Paper SM15

DOSEON: Fuzzy Matching DOSE Date Intervals ON Analysis Dates Across SAS (DATA Step, PROC SQL, SAS Macro, and PROC FCMP)

Inka Leprince, InkaStat Solutions, USA
Troy Martin Hughes, USA

ABSTRACT

In clinical trial analysis data sets, the treatment variable DOSEON, the treatment dose at record start, was introduced in ADaM OCCDS v1.0 for use in non-ADSL ADaM data sets. DOSEON is typically derived from exposure data by determining if and when an analysis (start) date falls within a treatment dose level start-end interval. Although the definition appears simple, performing the merge of exposure data with another analysis data set is complex because the CDISC data structures do not provide a natural primary key for joining these data sets. Instead, the derivation of DOSEON requires matching a single date to a date range. This paper explores procedural and functional approaches to solving this fuzzy matching lookup operation. Procedural approaches require one or more DATA steps and/or SAS procedures, as demonstrated with PROC SQL joins, a SAS macro, and a hash object lookup within a DATA step. In contrast, functional approaches leverage PROC FCMP to compile a user-defined function that is called in a single SAS statement—one line of code—to achieve equivalent, efficient, reusable functionality. Finally, these functional design solutions represent the first-ever white paper published that declare a hash iterator object as a parameter (or pass a hash iterator object as an argument), and the second-ever white paper published that declare a hash object as a parameter (or pass a hash object as an argument).

INTRODUCTION

The Clinical Data Interchange Standards Consortium (CDISC) Analysis Data Model (ADaM) standards provide a framework for the generation, replication, traceability and analysis of clinical trial data sets and associated metadata in the clinical research and healthcare industries (CDISC ADaM Team, 2009). DOSEON is one of several ADaM dosing variables that can be used to capture dosing information. DOSEON was introduced to occurrence data sets in ADaM OCCDS v1.0, in which it is the dose at record start/onset date (CDISC ADaM Team, 2016), but its use may be considered for any non-ADSL analysis data set (Leprince & Watson, 2024). This information is useful in capturing dose level variations during the treatment period of a study where the dose level of the drug is allowed to be adjusted.

Table 1. ADaM Dose Variables*

VARIABLE NAME	VARIABLE LABEL	TYPE	CODELIST	CONTROLLED TERMS	SUBCLASS ADVERSE EVENT CORE	CDISC NOTES
DOSEON	Treatment Dose at Record Start	Num			Perm	Dose received at the point in time of the record start date Example derivation: Obtained from EX.EXDOSE where --STDTC falls between the values of EX.EXSTDTC and EX.EXENDTC
DOSEU	Treatment Dose Units	Char	(UNIT)†		Perm	The units associated with DOSEON and/or DOSCUMA. Conditional on whether DOSEON and/or DOSCUMA are included.

(CDISC ADaM Team, 2021)

Table 1 includes CDISC notes that provide an example derivation of the DOSEON, where it is defined as the dose (EX.EXDOSE) from the exposure record in which the analysis date (–STDTC or –DT) falls within the inclusive exposure date interval defined by EX.EXSTDTC and EX.EXENDTC. Within a given subject, each analysis date can map to at most one exposure interval. This type of matching is *fuzzy*, a "merge in which there is no combination of key variables available that will match up the observations to be joined" (Carpenter, 2014), because the exposure records and analysis records cannot be merged using a primary key of SUBJID and date. As a result, a numeric fuzzy match between a date and a date interval is required to derive DOSEON values.

* Table is an excerpt from Table 3.2.7.1 in Section 3.2 in "Analysis Structure for Occurrence Data (OCCDS) Version 1.0" published February 12, 2016.

† Note: Codelists in parenthesis are the names of CDISC Controlled Terminology

Procedural solutions (e.g., PROC SQL; SAS macro; DATA steps with a hash look-up table) and functional solutions (PROC FCMP) are illustrated through the derivation of DOSEON in non-ADSL analysis data sets for the fictitious clinical trial, CAMELOT.

