

(Prior to ACUC Approval)

PART I: Investigator Completes

Protocol Number:	Redacted by agreement	
Protocol Title:	Assessment of primate aging: effects of caloric modification	
Principal Investigator:		

1. Relevance of this Research: Please explain how the research is relevant to human and/or animal health and how this project will advance the state of science.

Calorie restriction without malnutrition is the most reliable intervention shown, in many species, to slow the biological aging process. For nearly 100 years, this has fueled intense interest among the scientific community due to the obvious potential impact for humans. When this project began in 1987, it was a landmark endeavor to unravel the physiological mechanisms underlying the beneficial effects of CR ina species closely related to humans. More than 100 publications have resulted and we are continuing the investigation with tissue samples from all the subjects.

 Background/Rationale for Use of Nonhuman Primates: Please provide details of the scientific basis for why nonhuman primates are required for this project instead of a lower species or humans.

Our long-term study of CR in rhesus monkeys has been ongoing for over three decades. In addition, it is one of only two studies of its kind ever to exist, which is aimed at answering questions about how CR modulates lifespan and healthspan in a mammalian species. Though rodents are useful to help our understanding of basic physiology, rhesus monkeys are longer-lived, thereby sharing similar aging patterns with humans. They also develop age-associated pathologies at similar rates and trajectories as humans. But, most importantly, rhesus monkeys share 93% genetic homology to humans.

Currently 16 monkeys from the original cohort remain and will be monitored for the course of their natural life. No new animals are being added to this project and no invasive experiments are planned.

- 3. Experimental Design: Provide a copy of the draft Animal Study Proposal OR briefly explain the experimental design and specify all procedures performed on the nonhuman primates as part of the research. The description should allow the reviewers to understand the experimental timeline of an animal from its entry into the experiment to the endpoint of the study.
 - a. Include a justification for the number of animals to be used and

b. Explain how pain and distress are addressed in this protocol.					
ASP Provided: Yes 🔀 No 🗌					
Brief Explanation (Complete, only if ASP isn't provided):					
	Redacted by agreement Date: 11/06/2020				
PI Sign	nature:				
PART 2:	: Nonhum	nan Primate Scientific Merit Review Committee Co	mpletes		
(Cannot b	oe a Principal o name: ^{Redact}				
Reque	est is for a	minor amendment. If yes, committee review isn't required.	Yes No		
	ific Reviev	w Committee Participants (List names):	Date discussed: 11/23/2020		
Yes	No	The proposed research is designed to develop kno	wledge necessary to		
\boxtimes		improve human and/or animal health and well-be			
\boxtimes		The Study Objectives are clearly stated and scienti	fically meritorious.		
\boxtimes		The experimental methods are reasonable and well justified.			
\boxtimes	There is a clear and rational explanation for using NHPs and the proposed				
	+	species is the appropriate experimental model for			
\boxtimes	The number of animals required is well-justified and sufficient to achieve the				
	Study Objectives. The experimental endpoints are as humane as possible consistent with				
	obtaining valid results and achieving the Study Objectives.				
	esentation	entific Merit Review Discussion: The by Redacted by agreement was very informative and well or			
Scienti	ific Review	V Committee Vote:			
This is	a scientifi	cally meritorious study and ready for ACUC review:			
⊠ Yes □ No					

Respond to PI	Date:
Copy provided to the ACUC	Date:
Copy provided to the Scientific Director	Date:



(Prior to ACUC Approval)

PART I: Investigator Completes

Protocol Number:	Redacted by agreement	
Protocol Title:	Assessment of primate aging: effects of caloric modification	
Principal Investigator:	Redacted by agreement	

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NIA Nonhuman Primate Scientific Merit Review Form

