Task Book Report Generated on: 04/25/2024

PI Name: Sa, Rui Carlos Ph.D. Project Title: Variability in Flow Distribution within the Lung and Its Effects on Deposition and Clearance of Inhaled Particles in Normal and Reduced Growty Division Name: Human Research Program/Divicyline: NSBRI Program/Divicyline: NSBRI—Human Factors and Performance Team Element/Shaltheighlie: Joint Agency Name: Tech Port: No NSBRI—Human Research Program Risis: (I) SHFH-Space Human Factors & Habitability (archival in 2017) Human Research Program Risis: (I) Dast Risk of Adverse Health and Performance Effects of Celestial Dust Exposure None Space Biology Cross-Element Divicyline: None None Space Biology Special Category: None PI Email: research Program Risis: None None Space Biology Special Category: None PI Capanization Type: University Phone: PI Paddress 1: Department of Medicine PI Address 2: 9500 Gilman Dive, MC 0852 PI Web Page: City: La Jolla State: CA 2009-30-852 Compressional District: 53 Comments: Last name conctinues seen as "Percini de Sa" * Project Type: GROUND Solicitation / Funding Source: 2009 NSRIERE A-09-01 Postidoctoral Funding Source: Project Type: GROUND Solicitation / Funding Source: 1 No. of Past Docs: 1 No. of Past Docs: 1 No. of Past Docs: 0 No. of Master' Degrees: 0 No. of Master' Candidates: 1 No. of Past Docs: Ontact Muniture: Contact Plume: Contact Plume: Contact Plume: Contact Changes' Previous PI: COI Name (Institution): Proj. G. Kim (MENTOR/University of Californius, San Diego) Profermance Goal Nex: Performance Goal Text: Performance Goal Text: Post Docs: Project Type: Project Type: Project Institution is Project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow putters in the lung affects aerood deposition, and this to subsequent clearance between individuals. Such an understa	¥34 1 ¥7	TV 2012	m 1 x	FX 11/14/0011
Project Title: Variabitity in Flow Distribution within the Lang and Its Effects on Deposition and Clearance of Inbaled Particles in Nomal and Reduced Cravity Human Research Human Research	Fiscal Year:	FY 2012 Task Last Updated: FY 11/14/2011		
Division Name: Human Research Program/Discipline= Program/Discipline= Element/Suddiscipline= Element/Suddiscipline Element/Suddiscipline= Element/Suddiscipline=	PI Name:			
Program/Discipline: Program/Discipline- Element/Subdiscipline- Element/Subdiscipline- Element/Subdiscipline- Joint Agency Name:	Project Title:			
Program/Discipline- Element/Subdiscipline Element/Subdiscipline Element/Subdiscipline Johnt Agency Name: Tech Port: No Johnt Agency Name: Ituman Research Program Elements: (1) SHFH. Space Human Factors & Habitability (archival in 2017) Juman Research Program Risks: (1) Bust-Risk of Adverse Health and Performance Effects of Celestial Dust Exposure None Space Biology Element: None Space Biology Special Category: None Pl Camalian Space Biology Special Category: None Pl Camalian Type: UNIVERSITY Phone: S58-322-5081 Pl Lamali: Pl Organization Type: UNIVERSITY Phone: S58-322-5081 Pl Address 1: Department of Medicine Pl Address 2: Spong Biology Special Category: None Pl Address 3: Department of Medicine Pl Address 4: Department of Medicine Pl Address 2: Spong Silve Special Category: Project Type: La Jolin State: City: La Jolin Silve State: Category: Spong Silve Special District: Spong Spon	Division Name:	Human Research		
Element/Subdiscipline: No.	Program/Discipline:	NSBRI		
Human Research Program Elements: (I) SHFH: Space Human Factors & Habitability (archival in 2017) Human Research Program Risks: (I) Dust-Risk of Adverse Health and Performance Effects of Celestial Dust Exposure Space Biology Cross-Element None Space Biology Cross-Element None Space Biology Special Category: None PI Email: research Program Risks: None PI Email: prosefunction Type: UNIVERSITY Phone: 858-822-5081 Organization Name: University of California, San Diego PI Address 1: Department of Medicine PI Address 2: 9500 Gilman Drive, MC 0852 PI Web Page: City: La Jolla State: CA Zip Code: 92093-0852 Congressional District: 53 Comments: Last name ometimes seen as "Pereira de Sa"* Project Type: GROUND Solicitation / Funding Source: 2009 NSBRL-RFA-09-01 Postdoctoral Tellowships Start Date: 1101/2009 End Date: 1031/2012 No. of Pho Londidates: 0 No. of Master' Degrees: 0 No. of Pho Degrees: 0 No. of Pho Degrees: 0 No. of Bachelor's Candidates: 0 No. of Master' Degrees: 0 No. of Bachelor's Candidates: 0 No. of Master' Degrees: 0 No. of Bachelor's Candidates: 0 No. of Master' Degrees: 0 No. of Bachelor's Candidates: 0 No. of Master' Degrees: 0 No. of Bachelor's Candidates: 0 No. of Master' Degrees: 0 No. of Bachelor's Candidates: 0 No. of Master' Degrees: 0 No. of Bachelor's Candidates: 0 No. of Master' Degrees: 0 No. of Bachelor's Candidates: 0 No. of Master' Degrees: 0 No. of Bachelor's Candidates: 0 No. of Master' Degrees: 0 No. of Bachelor's Candidates: 0 No. of Master' Degrees: 0 No. of Bachelor's Candidates: 0 No. of Master' Degrees: 0 No. of Master' D		NSBRIHuman Factors and Perfor	rmance Team	
