



RA PHARMACEUTICALS, INC.

STATISTICAL ANALYSIS PLAN

**RA101495-01.203: A PHASE 2 MULTICENTER, OPEN-LABEL,
UNCONTROLLED STUDY TO EVALUATE THE SAFETY, TOLERABILITY,
EFFICACY, PHARMACOKINETICS, AND PHARMACODYNAMICS OF RA101495
IN SUBJECTS WITH PAROXYSMAL NOCTURNAL HEMOGLOBINURIA WHO
HAVE AN INADEQUATE RESPONSE TO ECULIZUMAB**

RA101495-01.203

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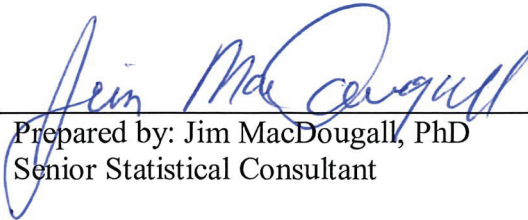
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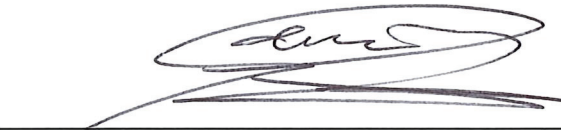
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LIST OF ABBREVIATIONS

Abbreviation	Full Term
ADA	anti-drug antibody
AE	adverse event
ALP	alkaline phosphatase
ALT	alanine aminotransferase
aPTT/APTT	activated partial thromboplastin time
AST	aspartate aminotransferase
AUC	area under the drug concentration-time curve
BMI	body mass index
BUN	blood urea nitrogen
C5	complement component 5
cm	centimeter
C _{max}	maximum plasma concentration
CPK	creatine phosphokinase
CRP	C-reactive protein
CSR	clinical study report
CTCAE	Common Terminology Criteria for Adverse Events
ECG	electrocardiogram
eCRF	electronic case report form
ELISA	enzyme-linked immunosorbent assay
EQ-5D	EuroQol 5D questionnaire

EORTC-QLQ-C30	European Organization for Research and Treatment of Cancer-Quality of Life Questionnaire
FACIT-F	Functional Assessment of Chronic Illness Therapy-Fatigue Scale
GGT	gamma-glutamyl transferase
HR	heart rate
ICF	informed consent form
ICH	International Conference on Harmonization
INR	international normalized ratio
ISR	injection site reaction
kg	kilogram
LDH	lactate dehydrogenase
MAVE	major adverse vascular event
MCH	mean corpuscular hemoglobin
MCHC	mean corpuscular hemoglobin concentration
MCV	mean corpuscular volume
MedDRA	Medical Dictionary for Regulatory Activities
mg	milligram
NCI	National Cancer Institute
PD	pharmacodynamics
PK	pharmacokinetics
PNH	paroxysmal nocturnal hemoglobinuria
PT	prothrombin time
PT	Preferred Term

PTT	partial thromboplastin time
QOL	quality of life
RBC	red blood cell
SAE	serious adverse event
SAP	statistical analysis plan
SOC	system organ class
sRBC	sheep red blood cell
TEAE	treatment-emergent adverse event
t_{\max}	time to corresponding C_{\max}
ULN	upper limit of normal
VAS	visual analogue scale
WBC	white blood cell

1 INTRODUCTION

Study RA101495-01.203 is a multicenter, open-label, uncontrolled study to evaluate the safety, tolerability, efficacy, pharmacokinetics and pharmacodynamics of RA101495 in subjects with PNH who have an inadequate response to eculizumab treatment for PND.

The planned enrollment is approximately 6-8 subjects.

This Statistical Analysis Plan (SAP) describes data-handling and statistical procedures to be used for the analysis and reporting of efficacy and safety data collected under Study RA101495-01.203 (version 1.1 20 October 2016) and presented in the clinical study report (CSR). They are based on those presented in Section 13 of the study protocol. Any post-hoc or exploratory analyses not specified in this SAP will be identified as such when they are presented in the CSR. This SAP has been developed and finalized prior to locking the clinical database.

The SAP was written in accordance with the recommendations outlined in the International Conference on Harmonisation (ICH) E9 Guideline entitled “Guidance for Industry: Statistical Principles for Clinical Trials” and the most recent ICH-E3 Guideline, entitled “Guidance for Industry: Structure and Content of Clinical Study Reports.”

2 STUDY SUMMARY

2.1 STUDY OBJECTIVES

The objectives of the study are

- To assess the safety and tolerability of RA101495 in subjects with PNH
- To assess preliminary efficacy of RA101495 in subjects with PNH
- To assess the pharmacokinetics (PK) and pharmacodynamics (PD) of RA101495 in subjects with PNH.

2.2 STUDY DESIGN

Study RA101495-01.203 is a multicenter, open-label, uncontrolled study to evaluate the safety, tolerability, efficacy, pharmacokinetics and pharmacodynamics of RA101495 in subjects with PNH who have an inadequate response to eculizumab treatment for PND.

The study includes an 8-week screening period and a 12-week Treatment Period. During the Treatment Period, subjects will return to the clinic weekly for the first 4 weeks followed by visits every 2 weeks to evaluate safety, tolerability, efficacy, PK and PD. Additional assessments will include immunogenicity, Quality of Life (QOL)

questionnaires, biomarker samples, and optional pharmacogenomics. Safety assessments include physical exam, vital signs, electrocardiogram (ECG), clinical laboratory tests, and adverse events (AEs).

At the conclusion of the Treatment Period subjects who complete the study and are demonstrating benefit will have the option to enroll in an extension study to continue receiving treatment with RA101495. Alternatively, they may opt to receive standard-of-care treatment off study, after consultation with their treating physician. If the subject withdraws early from the RA101495-01.203 study for any reason, he/she will not be eligible for the extension study.

All subjects will receive a loading dose of 0.3 mg/kg to be administered subcutaneously (SC) at the Day 1 Visit. Following in-clinic education and training, all subjects will self-inject daily SC doses of 0.1 mg/kg of RA101495 for 12 weeks. Except for Day 1, on study clinic days, the dose should be administered after the PK and PD collection has been completed.

After at least 2 weeks of treatment with RA101495 at 0.1 mg/kg daily, if a subject has not achieved an adequate response (defined as a lactate dehydrogenase [LDH] $<1.5 \times$ ULN), and following evaluation of safety and tolerability data by the investigator and the medical monitor, the dose should be escalated to 0.3 mg/kg daily.

2.2.1 Number of Patients

The planned enrollment is approximately 6-8 subjects.

2.2.2 Randomization and Blinding Procedures

This is an open-label single-arm uncontrolled study.

2.2.3 Safety Assessments

Safety assessments will include evaluation of AEs and SAEs (including major adverse vascular event (MAVE criteria), clinical laboratory tests, ECGs, vital signs, and physical examinations. Safety evaluations will also include a determination of anti-drug antibodies (ADA).

2.2.3.1 Physical Examination

Physical examinations will include the following assessments:

- General inspection
- Weight (kg) and height (height in cm to be collected at screening visit only)
- Examination of the injection site and draining nodes
- Head/ears/eyes/nose/throat examination
- Mucosal examination for icterus

- Cardiac examination
- Auscultation of lungs
- Abdominal examination (liver, spleen, and lower abdomen)
- Assessment for neurological deficits
- Musculoskeletal assessment

Any abnormalities found will be recorded in the eCRF.

2.2.3.2 Vital Signs

Vital signs (heart rate, body temperature, and blood pressure) will be measured in the sitting position after resting for at least 5 minutes.

2.2.3.3 Electrocardiogram

ECGs will be assessed as normal or abnormal by the investigator; any abnormal findings will be described in the eCRF and the investigator will assess clinical significance.

2.2.3.4 *Neisseria meningitidis* Testing

All subjects must have a negative result for *Neisseria meningitidis* colonization via a throat swab prior to study entry.

2.2.3.5 Adverse Event Recording

An AE is any untoward medical occurrence in a subject administered a pharmaceutical product and which does not necessarily have a causal relationship with this treatment. An AE can therefore be any unfavorable and unintended sign (including a clinically significant abnormal laboratory finding, for example), symptom, or disease temporally associated with the use of a medicinal product, whether or not considered related to the medicinal product.

The following are not considered to be AEs despite requiring hospitalization:

- Pre-existing conditions that, in the opinion of the investigator, did not worsen or progress during study participation
- Routinely scheduled procedures or treatment
- Elective procedures that had been scheduled prior to study participation (i.e. signing of the informed consent form (ICF))

A Serious adverse event (SAE) is any untoward medical occurrence that:

- results in death
- is life-threatening (note that this refers to an event in which the subject was at risk of death at the time of the event; it does not refer to an event that hypothetically might have caused death if it were more severe)
- requires hospitalization or prolongation of existing hospitalization
- results in persistent or significant disability/incapacity
- results in a congenital anomaly/birth defect

An SAE may also be any other important medical event that may not be immediately life-threatening or result in death or hospitalization, but may jeopardize the subject or require intervention to prevent one of the other outcomes listed in the definition above. Examples of such events include intensive treatment in an emergency room or at home for bronchospasm, hyperkalemia, or convulsions that do not result in a formal hospitalization.