CAMELOT

CAMELOT is a fictional clinical trial that is a Phase 1, open-label, dose-escalation study to evaluate safety of camel milk (CAMILK) in adult subjects with advanced cancer. This study consists of three cohorts with doses of 500 mL, 750 mL, and 1000 mL CAMILK once daily (QD). Subjects completed out-patient clinic visits once each 21-day cycle. Alternative dose levels (i.e., CAMILK dose escalation or reduction) were also implemented at the recommendation of the medical monitor based on the review of all available data.

The periods of the study consist of a Screening Period of up to seven days, a Treatment Period consisting of consecutive 21-day cycles, and a Safety Follow-up Period of up to 30 days after the last dose of study drug. The investigative product, CAMILK, was dispensed as cartons of milk and orally administered once daily in consecutive 21-day treatment cycles starting on Cycle 1 Day 1. CAMILK was administered until disease progression, unacceptable toxicity, withdrawal of consent, or up to 18 cycles is completed, whichever occurs first.

Due to the dynamic adjustments of study drug dose based on the safety profile of each subject and the analysis needs of the study CAMELOT analysis data sets need a variable that attaches the dose each subject is on at the start/onset of liver assessments from ADLIVER and adverse events from ADAE.

ADSL

ADSL (i.e., the Subject-Level Analysis Dataset) contains one record per subject. It contains demographic information, population flags, treatment variables, and important dates (CDISC Analysis Data Model Team, 2021). Table 2 displays an excerpt of variables stored in the CAMELOT ADSL data set. Since ADSL stores the high-level subject experience in the study, it is too high-level to capture the adjustments in dose levels and missed doses for each subject during the study.

Table 2. Excerpt of CAMELOT.ADSL

#	SUBJID	SEX	SAFFL	TRT01P	TRTSDT	TRTEDT	EOSDT
	Subject Identifier for the Study	*Sex*	*Safety Population Flag*	*Planned Treatment for Period 01*	*Date of First Exposure to Treatment*	*Date of Last Exposure to Treatment*	*End of Study Date*
1	BLAZE	M	Y	750 ML CAMILK QD	2025-11-16	2026-08-17	2026-08-17
2	BUMPY	M	Y	500 ML CAMILK QD	2025-10-11	2026-09-14	2026-10-12
3	CAMMY	F	Y	750 ML CAMILK QD	2025-12-18	2026-07-16	2026-08-16
4	DUNEY	M	Y	500 ML CAMILK QD	2025-06-29	2026-01-24	2026-09-23
5	OASIS	F	Y	500 ML CAMILK QD	2025-08-31	2026-07-30	2026-08-28
6	ROCCO	M	Y	750 ML CAMILK QD	2025-10-12	2026-02-14	2026-04-14
7	SANDY	F	Y	1000 ML CAMILK QD	2026-03-27	2026-09-09	2026-10-12
8	SUNNY	F	Y	1000 ML CAMILK QD	2026-01-02	2026-08-21	2026-09-21

The code to create this ADSL data set is provided in Appendix A: ADSL.

ADEX

ADEX is the Study Drug Exposure Analysis Data. It follows a basic data structure (BDS) of one record per subject per cycle per dose level per start date. Table 3 displays an excerpt of records and variables stored in the CAMELOT ADEX data set. A well-constructed ADEX data set contains continuous, non-overlapping date intervals that fully span each subject's treatment period, from the first dose of study drug (Treatment Start Date) through the last dose (Treatment End Date). Missed doses should also be represented as records in ADEX. For example, in Table 3, SANDY forgot to drink her CAMILK on April 22 to April 23. This missed dose is in ADEX by a record where ASTDT = 2026-04-22, AENDT = 2026-04-23 and EXDOSE = 0. SANDY also had a dose interruption that start on April 27th and she did not re-start taking CAMILK until May 1st. This dose interruption is captured in ADEX by a record where ASTDT = 2026-04-27, AENDT = 2026-04-30 and EXDOSE = 0.