Human Research Program Risks: Space Biology Element: None Space Biology Cross-Element Discipline: Space Biology Cross-Element Discipline: Space Biology Special Category: None Space Biology Special Category: None PI Email: Resigned edu Fax: FY \$58-534-6046 PI Organization Type: University of California, San Diego PI Address 1: Department of Medicine PI Address 2: 9500 Gilman Drive, MC 0852 PI Web Page: City: La Jolla State: CA Zip Code: 92003-0852 Comments: Last name ometimes seen as "Pereira de Sa" " Project Type: GROUND Solicitation / Funding Source: Project Type: GROUND Solicitation / Funding Source: Project Type: GROUND Solicitation / Funding Source: Project Ones: 1 10/12/09 End Date: 10/31/2012 No. of Post Does: 1 No. of PhD Degrees: 0 No. of Master's Candidates: 0 No. of Master' Degrees: 0 No. of Master's Candidates: 0 No. of Master' Degrees: 0 No. of Master's Candidates: 0 No. of Master's Candidates: 0 Monitoring Center: NSBRI Contact Monitor: Contact Monitor: Contact Email: Flight Program: Flight Assignment: Key Personnel Changes/Previous Pi: CO Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives Our goal is to provide a better understanding of how variability in convective aim understanding will allow better characterization of the normal variability in deposition and independent of the marrial variability in convective aim of capasing and objectives one of the internal variability in convective aim of capasing will allow better characterization of the normal variability in convective aim of capasing aims and objectives one of the internal variability in convective aim of the internal variability in deposition and clearance runds with the lung of the periodes one tech bened eposition. Provides a better understanding of how variability in convective the material solicit, and in lito **exidence time within the lung of the periodes one tech benedence the materia	Joint Agency Name:		TechPort:	No
Space Biology Element: Space Biology Cross-Element Disciplines: None Space Biology Cross-Element Disciplines: Rone PI Email: Costa@used.edu Fax: FY 858-534-6046 PI Organization Type: UNIVERSITY Phone: 858-822-5081 Organization Name: University of California, San Diego PI Address 1: Department of Medicine PI Address 2: 9500 Gilman Drive, MC 0852 PI Web Page: City: La Jolla State: CA Zip Code: 92003-0852 Comments: Last name ometimes seen as "Percira de Sa" " Project Type: GROUND Solicitation / Funding Source: Project Type: GROUND Solicitation / Funding Source: Project Type: GROUND Solicitation / Funding Source: Project Type: One of PhD Degrees: No. of Path Degrees: No. of Path Degrees: No. of Master's Candidates: No. of Master's Candidates: No. of Master's Candidates: No. of Master's Candidates: No. of Bachelor's Candidates: No. of Bachelor's Candidates: No. of Bachelor's Candidates: No. of Bachelor's Candidates: No. of Rachelor's Can	Human Research Program Elements:	(1) SHFH:Space Human Factors &	Habitability (archival in 2017)	
Space Biology Cross-Element Discipline: None PI Email: Press@mesd.edu Pi Organization Type: UNIVERSITY Phone: 858-822-5081 Proganization Name: University of California, San Diego PI Address 1: Department of Medicine PI Address 2: 9500 Gilman Drive, MC 0852 PI Web Page: City: La Jolla State: CA Zip Code: 92093-0852 Comments: Last name ometimes seen as "Pereira de Sa" " Project Type: GROUND Solicitation / Funding Source: Project Type: GROUND Solicitation / Funding Source: Project Totate: 11:01/2009 End Date: 10:31/2012 No. of PhD Degrees: 0 No. of PhD Degrees: 0 No. of Machelor's Candidates: Contact Email: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Performance Goal No.: Performance Goal No.: Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective now airbonne understanding will allow better characterization of the normal variability in convective now airbonne understanding will allow better characterization of the normal variability in convective the material itself, and 3) the residence time within the lung of the particles once they have been deposition, 2) the texplest the material inselt, and of the particles once they have been deposition, 2 the degree of deposition, 2 the degree of deposition, 2 the texplest the material them and the material than the lung of the particles once they have been deposition, 2 the texplacet. The	Human Research Program Risks:	(1) Dust :Risk of Adverse Health and Performance Effects of Celestial Dust Exposure		