Revised: 10/19/2020

	b. Ex	plain how pain and distress are addressed in this p	rotocol.
ASP	Provided	: Yes 🔀 No 🗌	
Brief	Explana	tion (Complete, only if ASP isn't provided):	
	Re	dacted by agreement	
PI Signa	_ ature:		Date: 11/06/2020
		nan Primate Scientific Merit Review Committee Co	ompletes
Scientif	fic Merit a Principal o ame:	Review Committee Chairperson: or Associate Investigator on the proposal under review.)	
Reques	t is for a	minor amendment. If yes, committee review isn't required.	Yes No No
Scientif Redacted by a	fic Revie	w Committee Participants (List names):	Date discussed: 11/22/20
Yes	No		
\boxtimes		The proposed research is designed to develop kno improve human and/or animal health and well-be	,
\boxtimes		The Study Objectives are clearly stated and scienti	
		The experimental methods are reasonable and we	,
\boxtimes	There is a clear and rational explanation for using NHPs and the proposed species is the appropriate experimental model for the study.		
\boxtimes	The number of animals required is well-justified and sufficient to achieve the		
	Study Objectives. The experimental endpoints are as humane as possible consistent with		
\boxtimes	obtaining valid results and achieving the Study Objectives.		
Question	ns regard	ntific Merit Review Discussion: ling husbandry conditions were asked and answere criteria addressed and found appropriate.	d appropriately. Information
	scientific	Committee Vote: cally meritorious study and ready for ACUC review:	
	id to PI		Date

Revised: 10/19/2020

Copy provided to the ACUC	Date:
Copy provided to the Scientific Director	Date:

PI Signa		dacted by agreement	Date: 11/06/2020
		nan Primate Scientific Merit Review Committee (Completes
Scientif (Cannot be Type na Affiliatio	a Princip <u>al o</u> me:	Review Committee Chairperson: or Associate Investigator on the proposal under review.) acted by agreement	
		minor amendment. If yes, committee review isn't required.	Yes No 🔀
Scientil * Redacted *	ic Reviev	w Committee Participants (List names):	Date discussed:
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Yes	No 🗆	The proposed research is designed to develop keeping improve human and/or animal health and well-beeping in the contract of the proposed research is designed to develop keeping in the proposed research is designed to develop keeping in the proposed research is designed to develop keeping in the proposed research is designed to develop keeping in the proposed research is designed to develop keeping in the proposed research is designed to develop keeping in the proposed research is designed to develop keeping in the proposed research is designed to develop keeping in the proposed research is designed to develop keeping in the proposed research is designed to develop keeping in the proposed research is designed to develop keeping in the proposed research is designed to develop keeping in the proposed research is designed to develop keeping in the proposed research is designed to develop keeping in the proposed research is designed to develop keeping in the proposed research is designed to develop keeping in the proposed research is designed in the proposed research is designed in the proposed research in the proposed research is designed in the proposed research in the proposed research is designed in the proposed research in the proposed research is designed in the proposed research in the proposed research is designed research in the proposed researc	nowledge necessary to being.
区		The Study Objectives are clearly stated and scien	ntifically meritorious.
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囚		The number of animals required is well-justified Study Objectives.	and sufficient to achieve the
囚		The experimental endpoints are as humane as p obtaining valid results and achieving the Study (
Summa	ry of Sci	entific Merit Review Discussion:	

Respond to PI	Date: 11/28/2020
Copy provided to the ACUC	Date: 11/23/2020
Copy provided to the Scientific Director	Date: 11/23/2020



NIA Nonhuman Primate Scientific Merit Review Form (Prior to ACUC Approval)

PART I: Investigator Completes

Protocol Number:	Redacted by agreement		
Protocol Title:	Aging interventions in rhesus monkeys		
Principal Investigator:	Redacted by agreement		

1. Relevance of this Research: Please explain how the research is relevant to human and/or animal health and how this project will advance the state of science.