Elective hospitalizations scheduled prior to study participation (i.e. signing of the ICF) should not be reported as SAEs.

2.2.3.6 Blood Chemistry and Hematology

Clinical chemistry and hematology analytes to be collected are identified in Table 1 and should be performed as specified in the Time and Events (Table 2).

Table 1: Clinical Chemistry, Hematology, and Coagulation Analytes

Clinical Chemistry	Hematology
alanine aminotransferase (ALT)	free hemoglobin
albumin	haptoglobin
alkaline phosphatase (ALP)	hematocrit
amylase	hemoglobin
aspartate aminotransferase (AST)	mean corpuscular hemoglobin (MCH)
bicarbonate	mean corpuscular hemoglobin concentration (MCHC)
bile acids	mean corpuscular volume (MCV)
bilirubin (total, direct, and indirect)	platelet count
blood urea nitrogen (BUN)	RBC count
calcium	reticulocyte count
chloride	white blood cell (WBC) count and differential (%)
creatinine	
gamma-glutamyl transferase (GGT)	Coagulation
glucose	international normalized ratio (INR)/prothrombin time (PT)
lactate dehydrogenase (LDH)	fibrinogen
lipase	fibrinogen
potassium	
sodium	
total protein	
uric acid	Other
	C-reactive protein (CRP)
	creatine phosphokinase (CPK)

2.2.3.7 Urinalysis

A urinalysis will be performed to measure pH, specific gravity, protein (qualitative), glucose (qualitative), ketones (qualitative), bilirubin (qualitative), urobilinogen, occult blood, hemoglobin, and cells. A microscopic examination will be performed, if necessary. Hemoglobinuria will be assessed using a urine colorimetric scoring system.

2.2.3.8 Pregnancy Test

A serum pregnancy test for human chorionic gonadotropin will be performed on female subjects of childbearing potential at Screening.

A urine dipstick pregnancy test (human chorionic gonadotropin) will be performed on female subjects of childbearing potential at Day 1 pre-dose and Day 29, Day 57, and Day 84 (End of Study).

2.2.3.9 PNH Clone

Blood sample for measurement of PNH clone size will be collected at Screening and Day 29, Day 57, and Day 84 (or End-of-Study Visit). PNH clone size will be determined by peripheral blood flow cytometry analysis (RBCs and granulocytes).

2.2.3.10 Immunogenicity

Blood samples for ADAs will be collected prior to dosing on Day 1 and on Day 29, Day 57, and Day 84 (or at the End-of-Study Visit) in all enrolled subjects. Samples will be sent to a central laboratory to determine the presence or absence of antibodies against RA101495 using a validated assay.

Detailed instructions regarding sample collection, processing, and shipping will be provided in a separate laboratory manual.

2.2.4 Efficacy Assessments

Efficacy assessments include the measurement of serum LDH levels as a measure of intravascular hemolysis. Additional assessments will include laboratory assessments of total bilirubin, total hemoglobin, free hemoglobin, haptoglobin, reticulocytes, and hemoglobinuria.

2.2.5 Exploratory Assessments

Exploratory endpoints include:

- Changes from baseline in QOL questionnaires

- European Organization for Research and Treatment of Cancer-Quality of Life Questionnaire (EORTC QLQ-C30)
- Functional Assessment of Chronic Illness Therapy-Fatigue Scale (FACIT-Fatigue)
- EuroQol 5D (EQ-5D)
- Treatment satisfaction questionnaire

2.2.6 Pharmacodynamic Assessments

The pharmacodynamics assessments include CH₅₀, sheep red blood cell (sRBC), Wieslab enzyme-linked immunosorbent assay (ELISA), and C5. Blood samples for the pharmacodynamic (PD) assessments occur at each study visit (except the screening visit).

For subjects who have a dose increase to 0.3 mg/kg, samples for PD should be collected at pre-dose Day 1 of the new dose.

2.2.7 Pharmacokinetic Assessments

Blood samples for the measurement of plasma concentrations of RA101495 and metabolites will be collected on all subjects. All subjects will also have a blood sample for measurement of eculizumab plasma concentrations.

2.2.8 Schedule of Assessments

The following is the time and events table

Table 2: Time and Events Table

Phase	Screening Period	Treatment Period								
Study Week →	-8 to 1	0	1	2	3	4	6	8	10	12 (End of Study)
Study Day ^a →	-56 to -1	1 ± 2 ^b	8 ± 2	15 ± 2	22 ± 2	29 ± 2	43 ± 4	57 ± 4	71 ± 4	84 ± 4
Study Procedure ↓										
ICF process and signed ICF	X									
Review eligibility criteria	X	X								
Medical history and demographics	X									
Prior and concomitant medications	X	X	X	X	X	X	X	X	X	X
Physical examination	X	X				X				X
Height and weight ^c	X	X				X				X
Vital signs	X	X				X				X
Electrocardiogram	X	X				X				X
Neisseria throat swab ^d	X									
Neisseria vaccination ^d		X								
Ciprofloxacin treatment ^d		X	X	D14						
Blood chemistry ^e	X	X	X	X	X	X	X	X	X	X
Hematology	X	X	X	X	X	X	X	X	X	X
Coagulation ^f	X	X	X	X	X	X	X	X	X	X
Urinalysis	X	X	X	X	X	X	X	X	X	X
PNH clone size	X					X		X		X

Phase	Screening Period	Treatment Period								
Study Week →	-8 to 1	0	1	2	3	4	6	8	10	12 (End of Study)
Study Day ^a →	-56 to -1	1 ± 2 ^b	8 ± 2	15 ± 2	22 ± 2	29 ± 2	43 ± 4	57 ± 4	71 ± 4	84 ± 4
Pregnancy test ^a	X	X				X		X		X
Adverse events		X	X	X	X	X	X	X	X	X
Assessment of injection site reactions ^h		X	X	X	X	X	X	X	X	X
Pharmacokinetics RA101495 ⁱ		X	X	X	X	X	X	X	X	X
Pharmacokinetics eculizumab ^j	X	X		X		X	X			
Pharmacodynamics RA101495 ⁱ		X	X	X	X	X	X	X	X	X
Anti-drug antibody ^k		X ^k				X		X		X
Quality of life questionnaires										
EORTC-QLQ-C30		X				X		X		X
FACIT-Fatigue		X				X		X		X
EQ-5D		X				X		X		X
Treatment satisfaction assessment										X
Additional biomarker samples ^l		X	X	X	X	X	X	X	X	X
Pharmacogenomic analysis (optional) ^l		X ^l								
Electronic diary training, dispensation, and collection		X								X
RA101495 administration ^m		X	X	X	X	X	X	X	X	X
Study drug dispensing and return ⁿ		X		X		X	X	X	X	X

Abbreviations: EORTC-QLQ-C30=European Organization for Research and Treatment of Cancer-Quality of Life Questionnaire; EQ-5D=EuroQol 5D questionnaire; FACIT-F=Functional Assessment of Chronic Illness Therapy-Fatigue Scale; ICF=informed consent form; LDH=lactate dehydrogenase; NA=not applicable; PD=pharmacodynamic; PK=pharmacokinetic.

- a. Study Visits have a Visit window of ± 2 days after the actual planned Visit day for the first 4 weeks, and ± 4 days from week 6 to week 12.
- b. The Day 1 Visit should be scheduled to coincide with the next scheduled dose of eculizumab (i.e. 14 ± 2 after from the last eculizumab dose). Eculizumab should NOT be administered at the Day 1 Visit or at any time thereafter during the study.
- c. Height will be measured only at the Screening Visit.
- d. All subjects must have a negative throat swab for *Neisseria meningitidis* colonization for eligibility. All subjects must have documentation of prior *Neisseria meningitidis* vaccination (and booster if appropriate) prior to study entry.
- e. Including LDH for primary efficacy endpoint
- f. Coagulation tests should be performed, according to standard practice, on all subjects taking anticoagulant therapy.
- g. For all female subjects of childbearing potential, a negative serum pregnancy test must be documented at the Screening Visit and a negative urine pregnancy test must be documented at the Day 1 Visit prior to dosing. All other pregnancy tests will be urine.
- h. The injection site should be assessed at each clinic visit through Day 84 (End of Study).
- i. Blood samples for PK and PD and additional biomarker sampling at the following time points in relationship to the first dose of RA101495: pre-dose (within 1 hour before first dose administration) and at 1, 3, and 6 hours post-dose on Day 1. For subjects who have a dose increase to 0.3 mg/kg, samples for PK and PD should be collected at pre-dose Day 1 of the new dose, see footnote j. On clinic visit days PK and PD should be collected prior to administration of RA101495.
- j. Blood samples for PK of eculizumab should be collected at screening, Day 1, Day 15, Day 29, and Day 43 (2-week, 4-week, and 6-week) Visits. The sample should be collected prior to administration of RA101495.
- k. Blood sample for ADA on Day 1 must be obtained prior to dosing of RA101495.
- l. Blood sample for optional pharmacogenomic testing must be obtained on Day 1.
- m. On clinic visit days, the study drug RA101495 should be administered after blood samples for PK and PD are collected.
- n. Prefilled syringes containing RA101495 will be dispensed every 2 weeks. Subjects will also receive a secure container to dispose of used syringes at each visit and should bring the used container containing all used syringes to each study visit. All study drug (syringes) and disposal containers must be returned to the site at the last study visit. Dosing on study visit days will be held until the completion of the PK and PD sample blood collection has been completed.