Discipline: Space Biology Special Category: None PI Email: resulting and the properties of California, San Diego PI Address 1: Department of Medicine PI Address 2: 9500 Gilman Drive, MC 0852 PI Web Page: City: La Jolla State: CA Zip Code: 92093-0852 Compressional District: Last name ometimes seen as "Pereira de Sa" " Project Type: GROUND Solicitation / Funding Source: Fellowships Start Date: 11.01/2009 Solicitation / Funding Source: Followships Start Date: 11.01/2009 Solicitation / Funding Source: Followships Start Date: 10.0. of PhD Degrees: No. of PhD Degrees: No. of Master's Candidates: No. of Master's Candidates: No. of Master's Candidates: No. of Bachelor's Candidates: O No. of Bachelor's Candidates: Contact Email: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Orrant/Contract No.: NCC 9-58-PF02103 Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective name understanding will allow better characterization of the normal variability in convective name understanding will allow better characterization of the normal variability in convective name understanding within the lung of the particles conce they have been deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in convective name in the una gardest aerooid deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in convective in the material institute the under which is believed to be highly reactive: 1) the degree of deposition, 2) the text between the ware arthered the material than than the lung of the particles conce they have been deposition, 2 the text beauter than the understanding will all on the text dead of the particles conce they have been deposition. The	Space Biology Element:	None		
PI Email: Progranization Type: UNIVERSITY Phone: 858-822-5081	1 00	None		
Pl Organization Type: UNIVERSITY Phone: 858-822-5081 Organization Name: University of California, San Diego Pl Address 1: Department of Medicine Pl Address 2: 9500 Gilman Drive, MC 0852 Pl Web Page: City: La Jolla State: CA Zip Code: 92093-0852 Congressional District: 53 Comments: Last name ometimes seen as "Pereira de Sa" " Project Type: GROUND Solicitation / Funding Source: 2009 NSBRI-RFA-09-01 Postdoctoral Fellowships Start Date: 11/01/2009 End Date: 10/31/2012 No. of Post Does: 1 No. of PhD Degrees: 0 No. of Post Does: 1 No. of Master' Degrees: 0 No. of Master's Candidates: 0 No. of Master's Degrees: 0 No. of Master's Candidates: 0 Monitoring Center: NSBRI Contact Monitor: Contact Email: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Grant/Contract No.: NCC 9-58-PF02103 Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological risk to the lung of exposure arishorme lunar dust which is believed to be highly reactive: 1) the degree of deposition, they have been deposited. The	Space Biology Special Category:	None		
Organization Name: University of California, San Diego PI Address 1: Department of Medicine PI Address 2: 9500 Gilman Drive, MC 0852 PI Web Page: City: La Jolla State: CA Zip Code: 92093-0852 Comments: Last name ometimes seen as "Pereira de Sa" " Project Type: GROUND Solicitation / Funding Source: 2009 NSBRI-RFA-09-01 Postdoctoral Fellowships Start Date: 11/01/2009 End Date: 10/31/2012 No. of PhD Degrees: 0 No. of PhD Degrees: 0 No. of PhD Candidates: 0 No. of Master's Candidates: 0 No. of Bachelor's Degrees: 0 No. of Bachelor's Candidates: 0 Monitoring Center: NSBRI Contact Monitor: Contact Email: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Grant/Contract No.: NCC 9-58-PF02103 Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects acrosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 16, and in low-gravity such as on the lunar vaface. Three key factors define the toxicological properties the maderial itself, and 3) the residence time within the lung of the particles on the phase been deposited. The	PI Email:	rcsa@ucsd.edu	Fax:	FY 858-534-6046
PI Address 1: Department of Medicine PI Address 2: 9500 Gilman Drive, MC 0852 PI Web Page: City: La Jolla State: CA Zip Code: 92093-0852 Congressional District: 53 Comments: Last name ometimes seen as "Percira de Sa" " Project Type: GROUND Solicitation / Funding Source: Perlowships Start Date: 11/01/2009 End Date: 10/31/2012 No. of Post Docs: 1 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: NSBRI Contact Monitor: Contact Email: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Grant/Contract No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects acrosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 16, and in low-gravity such so on the lunar sufface. There key factors define the toxicological risk to the lung of exposure airborne lunar dust which is believed to be highly reactive: 1) the degree of deposition, c) the toxicological properties the material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	PI Organization Type:	UNIVERSITY	Phone:	858-822-5081