This animal study protocol provides the framework for the work of the Nonhuman Primate (NHP) Core. The Core serves as a translational aging model resource for intramural and extramural investigators, conducts short-term in vivo research projects, and maintains a tissue bank. All individual procedures described in the ASP are needed for research projects and sample collections. The samples are used by collaborators for various projects including the evaluation of age-related changes in skeletal muscle, immune function, inflammatory profile, the gut microbiota, markers of cardiac disease, metabolomics, proteomics, assay development, and samples of COVID-19 related research. A list of relevant publications in high impact journal is attached and attests to the value of this important resource.

Additionally, under this ASP domain, the Core conducts short-term in vivo studies to characterize physiological parameters associated with aging and possible interventions to slow the process. Projects have included drug development trials, pharmacokinetic trials, metabolic effects of compounds previously assessed in the NIA Intervention Testing Program in rodents, and exercise effects on serum markers of memory. All new projects will be submitted as amendments and reviewed individually. The current ASP describes three ongoing studies, as follows:

- 1. Cardiovascular function in NHPs: This experiment will help establish potential links between changes in gene expression in cardiac tissue and age-related cardiac dysfunction. This study will provide the basis for mechanistic experiments aimed at establishing whether miRNAs modulated by aging have an effect on myocardial function, and thus, lay the groundwork for interventions to combat cardiovascular dysfunction in humans.
- 2. Muscle and Exercise in NHPs: Loss of muscle mass with age contributes to loss of mobility and independence. Activity can counteract deleterious affects on muscle but the mechanism for activity induced preservation of muscle protein is unclear. By examining the role of RNA splicing and the inflammatory response to activity, this study in monkeys will provide a better understanding of how to target interventions in humans to counteract muscle wasting.

- 3. Treating pre-diabetes in NHPs: Type II diabetes occurs spontaneously in rhesus monkeys at rates approximating the human population. Managing diabetic monkeys in the research setting is challenging, thus limiting their use for translational studies. This project aims to document clinical outcomes following treatment with newer FDA approved diabetes drugs to support a needed research model for the treatment and management of human diabetes.
- 2. <u>Background/Rationale for Use of Nonhuman Primates</u>: Please provide details of the scientific basis for why nonhuman primates are required for this project instead of a lower species or humans.

The purpose of the NHP Core is to provide translational model for aging research that is clinically relevant to humans. Rhesus monkeys are approximately 93% genetically similar to humans and parallel human morphology, physiology, and behavior changes with age. They allow us to explore physiological declines associated with aging in a controlled environment that is not possible with human studies but in a species that is closely related. Projects within the Core are bridging the bench to bedside gap.

- 3. Experimental Design: Provide a copy of the draft Animal Study Proposal OR briefly explain the experimental design and specify all procedures performed on the nonhuman primates as part of the research. The description should allow the reviewers to understand the experimental timeline of an animal from its entry into the experiment to the endpoint of the study.
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 - b. Explain how pain and distress are addressed in this protocol.

ASI Trovided. Tes 🖂 No 📋	
Brief Explanation (Complete, only	if ASP isn't provided):
Redacted by agreement	
	Date: 11/30/2020
l Signature:	

Scientific Merit Review Committee Chairperson: (Cannot be a Principal or Associate Investigator on the proposal under review.) Type name: Affiliation: Request is for a minor amendment. If yes, committee review isn't required. Scientific Review Committee Participants (List names): Redacted by agreement Date discussed: 12/11/2020

NIA Nonhuman Primate Scientific Merit Review Form Revised: 10/19/2020

ASP Provided: Voc M No M

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Yes	No		
\boxtimes		The proposed research is designed to develop kno improve human and/or animal health and well-be	owledge necessary to
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\boxtimes		The experimental methods are reasonable and we	ell justified
\boxtimes		There is a clear and rational explanation for using species is the appropriate experimental model fo	NHPs and the proposed
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Respond			
coponu	LOFI	_	Date:

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Copy provided to the Scientific Director	Date:



NIA Nonhuman Primate Scientific Merit Review Form (Prior to ACUC Approval)

PART I: Investigator Completes

Protocol Number:	Redacted by agreement
Protocol Title:	Aging interventions in rhesus monkeys
Principal Investigator:	Redacted by agreement

1. <u>Relevance of this Research</u>: Please explain how the research is relevant to human and/or animal health and how this project will advance the state of science.