3 STATISTICAL METHODS

3.1 General Methods

3.1.1 Computing Environment

All statistical analyses will be performed using SAS® Version 9.1.3 or higher for Windows.

3.1.2 Reporting of Numerical Values

All clinical study data will be presented in patient data listings. Descriptive statistics (n, mean, standard deviation, median, minimum, and maximum) will be calculated by treatment group for continuous variables. Confidence intervals will be provided where appropriate. For continuous endpoints, the confidence interval for the mean will be based on the t-distribution (e.g., CLM in the SAS Proc Means procedure).

Frequencies and percentages will be presented by treatment group for categorical and ordinal variables. If there are missing values, the number of missing values will be presented, but without a percentage and the number of non-missing values used as the denominator.

Means, medians, standard deviations, and confidence intervals will be reported to one decimal place more than the data reported on the CRF or by the laboratory/vendor. Minimum and maximum will be reported to the same number of decimal places displayed on the CRF or by the laboratory/vendor. P-values will be reported to 4 decimal places.

3.1.3 Baseline Value and Change from Baseline (if applicable)

Baseline value is defined as the most recent non-missing value obtained immediately prior to administration of first dose (i.e., generally the study day 1 assessment which occurs pre-dose).

Change from baseline will be calculated by subtracting the baseline value from the post-dose assessment for each patient (i.e. post-dose – baseline). Percent change from baseline will be calculated as $100 \times \text{change score} / \text{baseline score}$.

3.1.4 Handling of Missing/Incomplete Values

Unless otherwise explicitly specified, missing data will not be imputed; observed cases will be used in the analyses.

3.2 Analysis Populations

Analysis populations in this study are defined in the sections that follow.

3.2.1 Safety Population

The Safety Population will include all subjects who receive at least one injection of RA101495.

3.2.2 Efficacy Evaluable Population

The Efficacy Evaluable Population will include all subjects in the Safety Population who complete the 12-week Treatment Period.

3.2.3 Per Protocol Population

The Per Protocol Population will include all subjects in the Safety Population who complete the 12-week Treatment Period and have no major protocol violations.

Protocol violations will be assessed as “minor” or “major” during data review meetings that will take place prior to database lock.

3.2.4 Pharmacokinetic Population

The PK Population will include all subjects in the Safety Population who have at least 1 plasma sample obtained for PK assessment.

3.2.5 Pharmacodynamic Population

The PD Population will include all subjects in the Safety Population who have at least 1 plasma sample obtained for PD assessment.

3.3 Analysis Endpoints

3.3.1 Safety Endpoints

Safety assessments will include evaluation of AEs and SAEs (including major adverse vascular event (MAVE criteria), clinical laboratory tests, ECGs, vital signs, and physical examinations. Safety evaluation will also include a determination of anti-drug antibodies (ADA). Laboratory assessments will include PNH clone size.

3.3.1.1 Injection Site Reactions

The investigator will assess the injection sites at each scheduled visit for:

- Pain, tenderness, erythema, and induration severity (Table 3)
- Erythema and induration: maximum linear diameter
- Blisters, ulceration, necrosis: maximum linear diameter and severity

- Lymphadenopathy (absent, mild, moderate, or severe)

Table 3: Grading the Severity of Local Injection Site Reactions

Local Reaction to Injectable Product	Grade 1 (Mild)	Grade 2 (Moderate)	Grade 3 (Severe)	Grade 4 (Potentially Life Threatening)
Pain	Does not interfere with activity	Repeated use of non-narcotic pain reliever >24 hours or interferes with activity	Any use of narcotic pain reliever or prevents daily activity	Emergency room visit or hospitalization
Tenderness	Mild discomfort to touch	Discomfort with movement	Significant discomfort at rest	Emergency room visit or hospitalization
Erythema/redness	2.5 to 5.0 cm	5.1 to 10.0 cm	>10.0 cm	Necrosis or exfoliative dermatitis
Induration/swelling	2.5 to 5.0 cm and does not interfere with activity	5.1 to 10.0 cm or interferes with activity	>10.0 cm or prevents daily activity	Necrosis

3.3.2 Primary Efficacy Endpoint

The primary evaluation period is from Week 6 to Week 12. The primary efficacy endpoint is the change from baseline in serum LDH levels during this period, defined as the mean of the non-missing LDH values of Weeks 6, 8, 10, and 12 minus the baseline LDH value (defined in Section 3.1.3).

3.3.3 Secondary Efficacy Endpoints

Secondary efficacy variables include the change from baseline values at each of the following scheduled post-baseline assessment time-points:

- total hemoglobin,
- free hemoglobin,
- haptoglobin,
- reticulocytes
- hemoglobinuria.

Additionally, achieving an $LDH < 1.5 \times ULN$ will be a secondary efficacy endpoint (i.e., a dichotomous endpoint) which will be assessed during the primary evaluation period and at each the scheduled post-baseline assessment time-points.

3.3.4 Pharmacodynamic Endpoints

Pharmacodynamic endpoints include:

- Changes from baseline CH_{50}
- Changes from baseline in sRBC lysis for the classical complement pathway
- Changes from baseline in Wieslab ELISA for alternative complement pathway
- Changes from baseline in C5 concentration levels.

3.3.5 Pharmacokinetic Endpoints

Drug exposure will be evaluated using PK parameters derived from non-compartmental methods. All calculations for the final analysis will be based on actual sampling times. Individual PK parameters will be presented in listings and summarized using descriptive statistics.

Pharmacokinetic endpoints include:

- Plasma concentrations of RA101495 and its major metabolites
- Maximum plasma concentration (C_{max})
- Time corresponding to C_{max} (t_{max})
- Area under the drug concentration-time curves (AUC_{0-t})
- Plasma concentrations of eculizumab.

3.3.6 Quality of Life Assessments

Quality of life assessments will be performed according to the Time and Events Table (Table 2). The following QOL questionnaires will be used during this study:

- European Organization for the Research and Treatment of Cancer Quality of Life Questionnaire-C30 (EORTC-QLQ-C30)
- Functional Assessment of Chronic Illness Therapy-Fatigue (FACIT-Fatigue) Scale
- EuroQol-5D (EQ-5D).

3.3.6.1 EORTC-QLQ-C30

The EORTC QLQ-C30 consists of 30 questions, which are incorporated into 5 functional domains (physical, role, cognitive, emotional, and social domains; see Table 4); a global health status/global QOL scale; 3 symptom scales (fatigue, pain, and nausea and vomiting scales); 6 single items that assess additional symptoms (e.g. dyspnea, appetite loss, sleep disturbance, constipation, and diarrhea); and the

perceived financial burden of illness treatment (Aaronson, 1993; Aaronson, 1996). Subjects answer questions based on symptoms/status over the preceding week.

The QLQ-C30 is composed of both multi-item scales and single-item measures. These include five functional scales, three symptom scales, a global health status / QoL scale, and six single items.

Each of the multi-item scales includes a different set of items - no item occurs in more than one scale.

All of the scales and single-item measures range in score from 0 to 100. A high scale score represents a higher response level.

- a high score for a functional scale represents a high / healthy level of functioning
- a high score for the global health status / QoL represents a high QoL,
- a high score for a symptom scale / item represents a high level of symptomatology / problems.

The principle for scoring these scales is the same in all cases:

- 1) Estimate the average of the items that contribute to the scale; this is the raw score.
- 2) Use a linear transformation to standardize the raw score, so that scores range from 0 to 100; a higher score represents a higher ("better") level of functioning, or a higher ("worse") level of symptoms.

