Task Book Report Generated on: 04/26/2024

Project Title: A Plant-Based Platform for "Just in Times" Medications Program/Discipline: Program/Discipline- Element Sudisform TRISH-TRISH Joint Agency Name: TechPort: No Nome Share Biology Floren Element: Nome Space Biology Floren-Element: Nome Space Biology Special Category: Nome Pl Email: Semedunt/Affiguedaxis cells Space Biology Special Category: Nome Pl Email: Semedunt/Affiguedaxis cells Floren Space Biology Special Category: Nome Pl Email: Semedunt/Affiguedaxis cells Floren Space Biology Special Category: Nome Pl Email: Semedunt/Affiguedaxis cells Floren Space Biology Special Category: Nome Pl Email: Semedunt/Affiguedaxis cells Floren Space Biology Special Category: Nome Pl Email: Semedunt/Affiguedaxis cells Floren Space Biology Special Category: Nome Pl Modress 1: Department of Chemical Engineering Pl Address 1: Department of Chemical Engineering Pl Address 2: Special Category: Nome City: Davis Space Sp	Fiscal Year:	FY 2020	Task Last Updated:	FY 07/23/2020
	PI Name:	McDonald, Karen Ph.D.		
Program/Discipline:	Project Title:	A Plant-Based Platform for "Just in Time" Medications		
Program/Discipline-	Division Name:	Human Research		
	Program/Discipline:			
Human Research Program Elements: None Human Research Program Risks: None Space Biology Cross-Element: None Space Biology Cross-Element: None Discipline: None Pl Email: Lamber Mone Discipline: None Pl Email: Lamber Mone Pl Email: Lamber Mone Pl Email: Lamber Mone Discipline: None Pl Email: Lamber Mone Pl Email: Lamber Mone University of California, Davis Pl Address I: Department of Chemical Engineering Pl Address 2: I Shields Ave Pl More Mone City: Davis State: CA Zip Code: Solic-5270 Congressional District: 3 Comments: Comments: Comments: Comments: Lamber Mone Solicitation / Funding Source Lamber Mone Monitoring Center: Translational Research Discipline Solicitation / Funding Source Lamber Monitoring Center: TRISH Contact Monitor: No. of Master's Candidates: No. of Master's Degrees: No. of Post Does: No. of Master's Candidates: Monitoring Center: TRISH Contact Email: Flight Program: Flight Program: Flight Assignment: Key Personnel Changes/Previous Pl: Lamber Monitoring Contact Phole (University of California, Davis Health Nond), Sonsen Pl. D. (University of California, Davis Health Nond), Sonsen Pl. D. (University of California, Davis Health Nond), Sonsen Pl. D. (University of California, Davis Health Nond), Sonsen Pl. D. (University of California, Davis Health Nond), Sonsen Pl. D. (University of California, Davis Health Nond), Sonsen Pl. D. (University of California, Davis Health Nond), Sonsen Pl. D. (University of California, Davis Health Nond), Sonsen Pl. D. (University of California, Davis Health Nond), Sonsen Pl. D. (University of California, Davis Health Nond), Sonsen Pl. D. (University of California, Davis Health Nond), Sonsen Pl. D. (University of California, Davis Health Nond), Sonsen Pl. D. (University of California, Davis Health Nond), Sonsen Pl. D. (University of California, Davis Health Nond), Sonsen Pl. D. (University of California, Davis Davis) Solicitation Pl. D. (University of California, Davis Health Nond), Sonsen Pl. D. (University of California, Davis) Solicitation Pl. D. (University of	Program/Discipline Element/Subdiscipline:	TRISHTRISH		
Human Research Program Risks: None Space Biology Cross-Element Space Biology Cross-Element Space Biology Cross-Element Space Biology Special Category: None PI Email: kamedomald@ucdavis.edu Fax: PY PI Organization Type: UNIVERSITY Phone: 707-548-8314 Organization Name: University of California, Davis PI Address 1: Department of Chemical Engineering PI Address 2: 1 Shields Ave PI Web Page: City: Davis State: Ca Zip Code: Solicitation Parmer Solicitation Program State: Ca Comments: Cromments: GROUND Solicitation / Funding Source: Iranslational Research Institute for Space Health Craft Advances for Spanee Health Craft Date: No. of Phot Degrees: No. of Post Doces: No. of Phot Degrees: No. of Bachelor's Candidates: No. of Bachelor's Degrees: No. of Bachelor's Candidates: No. of Bachelor's Degrees: No. of Bachelor's Candidates: No. of Bachelor's Degrees: Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Lane, Nancy M.D. (University of California, Davis Health) Nandi, Somen Ph.D. (University of California, Davis) Paul, Debashis Ph.D. (Universi	Joint Agency Name:		TechPort:	No