PI Address 2: 9500 Gilman Drive, MC 0852 PI Web Page: City: La Jolla State: CA Zip Code: 92093-0852 Congressional District: 53 Comments: Last name ometimes seen as "Pereira de Sa" " Project Type: GROUND Solicitation / Funding Source: 2009 NSBRI-RFA-09-01 Postdoctoral Fellowships Start Date: 11/01/2009 End Date: 10/31/2012 No. of Post Does: 1 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: NSBRI Contact Monitor: Contact Email: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects acrosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 16, and in low-gravity such as on the lunar surface. Three key factors define the toxicological properties the material itself, and 3) the residence time within the lung of the patterns in the lung of the patterns of the lung of the patterns in the lung of the patterns one the lune of the patterns one the lune of the patterns one the lune of the patterns in the lung of the patterns in the lune of the patterns one the lune of the patterns in the lune of the patterns one the lune of the patterns in the lune of the patterns one the lune of the pattern	Organization Name:	University of California, San Diego)	
PI Web Page: City: La Jolla State: CA Zip Code: 92093-0852 Congressional District: 53 Comments: Last name ometimes seen as "Pereira de Sa" " Project Type: GROUND Solicitation / Funding Source: 2009 NSBRI-RFA-09-01 Postdoctoral Fellowships Start Date: 11/01/2009 End Date: 10/31/2012 No. of Post Does: 1 No. of PhD Degrees: 0 No. of PbD Candidates: 0 No. of Master' Degrees: 0 No. of Master's Candidates: 0 No. of Master' Degrees: 0 No. of Bachelor's Degrees: 0 No. of Bachelor's Candidates: 0 Monitoring Center: NSBRI Contact Monitor: Contact Fundi: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Grant/Contract No.: NCC 9-58-PF02103 Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects acrosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological properties the material itself, and 3) the residence time within the lung of the patterns in the lung of the patterns with the was then duracted time within the lung of the patterns one chu posited. The stem defined the lung of the patterns in the lung of the patterns	PI Address 1:	Department of Medicine		
City: La Jolla State: CA Zip Code: 92093-0852 Congressional District: 53 Comments: Last name ometimes seen as "Pereira de Sa" " Project Type: GROUND Solicitation / Funding Source: 2009 NSBRI-RFA-09-01 Postdoctoral Fellowships Start Date: 11/01/2009 End Date: 10/31/2012 No. of Post Docs: 1 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: NSBRI Contact Monitor: Contact Hemail: Flight Program: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Grant/Contract No.: NCC 9-58-PF02103 Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects acrosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lung affects acrosol deposition, and thus subsequent clearance rates both in 1G, and in low-gravity such as on the lung affects acrosol deposition, and thus subsequent clearance rates both in 1G, and in low-gravity such as on the lung affects acrosol deposition, 2 the toxicological properties the material itself, and 3) the residence time within the lung of the degree of deposition, 2) the toxicological properties the material itself, and 3) the residence time within the lung of the degree of deposition, 2) the toxicological properties the material itself, and 3) the residence time within the lung of the patricles once they have been deposited. The	PI Address 2:	9500 Gilman Drive, MC 0852		
Zip Code: 92093-0852 Congressional District: 53 Comments: Last name ometimes seen as "Pereira de Sa" " Project Type: GROUND Solicitation / Funding Source: 2009 NSBRI-RFA-09-01 Postdoctoral Fellowships Start Date: 11/01/2009 End Date: 10/31/2012 No. of Post Docs: 1 No. of PhD Degrees: 0 No. of PhD Candidates: 0 No. of Master' Degrees: 0 No. of Master's Candidates: 0 No. of Master' Degrees: 0 No. of Master's Candidates: 0 Monitoring Center: NSBRI Contact Monitor: Contact Phone: Contact Email: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Grant/Contract No.: NCC 9-58-PF02103 Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological risk to the lung of exposure airborne lunar dust which is believed to be highly reactive: 1) the degree of deposition, 2) the toxicological properties the material itself, and 3) the residence time within the lung of teprities once they have been deposited. The	PI Web Page:			
Comments: Last name ometimes seen as "Pereira de Sa" " Project Type: GROUND Solicitation / Funding Source: Project Type: 11/01/2009 End Date: 10/31/2012 No. of Post Does: 1 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: NSBRI Contact Monitor: Contact Honitor: Contact Email: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Grant/Contract No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological risk to the lung of exposure airborne lunar dust which is believed to be highly reactive: 1) the degree of deposition, 2) the toxicological properties the material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	City:	La Jolla	State:	CA