Table 4: Scoring the EORTC QLQ-C30

	Scale	Number of Items	Item Range*	Item Numbers	Functional scales
Global health status / QoL					
Global health status/QoL	QL2	2	6	29, 30	
Functional scales					
Physical functioning	PF2	5	3	1 to 5	F
Role functioning	RF2	2	3	6, 7	F
Emotional functioning	EF	4	3	21 to 24	F
Cognitive functioning	CF	2	3	20, 25	F
Social functioning	SF	2	3	26, 27	F
Symptom scales / items					
Fatigue	FA	3	3	10, 12, 18	
Nausea and vomiting	NV	2	3	14, 15	
Pain	PA	2	3	9, 19	
Dyspnoea	DY	1	3	8	
Insomnia	SL	1	3	11	
Appetite loss	AP	1	3	13	

Constipation	CO	1	3	16	
Diarrhoea	DI	1	3	17	
Financial difficulties	FI	1	3	28	
* Item range is the difference between the possible maximum and the minimum response to individual items; most items take values from 1 to 4, giving <i>range</i> = 3. The exceptions are the items contributing to the global health status/QoL, which are 7-point questions with range = 6,					

For all scales, the Raw Score is the mean of the component items.

For functional scales the score is:

$$\text{Score} = \{1 - (\text{Raw score} - 1)/(\text{range})\} \times 100$$

and for Symptom scales/items and Global health status/QoL:

$$\text{Score} = \{(\text{Raw score} - 1)/(\text{range})\} \times 100.$$

3.3.6.2 FACIT-Fatigue

The FACIT-Fatigue Scale is a 13-item, easy to administer tool that measures an individual's level of fatigue during their usual daily activities over the preceding week. The level of fatigue is measured on a five point ordinal scale (4 = not at all fatigued to 0 = very much fatigued) [Webster, 2003].

The items and scoring algorithm are given in Table 5.

Table 5: FACIT Fatigue Scale Scoring

Item
I feel fatigued
I feel weak all over
I feel listless ("washed out")
I feel tired
I have trouble starting things because I am tired
I have trouble finishing things because I am tired
I have energy
I am able to do my usual activities
I need to sleep during the day
I am too tired to eat
I need help doing my usual activities
I am frustrated by being too tired to do the things I want to do
I have to limit my social activity because I am tired
<ul style="list-style-type: none"> Item Response is the "raw score" on the 0 – 4 point scale (0: Not at all – 4: Very Much). Overall Fatigue Subscale Score Algorithm: <ul style="list-style-type: none"> Sum the individual scores Multiple the sum by 13 Divide by the # of non-missing items answered

The higher the score, the better the QOL.

3.3.6.3 EQ-5D

The EQ-5D 3 level version [EuroQol, 1990] is a standardized instrument for measuring generic health status. The EQ-5D consists of the EQ-5D descriptive system and the EQ visual analogue scale (VAS). The EQ-5D descriptive system comprises the following five dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression; each dimension has three levels:

- Level 1: indicating no problem
- Level 2: indicating some problems
- Level 3: indicating extreme problems.

For the EQ-5D visual analog scale (VAS) question the patient rates how good or bad there health is today on a 0 – 100 point scale (0 representing worst imaginable health state and 100 representing best imaginable health state).

3.3.6.4 Treatment Satisfaction Questionnaires

The following treatment satisfaction questionnaire will be administered to subjects to assess overall satisfaction with SC administration of the study medication at the end of the 12-week Treatment Period.

“How satisfied are you with the overall method of study medication administration (subcutaneous self-injection)?”

The following more targeted questionnaire will be administered to assess preference for daily SC self-injection at home compared with biweekly infusions given by a health-care professional in the clinic.

“Overall how satisfied are you with the method of medication administration used in this study (daily subcutaneous self-injection) compared with intravenous eculizumab infusions every 2 weeks?”

Both questions will use the following 5-point Likert response scale:

- Very Dissatisfied=1
- Dissatisfied=2
- Neutral=3
- Satisfied= 4

- Very Satisfied= 5.

3.4 Patients Disposition and Evaluability

3.4.1 Patient Disposition

A disposition of all enrolled subjects will be provided. This will include the number and percentage of patients evaluated for each of the analysis populations (Section 3.2). The number of patients discontinuing from the study and the primary reason for discontinuation will also be summarized.

3.4.2 Protocol Deviations

A listing of protocol deviations will be presented.

3.5 Demographics and Baseline Characteristics

3.5.1 Demographics

Patient demographics and baseline characteristics will be summarized for the Safety, Efficacy Evaluable, Per Protocol, and Pharmacodynamic Populations.

Descriptive statistics will be provided for age, height, weight, and body mass index (BMI, calculated as weight in kilograms divided by height in meters squared). Frequencies and percentages will be tabulated for sex, race, and ethnicity.

Age will be calculated as (informed consent date – date of birth + 1)/365.25, truncated and displayed as years. BMI will be calculated as weight (kg)/height² (m²), using the weight and height measurements obtained at screening.

3.5.2 Medical History

Medical history will be collected and summarized.

3.5.3 PNH Disease History

The following PNH disease history data will be summarized:

- Age at initial diagnosis (years)
Age at initial diagnosis will be calculated as (date of initial PNH diagnosis – date of birth + 1)/365.25,
- PNH clone size at diagnosis (% RBC, % WBC)
- Complement C5 gene mutation (Present, Absent, unknown)
- Thrombotic event within 6 months prior to screening (yes, no)
- Blood Transfusion within 6 months prior to screening (yes, no).

3.5.4 PNH Treatment History

The following PNH treatment history data will be summarized:

- Eculizumab treatment history
 - Age at initial eculizumab treatment

Age at initial eculizumab treatment will be calculated as (date of initial eculizumab treatment – date of birth + 1)/365.25,

Note: For if the day and month are missing impute July 2nd, if only the day is missing impute the 15th.
 - Duration of eculizumab treatment (months)

Calculated as:

(stop date of eculizumab treatment – of eculizumab treatment+ 1)
/(365.25/12)

Note: For stop date and start date, if the day and month are missing impute July 2nd, if only the day is missing impute the 15th. If corresponding duration calculation yields a negative number, impute a value of 1 day = 1/30.4375 months.
 - Eculizumab dose, units and frequency will be provided in the listings.

3.6 Prior and Concomitant Medications

Incidence of prior and concomitant medication will be presented by therapeutic area, and preferred (generic) drug name.

Prior medications are those that started and stopped before exposure to study medication; concomitant medications are all medications taken during the study period, including those started before but on going at first dose. Where a medication start date is partially or fully missing, and it is unclear as to whether the medication is prior or concomitant, it will be assumed that it is concomitant.

3.7 Exposure to Study Treatment

Prefilled syringes containing RA101495 will be dispensed every 2 weeks. Subjects will also receive a secure container to dispose of used syringes at each visit and should return the used container containing all used syringes. All study drug (syringes) and disposal containers must be returned to the site at the last study visit. Dosing on study visit days will be held until the completion of the PK and PD sample blood collection has been completed.

Treatment duration (number of days patient received study medication) will be described using summary statistics. Treatment duration will be calculated as the Date of last dose – Date of first dose +1.

The number of patients who had a dose escalation and the number of days from baseline where the dose escalation occurred (Date of dose escalation – date of first dose +1) will be summarized.

These analyses will be performed for the Safety Population.

3.8 Safety Analysis

Safety analysis results will be presented using the Safety Population.

3.8.1 Adverse Events

All adverse events will be coded using the Medical Dictionary of Regulatory Activities (MedDRA) Version 18.0 or higher and will be classified by MedDRA system organ class (SOC) and preferred term (PT). Analyses of adverse events will be performed using the safety population.

Treatment emergent adverse events (TEAEs) are defined as follows:

- An AE that occurs after treatment start that was not present at the time of treatment start; or
- An AE that increases in severity after treatment start, if the event was present at the time of treatment start.

The following TEAE summaries will be provided:

- Overall summary of Treatment Emergent Adverse Events
- Incidence of Treatment Emergent Adverse Events by System Organ Class and Preferred Term
- Incidence of Treatment Emergent Adverse Events by System Organ Class, Preferred Term, and Maximum Severity
- Incidence of Treatment Emergent Adverse Events by System Organ Class, Preferred Term, and Relationship to Study Drug
- Incidence of Treatment Emergent Adverse Events Leading to Study Discontinuation by System Organ Class and Preferred Term
- Listing of Serious Adverse Events by System Organ Class and Preferred Term.

For these summaries, the number and percentage of patients who experienced at least one of the TEAE as well as the number and percentage of patients who experienced each specific SOC and PT will be presented. The corresponding number of TEAEs will also be presented.

For the presentation of TEAE incidences, the SOC's will be sorted alphabetically, and within SOC, the preferred term (PT) will be used and presented by decreasing total frequency.