For the DOSEON derivations in this paper, ADEX serves as the lookup table. At a minimum, ADEX is ordered by ADEX.SUBJID, ADEX.ASTDT, ADEX.AENDT, and includes the EXDOSE and EXDOSEU variables that are retrieved and appended during all lookup, join, and merge operations. That is, although neither indexed nor sorted, the first key of the composite key must match the SUBJID variable being tested and the second key effectively represents a pair of dates (ADEX.ASTDT and ADEX.AENDT) between which a date being tested must fall, inclusively. And therein lies the complexity of the fuzzy matching techniques that must be leveraged to join this data set.

Table 3. Excerpt of CAMELOT.ADEX

#	SUBJID	ACYCLE	EXTRT	EXDOSE	EXDOSEU	ASTDT	AENDT	EXREASND
	Subject ID	*Analysis Cycle*	*Dose*	*Dose Units*	*Name of Treatment*	*Analysis Start Date*	*Analysis End Date*	*Reason Not Done*
1	DUNEY	CYCLE 01	500	mL	CAMILK	2025-06-29	2025-07-19	
2	DUNEY	CYCLE 02	500	mL	CAMILK	2025-07-20	2025-08-09	
3	DUNEY	CYCLE 03	500	mL	CAMILK	2025-08-10	2025-08-29	
4	DUNEY	CYCLE 04	500	mL	CAMILK	2025-08-30	2025-09-16	
5	SANDY	CYCLE 01	1000	mL	CAMILK	2026-03-27	2026-04-16	
6	SANDY	CYCLE 02	1000	mL	CAMILK	2026-04-17	2026-04-21	
7	SANDY	CYCLE 02	0	mL	CAMILK	2026-04-22	2026-04-23	FORGOT TO DRINK CAMILK
8	SANDY	CYCLE 02	1000	mL	CAMILK	2026-04-24	2026-04-26	
9	SANDY	CYCLE 02	0	mL	CAMILK	2026-04-27	2026-04-30	ADVERSE EVENT
10	SANDY	CYCLE 02	1000	mL	CAMILK	2026-05-01	2026-05-02	

The code to create this ADEX data set (lookup table) is provided in Appendix B: ADEX.

ADAE

ADAE is the Adverse Events Analysis Data. It follows the occurrence data structure (OCCDS), subclass ADVERSE EVENT, which contains one record per subject per adverse event (CDISC ADaM Team, 2021). Table 4 displays an excerpt of records and variables stored in the CAMELOT ADAE data set.

This (first) transactional data set comprises the data to which EXDOSE and EXDOSEU are appended during a lookup operation. During the lookup, the ADAE.SUBJID variable must match the ADEX.SUBJID key identically; however, the AE onset date (ADAE.ASTDT) variable must fuzzy-match the range between the ADEX.ASTDT and ADEX.AENDT variables.

Table 4. ADAE Data Set for Subjects in CAMELOT

#	SUBJID	DOSEON	DOSEU	ASTDT	AENDT	AETERM	AEDECOD
	Subject ID	*Treatment Dose at Record Start*	*Treatment Dose Units*	*Analysis Start Date*	*Analysis End Date*	*Adverse Event Reported Term*	*Dictionary-Derived Term*
1	DUNEY			2025-06-15		BACK PAIN	Back pain
2	DUNEY	**500**	**mL**	2025-07-06		WORSENING NAUSEA	Nausea
3	DUNEY	**500**	**mL**	2025-07-23		CONSTIPATION	Constipation
4	DUNEY	**750**	**mL**	2025-12-27	2025-12-29	SEEING MIRAGES	Visual hallucinations
5	SANDY	**1000**	**mL**	2026-04-09	2026-04-09	WORSENING DIARRHEA	Diarrhoea
6	SANDY	**1000**	**mL**	2026-04-13	2026-04-13	DYSGEUSIA	Dysgeusia
7	SANDY	**1000**	**mL**	2026-04-26		WORSENING NAUSEA	Nausea
8	SANDY	**1000**	**mL**	2026-05-07	2026-05-10	SWELLING	Generalised oedema
9	SANDY	**0**	**mL**	2026-05-23		VOMITING	Vomiting