Project Type: GROUND Solicitation / Funding Source: 2009 NSBRI-RFA-09-01 Postdoctoral Fellowships Start Date: 11/01/2009 End Date: 10/31/2012 No. of Post Does: 1 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: NSBRI Contact Monitor: Contact Monitor: Contact Email: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Grant/Contract No.: Performance Goal No.: Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects acrosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal rability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological properties when material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	Zip Code:	92093-0852	Congressional District:	53
Start Date: 11/01/2009 End Date: 10/31/2012 No. of Post Docs: 1 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: NSBRI Contact Monitor: Contact Phone: Contact Email: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Grant/Contract No.: NCC 9-58-PF02103 Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance retas both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological properties the material itself, and 3) the residence time within the lung of the particles once they have been deposition, 2) the toxicological properties the material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	Comments:	Last name ometimes seen as "Perei	ira de Sa" "	
No. of Post Docs: 1	Project Type:	GROUND	Solicitation / Funding Source:	
No. of PhD Candidates: 0	Start Date:	11/01/2009	End Date:	10/31/2012
No. of Master's Candidates: 0	No. of Post Docs:	1	No. of PhD Degrees:	0
No. of Bachelor's Candidates: O Monitoring Center: NSBRI Contact Monitor: Contact Phone: Contact Email: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Grant/Contract No.: NCC 9-58-PF02103 Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological risk to the lung of exposure airborne lunar dust which is believed to be highly reactive: 1) the degree of deposition, 2) the toxicological properties of the material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	No. of PhD Candidates:	0	No. of Master' Degrees:	0
Contact Email: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Grant/Contract No.: NCC 9-58-PF02103 Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological risk to the lung of exposure airborne lunar dust which is believed to be highly reactive: 1) the degree of deposition, 2) the toxicological properties the material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	No. of Master's Candidates:	0	No. of Bachelor's Degrees:	0
Contact Email: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Grant/Contract No.: NCC 9-58-PF02103 Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in IG, and in low-gravity such as on the lunar surface. Three key factors define the toxicological risk to the lung of exposure airborne lunar dust which is believed to be highly reactive: 1) the degree of deposition, 2) the toxicological properties the material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	No. of Bachelor's Candidates:	0	Monitoring Center:	NSBRI
Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Grant/Contract No.: NCC 9-58-PF02103 Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological risk to the lung of exposure airborne lunar dust which is believed to be highly reactive: 1) the degree of deposition, 2) the toxicological properties of the material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	Contact Monitor:		Contact Phone:	
Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Grant/Contract No.: NCC 9-58-PF02103 Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological risk to the lung of exposure airborne lunar dust which is believed to be highly reactive: 1) the degree of deposition, 2) the toxicological properties of the material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	Contact Email:			
Key Personnel Changes/Previous PI: COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) Grant/Contract No.: NCC 9-58-PF02103 Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological risk to the lung of exposure airborne lunar dust which is believed to be highly reactive: 1) the degree of deposition, 2) the toxicological properties of the material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	Flight Program:			
COI Name (Institution): Prisk, G. Kim (MENTOR/University of California, San Diego) NCC 9-58-PF02103 Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological risk to the lung of exposure airborne lunar dust which is believed to be highly reactive: 1) the degree of deposition, 2) the toxicological properties of the material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	Flight Assignment:			
Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological risk to the lung of exposure airborne lunar dust which is believed to be highly reactive: 1) the degree of deposition, 2) the toxicological properties of the material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	Key Personnel Changes/Previous PI:			
Performance Goal No.: Performance Goal Text: POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological risk to the lung of exposure airborne lunar dust which is believed to be highly reactive: 1) the degree of deposition, 2) the toxicological properties of the material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	COI Name (Institution):	Prisk, G. Kim (MENTOR/Univer	rsity of California, San Diego)	
POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological risk to the lung of exposure airborne lunar dust which is believed to be highly reactive: 1) the degree of deposition, 2) the toxicological properties of the material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	Grant/Contract No.:	NCC 9-58-PF02103		
POSTDOCTORAL FELLOWSHIP 1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological risk to the lung of exposure airborne lunar dust which is believed to be highly reactive: 1) the degree of deposition, 2) the toxicological properties of the material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	Performance Goal No.:			
1) Original project aims and objectives: Our goal is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. Such an understanding will allow better characterization of the normal variability in deposition and clearance rates both in 1G, and in low-gravity such as on the lunar surface. Three key factors define the toxicological risk to the lung of exposure airborne lunar dust which is believed to be highly reactive: 1) the degree of deposition, 2) the toxicological properties the material itself, and 3) the residence time within the lung of the particles once they have been deposited. The	Performance Goal Text:			
distribution of ventilation within the lung determines deposition. Studies by us using computational fluid dynamics (CFD) in realistic central airway trees show that ventilation varies widely at the lobar level. However, typical boundary		1) Original project aims and objects flow patterns in the lung affects aer understanding will allow better cha and in low-gravity such as on the lu airborne lunar dust which is believe the material itself, and 3) the reside distribution of ventilation within the	ives: Our goal is to provide a better un rosol deposition, and thus subsequent of tracterization of the normal variability unar surface. Three key factors define ed to be highly reactive: 1) the degree ence time within the lung of the particle e lung determines deposition. Studies	clearance between individuals. Such an in deposition and clearance rates both in 1G, the toxicological risk to the lung of exposure to of deposition, 2) the toxicological properties of es once they have been deposited. The by us using computational fluid dynamics

Task Book Report Generated on: 04/25/2024

conditions for deposition simulations assume that lung expansion is uniform, which we know to be incorrect. We have developed a Magnetic Resonance Imaging (MRI) technique that allows the quantification of regional specific ventilation in the human lung, providing realistic boundary conditions. In this proposal we will: a) map the spatial pattern of specific ventilation; b) map deposition in the supine position at 1G; and combine these with data on the spatial pattern of deposition of inhaled particles collected in low-gravity as part of our existing NSBRI studies; c) The measured pattern of aerosol deposition will be compared with the CFD predictions, using uniform and the more realistic boundary conditions. By comparing across a number of subjects, the mechanisms underlying the observed variability in deposition and regional ventilation can be elucidated. By comparing 1G and low-gravity deposition, the magnitude of the gravitational effect can be assessed.

Task Description:

- 2) Key findings: We have successfully applied the MRI technique for quantifying specific ventilation in the human lung-Specific Ventilation Imaging- completing aim a). We have used this technique to quantify the vertical, gravitational induced, gradient in specific ventilation that is present on the human lung on earth. Our findings are in accordance with previous radiation based techniques for quantifying specific ventilation. An article describing the technique was published during the second year in the Journal of Applied Physiology. A patent, protecting the intellectual property of this and two other MRI methodologies developed at our lab is currently actively pursued. During the second year we have mapped particle deposition for 4µm particles, when inhalation occurs in the supine position (10 subjects) and recently in low-gravity (6 subjects), addressing aim b).