3.8.1.1 Determining Treatment Emergent with Adverse Event Dates

The following rules apply when determining if an AE is treatment-emergent in the scenario where the start date is missing or partially missing. These rules provide an algorithm to "impute" a complete AE start date which will then be used to determine if the AE is treatment emergent.

AE start date missing day and month:

- If the year is the same as the year of the treatment start date, the day and month of the date of treatment start date will be assigned to the missing fields.
- If the year is prior to the year of the treatment start date, December 31 will be assigned to the missing fields.
- If the year is after the year of the date of the treatment start date, January 1 will be assigned to the missing fields.

AE start date missing month only:

- The day will be treated as missing, and both month and day will be replaced according to the above procedure.

AE start date missing day only:

- If the month and year are the same as the month and year of the treatment start date, the day of the treatment start date will be assigned to the missing day.
- If either the year is before the year of the date of the treatment start date or if both years are the same but the month is before the month of the treatment start date, the last day of the month will be assigned to the missing day.
- If either the year is after the year of the treatment start date or if both years are the same but the month is after the month of the treatment start date, the first day of the month will be assigned to the missing day.

AE start date completely missing:

- If the AE end date is complete and after the treatment start date, the treatment start date will be assigned to the missing start date.
- If the end date is complete and before the treatment start date, the end date will be assigned to the missing start date
- Otherwise the AE start date will be assigned the treatment start date.

If the end date is complete and the imputed start date as above is after the end date, the start date will be imputed by the end date.

3.8.2 Adverse Events of Special Interest

3.8.2.1 Thrombotic Adverse Events

A separate table for thrombotic AEs will be presented, summarizing TEAEs by PT. The events in Table 6 (MAVE criteria, 2007]) will be evaluated in the assessment of thrombotic AEs.

Table 6: Thrombotic Event Description (MAVE Criteria)

MAVE Criteria	AE Preferred Term Mapping
Thrombophlebitis/Deep vein thrombosis	Preferred Term: 10051055 Deep vein thrombosis Preferred Term: 10043570 Thrombophlebitis
Pulmonary embolus	Preferred Term: 10037377 Pulmonary embolism
Myocardial infarction	Preferred Term: 10028596 Myocardial infarction
Transient ischemic attack	Preferred Term: 10044390 Transient ischaemic attack
Renal vein thrombosis	Preferred Term: 10038548 Renal vein thrombosis
Acute peripheral vascular occlusion	Preferred Term: 10053648 Vascular occlusion
Amputation (non-traumatic, non-diabetic)	Preferred Term: 10061627 Amputation
Mesenteric/Visceral vein thrombosis	Preferred Term: 10027402 Mesenteric vein thrombosis Preferred Term: 10077829 Visceral venous thrombosis
Unstable angina	Preferred Term: 10002388 Angina unstable
Mesenteric/Visceral arterial thrombosis	Preferred Term: 10027397 Mesenteric artery thrombosis Lower level term: 10043611 Thrombosis arterial
Hepatic/Portal vein thrombosis	Preferred Term: 10019713 Hepatic vein thrombosis Preferred Term: 10036206 Portal vein thrombosis
Dermal thrombosis	Lower level term: 10042545 Superficial phlebothrombosis
Gangrene (non-traumatic, non-diabetic)	Preferred Term: 10017711 Gangrene Preferred Term: 10009971 Colon gangrene Preferred Term: 10017954 Gastrointestinal gangrene
Cerebral arterial occlusion/cerebrovascular accident	Preferred Term: 10008190 Cerebrovascular accident Preferred Term: 10008089 Cerebral artery occlusion
Cerebral venous occlusion	Preferred Term: 10076895 Cerebral vascular occlusion
Renal arterial thrombosis	Preferred Term: 10038380 Renal artery thrombosis

Abbreviation: MAVE=major adverse vascular event.

3.8.2.2 Injection Site Reactions

Analysis of ISRs will include summaries of the following assessments (defined in Section 3.3.1.1)

- Pain, tenderness, erythema, and induration severity, and lymphadenopathy (categorical variables with grades 1 – 4, and absent).
- Erythema and induration: record the maximum linear diameter
- Blisters, ulceration, necrosis: record the maximum linear diameter and severity

For both of these assessments, the maximum linear diameter will be summarized.

3.8.3 Clinical Laboratory Evaluation

A list of the clinical chemistry, hematology, and coagulation analytes are listed in Table 1.

Quantitative laboratory endpoints will be summarized by time point using descriptive statistics.

3.8.3.1 Hepatic Laboratory Tests: NCI CTCAE Grading

The liver functions test to be summarized via the National Cancer Institute (NCI) Common Terminology Criteria for Adverse Events (CTCAE) criteria are provided in Table 7.

Table 7: CTCAE Grading Criteria for Selected Liver Function Tests

Lab Test	Grade/Criteria			
	1	2	3	4
alanine (ALT)	> 1.0 - 3.0 (x ULN)	>3.0 - 5.0 (x ULN)	>5.0 - 20.0 (x ULN)	> 20.0 (x ULN)
alkaline phosphatase (ALP)	>1.0 - 2.5 (x ULN)	>2.5 - 5.0 (x ULN)	>5.0 - 20.0 (x ULN)	> 20.0 (x ULN)
direct bilirubin	> 1.0 – 1.5 (x ULN)	>1.5 – 3.0 (x ULN)	>3.0 - 10.0 (x ULN)	> 10.0 (x ULN)
gamma-glutamyl transferase (GGT)	>1.0 - 2.5 (x ULN)	>2.5 - 5.0 (x ULN)	>5.0 - 20.0 (x ULN)	>20.0 (x ULN)
Grading criteria based on Common Terminology Criteria for Adverse Events (CTCAE) v4.03				

3.8.3.2 Pancreatic Enzymes: NCI CTCAE Grading

Amylase and lipase values will be summarized via the NCI CTCAE criteria provided in Table 8.

Table 8: CTCAE Grading Criteria for Selected Pancreatic Enzyme Tests

Lab Test	Grade/Criteria			
	1	2	3	4
amylase	> 1.0 – 1.5 (x ULN)	>1.5 – 2.0 (x ULN)	>2.0 - 5.0 (x ULN)	> 5.0 (x ULN)
lipase	> 1.0 – 1.5 (x ULN)	>1.5 – 2.0 (x ULN)	>2.0 - 5.0 (x ULN)	> 5.0 (x ULN)
Grading criteria based on Common Terminology Criteria for Adverse Events (CTCAE) v4.03				

3.8.4 Anti-drug antibodies

The number and percentage of patients with a positive confirmatory assay will be summarized for each of the scheduled assessment time points.

3.8.5 Vital Signs and Other Physical Findings

Descriptive statistics for vital signs (i.e. heart rate, body temperature, and blood pressure) values and the change from baseline will be presented.

3.8.6 ECG

Descriptive statistics for ECG parameters (i.e., heart rate (HR), PR interval, RR interval, QRS interval, QT interval, QTcB interval, and QTcF interval) at each assessment time point will be presented for the values and change from baseline scores.

QTc intervals will be calculated using both Fridericia's and Bazett's corrections, with the formulae:

$$\text{Fridericia's correction: } QTc = QT/RR^{0.33}$$

$$\text{Bazett's correction: } QTc = QT/RR^{0.5}.$$

Additionally, the ECG interpretation categorized as Normal, Abnormal – Clinically Significant, Abnormal – Not Clinically Significant, Not Evaluable, or Not Done will also be provided for each assessment time point (note: ECG interpretations of “Abnormal – Clinically Significant” would be recorded as AEs).

3.8.7 Physical Examination

The complete set physical examination findings will be provided in listings. Clinically significant physical examination abnormalities will be included and summarized as AEs if appropriate.

3.9 Efficacy Analysis

3.9.1 Primary Efficacy Endpoint Analysis

The primary evaluation period is from Week 6 to Week 12. The primary efficacy endpoint is the change from baseline in serum LDH levels during this period, defined as the mean of the non-missing LDH values of Weeks 6, 8, 10, and 12 minus the baseline LDH value (defined in Section 3.1.3).

The primary efficacy endpoint analysis will be a Wilcoxon signed-rank test on the change from baseline endpoints.

Summary statistics and will be provided for patient's mean LDH value, change from baseline scores, and percent change from baseline scores over the primary evaluation period.

Additionally, summary statistics for the values, change, percent change from baseline scores, and the two-sided Wilcoxon signed-rank test will be performed at each post-baseline assessment time-point.

3.9.2 Secondary Efficacy Endpoints Analysis

Secondary efficacy endpoints include the change from baseline values at each of the following scheduled post-baseline assessment time-points:

- total hemoglobin,
- free hemoglobin,
- haptoglobin,
- reticulocytes
- hemoglobinuria (note: hemoglobinuria will be assessed using a urine colorimetric scoring system).

The change from baseline for each of these endpoints will be assessed by a two-sided Wilcoxon signed-rank test. Additionally, the summary statistics will be presented for the values, change, and percent change from baseline scores.