The code to create ADAE data set is provided in Appendix C: ADAE, excluding the DOSEON and DOSEU variables. These two variables and their values are derived using the multiple methods described in this paper.

ADLIVER

ADLIVER is the Liver Laboratory Analysis Data that follows a basic data structure (BDS) of one record per subject per parameter per analysis time point. This data set contains liver enzymes captured from serum chemistry liver panels of alkaline phosphatase (ALP), alanine aminotransferase (ALT), and aspartate aminotransferase (AST).

This (second) transactional data set follows a BDS data structure rather than the OCCDS data structure of ADAE. Notably, ADLIVER contains the analysis date in a variable named ADT as opposed to ASTDT. ADLIVER is included only to demonstrate the extent to which various solutions demonstrate software reusability. That is, a merge, join, or lookup operation might be efficient yet not demonstrate reusability if all (or a substantial portion) of its functionality must be hardcoded.

Table 5. ADLIVER for Subjects in CAMELOT

#	SUBJID	DOSEON	DOSEU	AVIST	ADT	PARAMCD	AVAL
	Subject ID	*Treatment Dose at Record Start*	*Treatment Dose Units*	*Analysis Visit*	*Analysis Date*	*Parameter Code*	*Analysis Value*
1	DUNEY			Screening	2025-06-20	ALP	101
2	DUNEY	**500**	**mL**	Cycle 01 Day 1	2025-06-29	ALP	101
3	DUNEY	**500**	**mL**	Cycle 02 Day 1	2025-07-19	ALP	101
4	DUNEY	**500**	**mL**	Cycle 03 Day 1	2025-08-09	ALP	101
5	DUNEY	**500**	**mL**	Cycle 04 Day 1	2025-08-29	ALP	98
6	DUNEY	**0**	**mL**	Cycle 05 Day 1	2025-09-20	ALP	112

The code to create this ADLIVER data set is provided in, excluding the DOSEON and DOSEU variables. These two variables and their values are derived using the multiple methods described in this paper.

DOSEON

In CAMELOT, the CDISC ADaM variable DOSEON is required to support analyses. The DOSEON values answer the question: "What dose of was this subject taking at the time that this observation began?" Specifically, DOSEON records the dose of CAMILK a subject was taking at the start of each observation, such as the CAMILK dose at the onset of an adverse event (ASTDT) in ADAE or the CAMILK dose at the time of a laboratory assessment (ADT) in ADLIVER.

Table 6. DOSEON Metadata

VARIABLE NAME	VARIABLE LABEL	TYPE	SOURCE	DERIVATION
DOSEON	Treatment Dose at Record Start	Num	Derived	If the analysis (start) date (ADT or ASTDT) falls between the values of ADEX.ASTDT and ADEX.AENDT (inclusive), then set to ADEX.EXDOSE

Depending on the analysis requirements for the study, the derivation of DOSEON may incorporate additional logic, such as, "…; otherwise set to last, non-missing dose taken prior to ASTDT." For example, pre-treatment adverse events and assessments may appropriately have null DOSEON values, whereas post-treatment and follow-up events and assessments may need to be associated with the most recent, non-missing dose received by each subject. Analysts should consult the statistical analysis plan to determine the appropriate derivation logic based on the specific objectives of the clinical study.