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ASP Provided: Yes 🔀 No 🗌	
Brief Explanation (Complete, only i	f ASP isn't provided):
Redacted by agreement	D
PI Signature:	Date: 11/30/2020

PART 2: Nonhuman Primate Scientific Merit Review Committee Completes

Scientific Merit Review Committee Chairperson: (Cannot be a Principal or Associate Investigator on the proposal under review.) Type name: Affiliation:	
Request is for a minor amendment. If yes, committee review isn't required.	Yes No 🖂
Scientific Review Committee Participants (List names): *	Date discussed: 12/11/20

Redacted by a	ngreement			
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Yes	No			
\boxtimes		The proposed research is designed to develop knowledge		ecessary to
		improve human and/or animal health and well-beir	ng.	
\boxtimes		The Study Objectives are clearly stated and scientifi	ically me	ritorious.
\boxtimes		The experimental methods are reasonable and well	ljustified	d
		There is a clear and rational explanation for using N		
		species is the appropriate experimental model for		
\boxtimes		The number of animals required is well-justified and	d sufficie	ent to achieve the
		Study Objectives.		
\boxtimes		The experimental endpoints are as humane as poss		sistent with
		obtaining valid results and achieving the Study Obje	ectives.	
Cummar	v of Scion	stific Marit Pavious Discussions		
	•	ntific Merit Review Discussion:		
	The reviewers did not have any scientiific concerns wit the NIA NHP Core resource and the three			
	proposed projects: (1) cardiovascular function in NHPs, (2) Muscle and exercise in NHPs and (3)			
	Treating pre-diabetes in NHPs. The only issue raised by this reviewer was the specific criteria that			
	will use to house experiemntal animals alone or in pairs. The issue was explained initially by $\frac{Redaction}{d}$			
Redacted by ag	reement and	will be addressed at a later date by Redacted by agreement		
			ı	
Scientifi	c Review	Committee Vote:		
This is a scientifically meritorious study and ready for ACUC review:				
⊠ Yes □ No				
40/44/2020				
Respond to PI X Date: 12/14/2020		12/14/2020		
Copy provided to the ACUC X Date: 12/14/2020		12/14/2020		
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Сору р	rovided t	o the Scientific Director X	Date:	12/14/2020



(Prior to ACUC Approval)

PART I: Investigator Completes

Protocol Number:	Redacted by agreement
Protocol Title:	Aging interventions in rhesus monkeys
Principal Investigator:	Redacted by agreement

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	Date: 11/30/2020
Redacted by agreement	
Brief Explanation (Complete, only	f ASP isn't provided):
ASP Provided: Yes 🔀 No 🗌	

PART 2: Nonhuman Primate Scientific Merit Review Committee Completes

Scientific Merit Review Committee Chairperson: (Cannot be a Principal or Associate Investigator on the proposal under review.) Type name: Affiliation:	
Request is for a minor amendment. If yes, committee review isn't required.	Yes No 🔀
Scientific Review Committee Participants (List names): * Redacted by agreement	Date discussed:

* [Redacted by agr	eement			
*	, ,				
Yes	No				
\boxtimes		The proposed research is designed to develop knowledge necessary to improve human and/or animal health and well-being.			
X		The Study Objectives are clearly stated and scienti			
X			The experimental methods are reasonable and well justified.		
K.		There is a clear and rational explanation for using NHPs and the proposed species is the appropriate experimental model for the study.			
X		The number of animals required is well-justified and sufficient to achieve the Study Objectives.			
The experimental endpoints are as humane as possible consistent with obtaining valid results and achieving the Study Objectives.					
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nis is a	scientific	ally meritorious study and ready for ACUC review:			
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