- 3) Impact of key findings on original project: The successful completion of aim a) was essential to completion the project. The data for addressing aim b was recently collected for 4µm particles. Data analysis is under way. These results allow us to start CFD modeling, addressing aim c).
- 4) Research plan for the coming year: We have collected deposition data for $4\mu m$ particles (aim b). A second parabolic flight campaign ($1\mu m$ particles) is expected in the spring 2012. MATLAB based software tools for the analysis of this data developed by the fellow are in use for the analysis of ground (1-G) data. Further development and optimization of these tools for application to low-gravity acquired data is underway. Computational Fluid Dynamic modeling will begin soon. The third year will be dedicated to the analysis of the outcomes of these models, and establishing a metric for comparison with the measured deposition patterns. We expect that, by imposing realistic instead of idealized boundary conditions, we will significantly improve our ability to predict particle deposition. Time will be dedicated to compiling and writing these results into a scientific publication.

Rationale for HRP Directed Research:

The overall goal of this project is to better understand how variability in convective flow patterns in the lung affect aerosol deposition and subsequent clearance between individuals. Such knowledge will help better characterize the normal variability, both on the ground and in low gravity (the lunar, martian or asteroid surface), and thus better characterize the risks of exposure to potentially toxic, aggressive dust. This improved risk assessment is important both in earth's gravity, where many people are exposed to airborne dust, as well as in future planetary exploration (lunar dust is aggressive, highly reactive, and in low gravity, dust particles are likely to deposit further down in the lung, increasing residence time; little is know at this time on the toxicological properties of martian or asteroid dust). From a different and more long-term perspective, an improved fundamental understanding of the individual spatial variability in particle deposition might also help optimize aerosols drug delivery, helping optimizing aerosols mixes that will more accurately target specific portions of the lung. Individualized targeting of aerosol medication in chronic diseases such as asthma has the potential to increase the efficiency of the drug delivery, decreasing the inhaled dose and minimizing side effects. In the framework of this project, we have developed a novel MRI technique for the quantification of specific ventilation in the human lung. The technique requires a standard proton MRI machine with a 1.5 Tesla field, machines that are widely available in clinical setting. The technique does not require the use of radiation, and is therefore suitable for repeated measures. At a first stage, we are using the technique as a novel research tool, but its repercussions can be extended to the clinical setting. The fact that it does not involve radiation opens a novel diagnostic window, for it can be applied repetitively. This can be of particular importance in patient populations suffering from chronic respiratory diseases, such as asthma and chronic obstructive pulmonary disease (COPD). Patients with chronic respiratory disease could benefit from a non invasive, zero radiation dose assessment of their lung function, that can thus be repeated time and again, allowing for a more regular follow up than the existing techniques. A patent protecting the intellectual property of this MRI technique as well as two additional MR-sequences developed by our group is currently being pursued (provisional patent application: "New method for imaging ventilation and perfusion in the lung using MRI" SD2010-320, provisional application number 61420554 - R.B. Buxton, G.K. Prisk, S.R. Hopkins, R.C. Pereira de Sá, R.J. Theilmann, M.V. Cronin).

Research Impact/Earth Benefits:

The goal of this project is to provide a better understanding of how variability in convective flow patterns in the lung affects aerosol deposition, and thus subsequent clearance between individuals. In order to achieve this goal, three specific aims need to be addressed: a) map the spatial pattern of specific ventilation; b) map deposition in the supine position at 1G; and combine these with data on the spatial pattern of deposition of inhaled particles collected in low-gravity as part of our existing NSBRI studies. c) The measured pattern of aerosol deposition will be compared with Computational Fluid Dynamics (CFD) predictions, using uniform and the more realistic boundary conditions. By comparing across a number of subjects, the mechanisms underlying the observed variability in deposition and regional ventilation can be elucidated. By comparing the data collected in 1G with data from low-gravity, the magnitude of the gravitational effect can be assessed.