Additionally, the secondary endpoint of an LDH score $< 1.5 \times \text{ULN}$ (i.e., a dichotomous endpoint) will be assessed at the primary evaluation period and the scheduled post-baseline assessment time-points by means of a one-sided exact McNemar's test.

3.9.3 Pharmacodynamic Endpoints Analysis

The pharmacodynamic endpoints include:

- Changes from baseline CH_{50}
- Changes from baseline in sRBC lysis for the classical complement pathway

- Changes from baseline in Wieslab ELISA for alternative complement pathway
- Changes from baseline in C5 concentration levels.

The change from baseline for each of these endpoints will be assessed by a two-sided Wilcoxon signed-rank test. Additionally the summary statistics will be presented for the values, change, and percent change from baseline scores.

3.9.4 Pharmacokinetic Endpoints Analysis

The following pharmacokinetic endpoints will be summarized using descriptive statistics:

- Plasma concentrations of RA101495 and its major metabolites
- Maximum plasma concentration (C_{\max})
- Time corresponding to C_{\max} (t_{\max})
- Area under the drug concentration-time curves (AUC_{0-t})
- Plasma concentrations of eculizumab.

3.9.5 Exploratory Endpoints Analysis

3.9.5.1 EORTC QLQ-C30

Summary statistics for each scales/items scores (Section 3.3.6.1) will be presented as well as the corresponding change from baseline scores for each scheduled assessment time-point.

Global health status

- Global health status/QoL

Functional scales

- Physical functioning
- Role functioning
- Emotional functioning
- Cognitive functioning
- Social functioning

Symptom scales/items

- Fatigue
- Nausea and vomiting
- Pain
- Dyspnoea
- Insomnia
- Appetite loss

- Constipation
- Diarrhoea
- Financial difficulties.

The change from baseline for the EORTC QLQ-C30 scales will be assessed by a two-sided Wilcoxon signed-rank test.

3.9.5.2 FACIT-Fatigue

The overall FACIT-Fatigue score and the individual 13 item scores (Section 3.3.6.2) will be summarized as well as the corresponding change from baseline scores for each scheduled assessment time-point. Shift tables displaying the individual item values from baseline to each post-baseline visit will also be presented.

The change from baseline for the FACIT-Fatigue overall and individual item scores will be assessed by a two-sided Wilcoxon signed-rank test.

3.9.5.3 EQ-5D

The five EQ-5D scale scores (score values range 1 – 3) and the VAS score (Section 3.3.6.3) will be summarized as well as the corresponding change from baseline scores for each scheduled assessment time-point. Shift tables displaying the individual dimension values from baseline to each post-baseline visit will also be presented.

The change from baseline for the EQ-5D VAS score will be assessed by a two-sided Wilcoxon signed-rank test. For this change from baseline analysis the item response categories (e.g., 1, 2, and 3) will be summarized as a continuous variable.

3.9.5.4 Treatment Satisfaction Questionnaires

For both treatment satisfaction questions (Section 3.3.6.4) the number and percentage for each response category will be summarized.

Both treatment satisfaction will be assessed by a two-sided Wilcoxon signed-rank test testing against a score of neutral. This is equivalent to subtracting 3 from each of the scores and testing against a score of 0 (i.e., the default for a Wilcoxon signed-rank test).

3.10 Interim Analysis

During this open-label study, the Sponsor will review safety and efficacy data as it becomes available during the Treatment Period. Following completion of the 12-week Treatment Period, data will be cleaned and locked at the individual subject level, and will be available for final analysis by the Sponsor on a rolling basis.

3.11 Sample Size Considerations

A sample size of 6 subjects will yield a standard error of approximately 114 U/L for an LDH mean change-from-baseline estimate. This assumes a standard deviation of 443 U/L for the baseline and post-baseline endpoints, and a within-subject correlation estimate of 0.8.

3.12 Replacement of Subjects

Enrolled subjects who prematurely discontinue study treatment for any reason prior to the Day 84 Visit may be replaced, at the discretion of the Sponsor.

4 References

Aaronson NK, Ahmedzai S, Bergman B, et al. The European Organization for Research and Treatment of Cancer QLQ-C30: a quality-of-life instrument for use in international clinical trials in oncology. *J Natl Cancer Inst* 1993;85:365-376.

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EuroQol Group. EuroQol-a new facility for the measurement of health-related quality of life. *Health Policy* 1990; 16:199-208.

Webster K, Cella D, and Yost K. The functional assessment of chronic illness therapy (FACIT) measurement system: properties, applications, and interpretation. *Health Qual Life Outcomes* 2003; 1:79-85.

5 List of Tables, Figures, and Listings

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Figure Number	Figure Title
14.2.5.4	Mean Reticulocyte Values Over Time; Pharmacodynamic Population
14.2.6.1	Mean Hemogloubinuria Values Over Time; Safety Population
14.2.6.2	Mean Hemogloubinuria Values Over Time; Efficacy Evaluable Population
14.2.6.3	Mean Hemogloubinuria Values Over Time; Per Protocol Population
14.2.6.4	Mean Hemogloubinuria Values Over Time; Pharmacodynamic Population
14.2.7.1	Mean CH ₅₀ Values Over Time – Semi-Log Scale; Pharmacodynamic Population
14.2.7.2	Mean CH ₅₀ Values Over Time – Linear Scale; Pharmacodynamic Population
14.2.8	Mean sRBC Values Over Time; Pharmacodynamic Population
14.2.9	Mean Wieslab ELISA Values Over Time; Pharmacodynamic Population
14.2.10	Mean C5 Concentration Values Over Time; Pharmacodynamic Population
14.2.11	Mean Plasma RA101495 Concentrations Over Time; PK Population
14.2.12	Mean Plasma Eculizumab Concentrations Over Time; PK Population

Listing Number	Listing Title
16.2.1	Patient Disposition; Safety Population
16.2.2.1	Medical History; Safety Population
16.2.2.2	PNH Disease History; Safety Population
16.2.2.3	PNH Treatment History; Safety Population
16.2.2.4	Neisseria meningitidis Testing
16.2.3.1	Prior Medications; Safety Population
16.2.3.2	Concomitant Medications; Safety Population
16.2.4.1	Treatment Compliance; Safety Population
16.2.4.2	Exposure to Study Treatment; Safety Population
16.2.5	Demographics; Safety Population
16.2.6	Pharmacodynamic Endpoints
16.2.7.1	Plasma Pharmacokinetic Sample Collection Times and RA101495 Concentrations
16.2.7.2	Individual Plasma RA101495 PK Parameters
16.2.8.1	EORTC QLQ-C30; Safety Population
16.2.8.2	FACIT-Fatigue; Safety Population
16.2.8.3	EQ-5D; Safety Population
16.2.8.4	Treatment Satisfaction; Safety Population
16.2.9	Adverse Events
16.2.10	Injection Site Reactions
16.2.11.1	Hematology
16.2.11.2	Clinical Chemistry
16.2.11.3	Coagulation, C-Reactive Protein, and Creatine Phosphokinase
16.2.11.4	Urinalysis
16.2.12	Vital Signs
16.2.13	Anti-Drug Antibodies
16.2.14	ECG
16.2.15	Physical Examination



RA PHARMACEUTICALS, INC.

STATISTICAL ANALYSIS PLAN AMENDMENT
Post Database Lock Modifications

RA101495-01.203: A PHASE 2 MULTICENTER, OPEN-LABEL, UNCONTROLLED
STUDY TO EVALUATE THE SAFETY, TOLERABILITY, EFFICACY,
PHARMACOKINETICS, AND PHARMACODYNAMICS OF RA101495 IN SUBJECTS
WITH PAROXYSMAL NOCTURNAL HEMOGLOBINURIA WHO HAVE AN
INADEQUATE RESPONSE TO ECULIZUMAB

RA101495-01.203

Statistical Analysis Plan Post-Lock Amendment Version: Date:

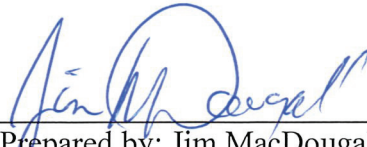
Post-lock Amendment 1.0

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Date



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12 Sep 2018

Date



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DOCUMENT HISTORY

Version	Author	Description
Post database lock amendment v1.0	Jim MacDougall	<ul style="list-style-type: none">• Titles changed for plasma concentration tables• New plasma concentration tables created• New statistics added to Table 14.1.4, Exposure to Study Treatment• New plasma concentration figures added

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1 INTRODUCTION

This document specifies the requested changes to the statistical analysis plan (SAP) for Study RA101495-01.203 after study database lock. These changes are based on the latest version of the SAP: Version 3.0, 22Mar2018.