Fuzzy matching, as defined in this text, references the need to match a date value to a range of dates rather than a single date key. As described previously, the ADEX lookup table composite key effectively comprises two keys—SUBJID, the unique subject ID, and a date range, which represents the range of dates between analysis start date (ADEX.ASTDT) and analysis end date (ADEX.AENDT). That is, although SUBJID can be matched directly with ease—for example, from a transactional data set like ADAE to a lookup table like ADEX—a date range cannot, and thus requires fuzzy matching.

Stated another way, the matching criteria to join ADAE to ADEX require composite keys, comprising:

- SUBJID must match between the transactional data set and the lookup table. *NOT FUZZY!*
- ASTDT in the transactional data set must fall *between* the ASTDT and AENDT dates (inclusive) in the lookup table. *VERY FUZZY!*

Thus, the keyword "between" necessitates the fuzzy matching *between* a date and a date range, which can be operationalized using various procedural and functional techniques. The next sections introduce and differentiate various methods, with *procedural* solutions requiring one or more SAS procedures and/or DATA steps to complete the fuzzy merge, and *functional* solutions requiring only a single line of code (i.e., a functional call or subroutine call) to complete the fuzzy merge. Functional approaches are no less complex than their procedural brethren, and can arguably be *more* complex given their modular design that necessitates building code components that are compiled. However, given that functional approaches are thereafter operationalized in a single line of code, their design facilitates multiple, successive lookup operations performed within a single DATA step, inasmuch as significantly improved readability of the software in which they are called. That is, functional design improves both software functionality and performance.

ADEX, ADAE, and ADLIVER are utilized in several functionally equivalent lookup solutions, as demonstrated in subsequent sections.

EXPLODING KEY RANGES TO GENERATE UNIQUE KEYS

In all solutions, however, the fuzzy match is operationalized by *exploding* keys, such that each potential key (in a range of keys) is explicitly declared and associated key-value pairs created in the lookup table (either temporarily or permanently). For example, if the date range for a specific subject ranges from an ASTDT value of JAN 5 to an AENDT value of JAN 8, the lookup table would be expanded to include observations for JAN 5, JAN 6, JAN 7, and JAN 8. Each of these separate keys would return the same associated value(s). Once the lookup table has been exploded, both SUBJID and ASTDT can be matched directly without the need to evaluate a range of dates—because each unique value within a given range will have been explicitly declared as a key within the lookup table.

The ADEX data set is exploded in Program 1 to demonstrate the technique. Note that the DATA step in Appendix B: ADEX must first be run to create the ADEX data set.

Program 1. Explode ADEX by SUBJID and ASTDT

```
data explode_adex;
    set adex (rename=(astdt=ex_stdt  aendt=ex_endt));
    do ASTDT = ex_stdt to ex_endt;
        output;
    end;
run;
```

The log shows that whereas ADEX has 192 observations, its exploded form contains 1,871 observations:

```
NOTE: There were 192 observations read from the data set WORK.ADEX.
NOTE: The data set WORK.EXPLODE_ADEX has 1871 observations and 17 variables.
```

This fuzzy matching technique is highly efficient in cases where the number of keys to be exploded is reasonable and not resource intensive, as is often the case when exploding date ranges. However, if a transactional data set were instead required to match datetime values (in lieu of only date values), the 31 million seconds per year could quickly cause added keys to stymie runtime, efficiency, and memory utilization or disk space, so other fuzzy matching methods would be required. Similarly, although you might explode a discrete range of subject IDs, you would never want to explode the massive expanse of subject social security numbers (SSNs).

Within the SQL procedure, a fuzzy match such as this is operationalized using the BETWEEN operator, as described in the next section, which effectively performs a cartesian join, thus exploding the lookup table briefly. In subsequent solutions that are demonstrated, a hash object is similarly exploded by iterating date ranges to append date keys that are not explicitly defined. Other techniques can operationalize a fuzzy match, but they are not described in this text.