In the first year we have successfully developed a Magnetic Resonance Imaging technique for quantifying specific ventilation in the human lung - Specific Ventilation Imaging, completing point a) of the initial project aims. We have used this technique to quantify the vertical, gravitational induced, gradient in specific ventilation that is present on the human lung on earth. An article describing the technique and the first physiological results obtained was published in the Journal of Applied Physiology during the second year of the project. This novel MRI technique was included in a provisional patent application: "New method for imaging ventilation and perfusion in the lung using MRI" (provisional application number 61420554). During this second year we quantified specific ventilation in the entire pool of subjects available (parabolic flight certified) for the low-gravity deposition experiments (N=10). The data thus obtained allowed us to determined realistic boundary conditions required for addressing aim c) in a individualized subject by subject basis.

We have mapped the deposition of 4µm particles (1G supine) in the same pool of subjects (N=10). A subset of these

Task Progress:

Task Book Report Generated on: 04/25/2024

	subjects (N=6) participated in a recent NASA parabolic flight campaign, where maps of particle deposition in low gravity were obtained for the first time, thus completing data acquisition for $4\mu m$ particles. Low-gravity deposition maps for $1\mu m$ particles, and the corresponding post-flight controls are expected to occur during a parabolic flight campaign tentatively scheduled for the spring 2012. The analysis of the acquired data is ongoing using MATLAB based software analysis tools developed during the first and second year of the project. The constraints of parabolic-flight acquired data imposed, as expected, additional customization and optimization. The implementation of the necessary changes is currently underway. We expect to start the CFD modeling component of the project shortly.
Bibliography Type:	Description: (Last Updated: 01/11/2021)
Abstracts for Journals and Proceedings	Henderson AC, Sa RC, Barash IA, Holverda S, Buxton RB, Hopkins SR, Prisk GK. "Rapid intravenous infusion of 20 ml/kg saline alters the distribution of perfusion in healthy supine humans." American Thoracic Society (ATS) 2011 Conference, Denver, CO, May 13-18, 2011. Am J Respir Crit Care Med 2011 May;183:A3572., May-2011
Abstracts for Journals and Proceedings	Prisk GK, Cronin MV, Henderson AC, Holverda S, Theilmann RJ, Arai TJ, Dubowitz DJ, Hopkins SR, Buxton RB, Sa RC. "Quantifying regional ventilation with proton MRI." The 2011 International Functional Pulmonary Imaging Workshop, Philadelphia, PA, February 28 - March 2, 2011. The 2011 International Functional Pulmonary Imaging Workshop, Philadelphia, PA, February 28 - March 2, 2011. Abstract Book, February 2011., Feb-2011
Abstracts for Journals and Proceedings	Prisk GK, Sa RC, Bennett WD, Darquenne C. "Deposition and subsequent clearance of aerosols in reduced gravity." 18th International Academy of Astronautics (IAA) Humans in Space Symposium, Houston, TX, April 11-15, 2011. 18th IAA Humans in Space Symposium, Houston, TX, April 11-15, 2011. , Apr-2011
Abstracts for Journals and Proceedings	Prisk GK, Sa RC, Holverda S, Dubowitz D, Cronin MV, Hopkins SR, Buxton RB. "Spatial-temporal heterogeneity of pulmonary blood flow is altered by changes in FIO2." American Thoracic Society (ATS) 2011 Conference, Denver, CO, May 13-18, 2011. Am J Respir Crit Care Med 2011 May;183:A5188., May-2011
Abstracts for Journals and Proceedings	Sa RC, Darquenne C, Prisk GK. "Imaging ventilation within the lung to predict deposition of inhaled particles in normal and reduced gravity." 18th International Academy of Astronautics (IAA) Humans in Space Symposium, Houston, TX, April 11-15, 2011. 18th IAA Humans in Space Symposium, Houston, TX, April 11-15, 2011., Apr-2011
Articles in Peer-reviewed Journals	Sa RC, Cronin MV, Henderson AC, Holverda S, Theilmann RJ, Arai TJ, Dubowitz DJ, Hopkins SR, Buxton RB, Prisk GK. "Vertical distribution of specific ventilation in normal supine humans measured using oxygen-enhanced proton MRI." J Appl Physiol. 2010 Dec;109(6):1950-9. Epub 2010 Oct 7. PubMed PMID: 20930129 , Dec-2010