2 SUMMARY OF CHANGES

2.1 PLASMA CONCENTRATION TABLES

The current set of plasma concentration tables (i.e., 14.2.11.1, 14.2.11.2, 14.2.11.3 the plasma concentration and metabolites tables) will be renamed as follows:

- Table 14.2.11.1 Plasma RA101495 Concentrations (ug/L) at 0.1 mg/kg dose Prior to Dose Escalation
- Table 14.2.11.2 Plasma RA103488 Metabolite Concentrations (ug/L) at 0.1 mg/kg dose Prior to Dose Escalation
- Table 14.2.11.3 Plasma RA102758 Metabolite Concentrations (ug/L) at 0.1 mg/kg dose Prior to Dose Escalation

The table footnote will be modified from

Note: Patient concentration values assessed after RA101495 dose escalation were excluded from this table

To

Note: Table includes plasma concentration values assessed when dose was 0.1 mg/kg (including the 0.3 mg/kg loading dose)

A **new** set of plasma concentration tables (i.e., 14.2.11.5, 14.2.11.6, 14.2.11.7) will be created to summarize the plasma concentration when the subject is at 0.3 mg/kg

- Table 14.2.11.5 Plasma RA101495 Concentrations (ug/L) at 0.3 mg/kg dose After Dose Escalation
- Table 14.2.11.6 Plasma RA103488 Metabolite Concentrations (ug/L) at 0.3 mg/kg dose After Dose Escalation
- Table 14.2.11.7 Plasma RA102758 Metabolite Concentrations (ug/L) at 0.3 mg/kg dose After Dose Escalation

This new set of plasma concentration tables will be a “complimentary” set in that every plasma concentration observation will be in one of the two tables.

These changes are reflected in the updated listing of tables (Section 3).

2.2 EXPOSURE TO STUDY TREATMENT MODIFICATION

Table 14.1.4, Exposure to Study Treatment Modification will be modified such that the frequency of when the dose escalation occurred relative to study visit will be presented. If the dose escalation study visit is an “Unscheduled” visit the closest scheduled study visit will be used.

2.3 PLASMA CONCENTRATION FIGURES

A new set of plasma concentration “spaghetti plot” figures will be created. The details of the figure specifications will be provided in the Figures Shells document and the new figures are included in the updated list of Figures (Section 3).

2.4 MODIFICATIONS TO FIGURES

Additional modifications to the figures are occurring and the changes are reflected in updated Figure Shells. These updates do not impact the titles or the underlying data being presented.

3 LIST OF TABLES, FIGURES, AND LISTINGS

Shells for the tables, figures, and listings will be provided in a separate document. Table and figure numbers with a “*” indicate tables and figures which are being modified or created as per this SAP post-lock amendment document (note: as discussed in Section 2.4, additional minor modifications to the figures are occurring and the changes are reflected in updated Figure Shells).

Table Number	Table Title
14.1.1	Patient Disposition
14.1.2.1	Medical History; Safety Population
14.1.2.2	PNH Disease History; Safety Population
14.1.2.3	PNH Treatment History; Safety Population
14.1.3.1	Prior Medications; Safety Population
14.1.3.2	Concomitant Medications; Safety Population
14.1.4*	Exposure to Study Treatment; Safety Population
14.1.5.1	Demographics; Safety Population
14.1.5.2	Demographics; Efficacy Evaluable Population
14.1.5.3	Demographics; Per Protocol Population
14.1.5.4	Demographics; Pharmacodynamic Population
14.2.1.1	Summary of LDH Values; Safety Population
14.2.1.2	Summary of LDH Values; Efficacy Evaluable Population
14.2.1.3	Summary of LDH Values; Per Protocol Population
14.2.1.4	Summary of LDH Values; Pharmacodynamic Population
14.2.2.1	Summary of Total Bilirubin Values; Safety Population
14.2.2.2	Summary of Total Bilirubin Values; Efficacy Evaluable Population
14.2.2.3	Summary of Total Bilirubin Values; Per Protocol Population
14.2.2.4	Summary of Total Bilirubin Values; Pharmacodynamic Population
14.2.3.1	Summary of Total Hemoglobin Values; Safety Population
14.2.3.2	Summary of Total Hemoglobin Values; Efficacy Evaluable Population
14.2.3.3	Summary of Total Hemoglobin Values; Per Protocol Population
14.2.3.4	Summary of Total Hemoglobin Values; Pharmacodynamic Population
14.2.4.1	Summary of Free Hemoglobin Values; Safety Population
14.2.4.2	Summary of Free Hemoglobin Values; Efficacy Evaluable Population
14.2.4.3	Summary of Free Hemoglobin Values; Per Protocol Population
14.2.4.4	Summary of Free Hemoglobin Values; Pharmacodynamic Population

Table Number	Table Title
14.2.5.1	Summary of Haptoglobin Values; Safety Population
14.2.5.2	Summary of Haptoglobin Values; Efficacy Evaluable Population
14.2.5.3	Summary of Haptoglobin Values; Per Protocol Population
14.2.5.4	Summary of Haptoglobin Values; Pharmacodynamic Population
14.2.6.1	Summary of Reticulocyte Values; Safety Population
14.2.6.2	Summary of Reticulocyte Values; Efficacy Evaluable Population
14.2.6.3	Summary of Reticulocyte Values; Per Protocol Population
14.2.6.4	Summary of Reticulocyte Values; Pharmacodynamic Population
14.2.7.1	Summary of Hemoglobinuria Values; Safety Population
14.2.7.2	Summary of Hemoglobinuria Values; Efficacy Evaluable Population
14.2.7.3	Summary of Hemoglobinuria Values; Per Protocol Population
14.2.7.4	Summary of Hemoglobinuria Values; Pharmacodynamic Population
14.2.8	Summary of sRBC Values; Pharmacodynamic Population
14.2.9	Summary of Wieslab ELISA Values; Pharmacodynamic Population
14.2.10	Summary of C5 Concentration Values; Pharmacodynamic Population
14.2.11.1*	Plasma RA101495 Concentrations (ug/L) at 0.1 mg/kg dose Prior to Dose Escalation; PK Population
14.2.11.2*	Plasma RA103488 Metabolite Concentrations (ug/L) at 0.1 mg/kg dose Prior to Dose Escalation; PK Population
14.2.11.3*	Plasma RA102758 Metabolite Concentrations (ug/L) at 0.1 mg/kg dose Prior to Dose Escalation; PK Population
14.2.11.4	Plasma Eculizumab Concentrations; PK Population
14.2.11.5*	Plasma RA101495 Concentrations (ug/L) at 0.3 mg/kg dose After Dose Escalation; PK Population
14.2.11.6*	Plasma RA103488 Metabolite Concentrations (ug/L) at 0.3 mg/kg dose After Dose Escalation; PK Population
14.2.11.7*	Plasma RA102758 Metabolite Concentrations (ug/L) at 0.3 mg/kg dose After Dose Escalation; PK Population
14.2.12	Plasma RA101495 PK Parameters; PK Population
14.2.13.1	Summary of EORTC QLQ-C30; Safety Population
14.2.13.2	Summary of EORTC QLQ-C30; Per Protocol Population
14.2.14.1	Summary of FACIT-Fatigue: Overall Score; Safety Population
14.2.14.2	Summary of FACIT-Fatigue: Overall Score; Per Protocol Population

Table Number	Table Title
14.2.14.3	Summary of FACIT-Fatigue: Items; Safety Population
14.2.14.4	Summary of FACIT-Fatigue: Items; Per Protocol Population
14.2.14.5	Summary of FACIT-Fatigue: Items Shift Table; Safety Population
14.2.14.6	Summary of FACIT-Fatigue: Items Shift Table; Per Protocol Population
14.2.15.1	Summary of EQ-5D: Health State VAS Score; Safety Population
14.2.15.2	Summary of EQ-5D: Health State VAS Score; Per Protocol Population
14.2.15.3	Summary of EQ-5D: Individual Dimensions; Safety Population
14.2.15.4	Summary of EQ-5D: Individual Dimensions; Per Protocol Population
14.2.15.5	Summary of EQ-5D: Individual Dimensions Shift Table; Safety Population
14.2.15.6	Summary of EQ-5D: Individual Dimensions Shift Table; Per Protocol Population
14.2.16.1	Summary of Treatment Satisfaction; Safety Population
14.2.16.2	Summary of Treatment Satisfaction; Per Protocol Population
14.3.1.1	Overall summary of Treatment Emergent Adverse Events; Safety Population
14.3.1.2.1	Incidence of Treatment Emergent Adverse Events by System Organ Class and Preferred Term; Safety Population
14.3.1.2.2	Incidence of Treatment Emergent Adverse Events by System Organ Class, Preferred Term, and Maximum Severity; Safety Population
14.3.1.2.3	Incidence of Treatment Emergent Adverse Events by System Organ Class, Preferred Term, and Relationship to Study Drug; Safety Population
14.3.1.2.4	Incidence of Treatment Emergent Adverse Events Leading to Discontinuation of Study Drug by System Organ Class and Preferred Term; Safety Population
14.3.1.3	Listing of Serious Adverse Events by System Organ Class and Preferred Term; Safety Population
14.3.1.4	Incidence of Thrombotic Treatment Emergent Adverse Events by System Organ Class, and Preferred Term; Safety Population
14.3.1.5	Summary of Injection Site Reaction Assessments; Safety Population
14.3.2.1	Summary of Hematology Values; Safety Population
14.3.2.2	Summary of Clinical Chemistry Values; Safety Population