Space Biology Cross-Element Space Biology Cross-Element Discipline: Space Biology Cross-Element Discipline: Space Biology Special Category: None PI Email: Samedonaldicouclavis.edu Fax: FY PI Organization Type: UNIVERSITY Phone: 707-548-8314 Organization Name: University of California, Davis PI Address 1: Department of Chemical Engineering PI Address 2: I Shields Ave PI Web Page: City: Davis State: CA Zip Code: Space Biology Special Category: Space Biology Space	Human Research Program Elements:	None		
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PI Email: kamedonald@uedavis.edu Fax: FY Pl Organization Type: UNIVERSITY Phone: 707-548-314 Organization Name: University of California, Davis PI Address 1: Department of Chemical Engineering PI Address 2: I Shields Ave PI Web Page: City: Davis State: CA Zip Code: 95616-5270 Congressional District: 3 Comments: Project Type: GROUND Solicitation / Funding Source: Iranslational Research Institute of Space Health Constant Page 18 (RISF) Project Type: Randon Advances for Space Health Constant Page 18 (RISF) Project Type: No. of Past Docs: No. of PhD Candidates: No. of Master's Candidates: No. of Master's Candidates: No. of Master's Candidates: No. of Master's Degrees: No. of Master's Candidates: No. of Master's Candidates: Round Program: Flight Program: Flight Program: Flight Assignment: Key Personnel Changes/Previous PI: Lane, Nancy M.D. (University of California, Davis) Paul, Debashis Ph.D. (University of California, Davis) Paul	Space Biology Cross-Element Discipline:	None		
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	Grant/Contract No.:	NNX16AO69A-T0505		
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The objectives of this proposal are to design, develop, and evaluate a plant-based bioproduction platform for rapid production of three NASA-relevant human therapeutic biologics, recombinant parathyroid hormone residues 1-34 (PTH) for osteoporosis, granulocyte colony stimulating factor (G-CSF) for acute radiation treatment, and Trypsin (TRP) in treatment of burns, skin abrasion or skin laceration in Lactuca sativa (lettuce). Plants offer many advantages as a biological host for production of medicines since they are safe, will already be available during deep space missions, require minimal external resources, can utilize in situ resources (light and carbon dioxide) for growth, and do not propagate mammalian viruses. Plants can be used for production of the therapeutics as well as purification reagents, and even offer a potential for oral delivery of the therapeutics in the future. To achieve production, purification, and delivery of just-in-time biologics made in lettuce within 24 hours we will develop novel plant viral expression systems, production and purification protocols, and viral immunosorbent nanoparticles.

Our Specific Aims are:

Task Description:

Specific Aim #1: Development and evaluation of transgene constructs and plant viral expression vectors for transient production of three therapeutic biologics, in Lactuca sativa (lettuce), for NASA-medically relevant conditions.

Specific Aim #2: Development and testing of methods for delivery and utilization of plant viral expression cassettes in lettuce plants/tissues and evaluation of the production kinetics and levels (mg/kg fresh weight) of these biologics.

Specific Aim #3: Development and testing of methods for rapid purification of the three biologics using plant-made plant viral immunosorbent nanoparticles (VINs) for affinity separation and evaluation of additional purification strategies to meet Topic 6 ("Just in time" medications") constraints.

Specific Aim #4: Characterization of the purity, efficacy, and potency of the purified plant-made biologics. This proposal is innovative due to the development of novel recombinant protein expression technologies in plants as well as purification strategies that are fast and simple. The proposed approach minimizes mass, volume, power, and cold chain requirements.

Rationale for HRP Directed Research:

Research Impact/Earth Benefits:

Task Progress:

New project for FY2020.

Bibliography Type:

Description: (Last Updated: 07/12/2023)