks post examination. Preliminary results for average cataract stage in this study can be calculated using the aggregate data from the four genotypes without revealing information about any particular animal. In general, at any time point, average cataract stage for single and double heterozygotes is greater than that of wild type animals and the oldest such animals are presently approaching an average cataract stage of 2.0 (3.0 is considered blinding and any animal with this score is sacrificed.) Unirradiated control animals have average cataract scores in the range of 1.0-1.5. The code will be broken and the data analysed in approximately one year.	
Bibliography Type:	Description: (Last Updated: 10/26/2023)	
Articles in Peer-reviewed Journals	Hall EJ, Worgul BV, Smilenov L, Elliston CD, Brenner DJ. "The relative biological effectiveness of densely ionizing heavy-ion radiation for inducing ocular cataracts in wild type versus mice heterozygous for the ATM gene. " Radiat Environ Biophys. 2006 Jul;45(2):99-104. Epub 2006 Jun 24. <a href="PMID: 16799786">PMID: 16799786</a> , Jul-2006	
Articles in Peer-reviewed Journals	Hall EJ. "Intensity-modulated radiation therapy, protons, and the risk of second cancers." Int J Radiat Oncol Biol Phys. 2006 May 1;65(1):1-7. Review. <a href="PMID: 16618572">PMID: 16618572</a> , May-2006	
Articles in Peer-reviewed Journals	Travis LB, Rabkin CS, Brown LM, Allan JM, Alter BP, Ambrosone CB, Begg CB, Caporaso N, Chanock S, DeMichele A, Figg WD, Gospodarowicz MK, Hall EJ, Hisada M, Inskip P, Kleinerman R, Little JB, Malkin D, Ng AK, Offit K, Pui CH, Robison LL, Rothman N, Shields PG, Strong L, Taniguchi T, Tucker MA, Greene MH. "Cancer survivorshipgenetic susceptibility and second primary cancers: research strategies and recommendations. " J Natl Cancer Inst. 2006 Jan 4;98(1):15-25. Review. <a href="PMID: 16391368">PMID: 16391368</a> , Jan-2006	
Articles in Peer-reviewed Journals	Hall EJ. "The inaugural Frank Ellis Lecturelatrogenic cancer: the impact of intensity-modulated radiotherapy." Clin Oncol (R Coll Radiol). 2006 May;18(4):277-82. <a href="PMID: 16703744">PMID: 16703744</a> , May-2006	
Articles in Peer-reviewed Journals	Hall EJ. "Cancer caused by x-raysa random event?" Lancet Oncol. 2007 May;8(5):369-70. <a href="https://example.com/pmills-17466892"><u>PMID: 17466892</u></a> , May-2007	