Table Number	Table Title
14.3.2.3	Summary of Coagulation Values; Safety Population
14.3.2.4	Summary of C-Reactive Protein and Creatine Phosphokinase Values; Safety Population
14.3.2.5	Summary of Liver Function Test Values – NCI CTCAE Grading; Safety Population
14.3.2.6	Summary of Pancreatic Enzyme Test Values – NCI CTCAE Grading; Safety Population
14.3.2.7	Summary of Urinalysis Values; Safety Population
14.3.3	Summary of PNH Clone Size Values Safety Population
14.3.4	Summary of Vital Signs; Safety Population
14.3.5.1	Summary of ECG Interpretation; Safety Population
14.3.5.2	Summary of ECG Values; Safety Population

Figure Number	Figure Title
14.2.1.1	Mean LDH Values Over Time by Cohort; Safety Population
14.2.1.2	Mean LDH Values Over Time by Cohort; Efficacy Evaluable Population
14.2.1.3	Mean LDH Values Over Time by Cohort; Per Protocol Population
14.2.1.4	Mean LDH Values Over Time by Cohort; Pharmacodynamic Population
14.2.2.1	Mean Total Bilirubin Values Over Time by Cohort; Safety Population
14.2.2.2	Mean Total Bilirubin Values Over Time by Cohort; Efficacy Evaluable Population
14.2.2.3	Mean Total Bilirubin Values Over Time by Cohort; Per Protocol Population
14.2.2.4	Mean Total Bilirubin Values Over Time by Cohort; Pharmacodynamic Population
14.2.3.1	Mean Total Hemoglobin Values Over Time by Cohort; Safety Population
14.2.3.2	Mean Total Hemoglobin Values Over Time by Cohort; Efficacy Evaluable Population
14.2.3.3	Mean Total Hemoglobin Values Over Time by Cohort; Per Protocol Population
14.2.3.4	Mean Total Hemoglobin Values Over Time by Cohort; Pharmacodynamic Population
14.2.4.1	Mean Free Hemoglobin Values Over Time by Cohort; Safety Population

Figure Number	Figure Title
14.2.4.2	Mean Free Hemoglobin Values Over Time by Cohort; Efficacy Evaluable Population
14.2.4.3	Mean Free Hemoglobin Values Over Time by Cohort; Per Protocol Population
14.2.4.4	Mean Free Hemoglobin Values Over Time by Cohort; Pharmacodynamic Population
14.2.5.1	Mean Haptoglobin Values Over Time by Cohort; Safety Population
14.2.5.2	Mean Haptoglobin Values Over Time by Cohort; Efficacy Evaluable Population
14.2.5.3	Mean Haptoglobin Values Over Time by Cohort; Per Protocol Population
14.2.5.4	Mean Haptoglobin Values Over Time by Cohort; Pharmacodynamic Population
14.2.6.1	Mean Reticulocyte Values Over Time by Cohort; Safety Population
14.2.6.2	Mean Reticulocyte Values Over Time by Cohort; Efficacy Evaluable Population
14.2.6.3	Mean Reticulocyte Values Over Time by Cohort; Per Protocol Population
14.2.6.4	Mean Reticulocyte Values Over Time by Cohort; Pharmacodynamic Population
14.2.7.1	Mean Hemogloubinuria Values Over Time by Cohort; Safety Population
14.2.7.2	Mean Hemogloubinuria Values Over Time by Cohort; Efficacy Evaluable Population
14.2.7.3	Mean Hemogloubinuria Values Over Time by Cohort; Per Protocol Population
14.2.7.4	Mean Hemogloubinuria Values Over Time by Cohort; Pharmacodynamic Population
14.2.8	Mean sRBC Values Over Time by Cohort; Pharmacodynamic Population
14.2.9	Mean Wieslab ELISA Values Over Time by Cohort; Pharmacodynamic Population
14.2.10	Mean C5 Concentration Values Over Time by Cohort; Pharmacodynamic Population
14.2.11.1	Mean Plasma RA101495 Concentrations Over Time by Cohort, Linear Scale, PK Population
14.2.11.2	Mean Plasma RA101495 Concentrations Over Time by Cohort, Log Scale, PK Population
14.2.11.3*	Subject Plots of RA101495 Concentrations Over Time by Cohort, Linear Scale, PK Population

Figure Number	Figure Title
14.2.11.4*	Subject Plots of Plasma RA101495 Concentrations Over Time by Cohort, Log Scale, PK Population
14.2.12.1	Mean Plasma RA103488 Concentrations Over Time by Cohort, Linear Scale, PK Population
14.2.12.2	Mean Plasma RA103488 Concentrations Over Time by Cohort, Log Scale, PK Population
14.2.12.3*	Subject Plots of RA103488 Concentrations Over Time by Cohort, Linear Scale, PK Population
14.2.12.4*	Subject Plots of Plasma RA103488 Concentrations Over Time by Cohort, Log Scale, PK Population
14.2.13.1	Mean Plasma RA102758 Concentrations Over Time by Cohort, Linear Scale, PK Population
14.2.13.2	Mean Plasma RA102758 Concentrations Over Time by Cohort, Log Scale, PK Population
14.2.13.3*	Subject Plots of RA102758 Concentrations Over Time by Cohort, Linear Scale, PK Population
14.2.13.4*	Subject Plots of RA102758 Concentrations Over Time by Cohort, Log Scale, PK Population
14.2.14.1	Mean Plasma Eculizumab Concentrations Over Time for Cohort B, Linear Scale, PK Population
14.2.14.2	Mean Plasma Eculizumab Concentrations Over Time for Cohort B, Log Scale; PK Population

Listing Number	Listing Title
16.2.1.1	Patient Disposition; Safety Population
16.2.1.2	Patient Screening and Enrollment; All Screened Patients
16.2.2.1	Medical History; Safety Population
16.2.2.2	PNH Disease History; Safety Population
16.2.2.3	PNH Disease History: Thrombotic Events; Safety Population
16.2.2.4	PNH Treatment History; Safety Population
16.2.2.5	Transfusion History; Safety Population
16.2.2.6	LDH History; Safety Population
16.2.2.7	Neisseria meningitidis Testing; Safety Population
16.2.2.8	Pregnancy Testing; Safety Population
16.2.3.1	Prior Medications; Safety Population
16.2.3.2	Concomitant Medications; Safety Population
16.2.4.1	Study Drug Administration: In Clinic; Safety Population
16.2.4.2	Study Drug Dispensation; Safety Population
16.2.5	Demographics; Safety Population
16.2.6	Efficacy Assessments; Safety Population
16.2.7	Pharmacodynamic Endpoints

Listing Number	Listing Title
16.2.8.1	Plasma Pharmacokinetic Sample Collection Times and RA101495 and Metabolites Concentrations
16.2.8.2	Individual Plasma RA101495 PK Parameters
16.2.8.3	Plasma Pharmacokinetic Sample Collection Times and Eculizumab Concentrations
16.2.9.1	EORTC QLQ-C30: Items; Safety Population
16.2.9.2	EORTC QLQ-C30: Scales; Safety Population
16.2.9.3	FACIT-Fatigue; Safety Population
16.2.9.4	EQ-5D; Safety Population
16.2.9.5	Treatment Satisfaction; Safety Population
16.2.10.1	Adverse Events; Safety Population
16.2.10.2	Adverse Events: Treatment Required; Safety Population
16.2.10.3	Adverse Events: MedDRA Coding; Safety Population
16.2.10.4	Deaths; Safety Population
16.2.10.5	Thrombotic Adverse Events; Safety Population
16.2.11	Injection Site Reactions; Safety Population
16.2.12.1	Hematology; Safety Population
16.2.12.2	Clinical Chemistry; Safety Population
16.2.12.3	Coagulation, C-Reactive Protein, and Creatine Phosphokinase; Safety Population
16.2.12.4	Urinalysis; Safety Population
16.2.13	Vital Signs; Safety Population
16.2.14	Surgery and Other Procedures; Safety Population
16.2.15	ECG; Safety Population
16.2.16	Physical Examination; Safety Population
16.2.17	Study Completion; Safety Population