PROCEDURAL: MERGING WITH PROC SQL

PROC SQL is a procedure within Base SAS that implements Structured Query Language (SQL) (SAS Institute Inc., 2016). SQL joins form a Cartesian product, a combination of all the combinations of the rows from all the contributing data sets that satisfy the rows that do not satisfy the conditions defined in the WHERE or ON clause. Although Cartesian products can be computationally intensive compared to the SAS DATA Step, SQL is a language that can reduce the required lines of code, whereas the SAS DATA step gives more control over *how* SAS processes the data (SAS Institute Inc.).

Program 2 demonstrates the PROC SQL derivation of DOSEON for the OCCDS data set ADAE. This query is then modified to use the variable name ADT in place of ASTDT, and applied to the BDS data set ADLIVER. Note that the DATA steps in Appendix C: ADAE, and Appendix D: ADLIVER must first be run to generate the ADAE and ADLIVER data sets, respectively.

Program 2. DOSEON in PROC SQL

```
PROC SQL ;
    /* ADAE.DOSEON derivation */
    create table ADAE_SQL as /* Note 1 */
        select ae.*,
               ex.exdose as DOSEON,
               ex.exdoseu as DOSEU
        from adae as ae /* Note 2 */
        LEFT JOIN adex as ex /* Note 3 */
        ON ex.subjid=ae.subjid and
            ae.astdt BETWEEN ex.astdt AND ex.aendt and /* Note 4 */
            NOT MISSING(ae.astdt) /* Note 5 */
        order by ae.subjid, ae.aeseq /* Note 6 */
        ;
    /* ADLIVER.DOSEON derivation */
    create table ADLIVER_SQL as
        select lb.*,
```

```
               ex.exdose as DOSEON,
               ex.exdoseu as DOSEU
        from adliver as lb
        LEFT JOIN adex as ex
        ON ex.subjid=lb.subjid and
            lb.adt BETWEEN ex.astdt AND ex.aendt and
            NOT MISSING(lb.adt)
        order by lb.subjid, lb.adt, lb.paramcd
        ;
QUIT ;
```

1. CREATE TABLE … AS ... statement creates a SAS data file with the specified name rather than only printing a report. The data set produced from this SQL query can be used for subsequent processing and analysis. All columns from the analysis data set ADAE are selected, along with the minimally required variables EXDOSE and EXDOSEU from ADEX. These exposure variables provide the source values and are renamed to DOSEON and DOSEU, respectively, to comply with CDISC ADaM variable naming conventions.
2. Input data sets are identified in the FROM clause and table aliases are defined to simplify column references and improve readability. Table aliases are temporary, abbreviated names that are used to qualify variables and avoid ambiguity when data sets contain variables with the same name (SAS Institute Inc., 2016). Here, ADAE is assigned the alias ‘AE,’ and ADEX is assigned the alias ‘EX.’
3. A LEFT JOIN is used to merge the analysis data set with exposure data from ADEX, adding dosing information, where available, while retaining all observations from the analysis data set (ADAE or ADLIVER). Analysis records that do not match any exposure interval in ADEX are preserved, with DOSEON and DOSEU populated as null values. In SQL joins, the ON clause is used instead of the usual WHERE clause for the specify the matching criteria for the join. For DOSEON, we are matching records within each subject identifier (SUBJID) and fuzzy date matching where the analysis date is not missing.
4. BETWEEEN-AND Operator: is a conditional operator that tests for values within an inclusive range.
5. Because PROC SQL treats null values as matching in joins, an explicit condition excluding missing analysis dates is included to prevent unintended matches. Any null will match with any other null of the same type (character or numeric) in a join. “AND A[ST]DT IS NOT MISSING” is included as a selection criterion to avoid this unintended matching.
6. Finally, the ORDER BY clause specifies the sort order of the output data set. This ORDER BY is not required to perform the join; however, given that the resultant ADAE_SQL and ADLIVER_SQL data sets are subsequently used to validate all further solutions, these data must be precisely ordered so that the COMPARE procedure can perform an observation-by-observation comparison. In other words, all observations in the ADAE_SQL data are unique by the SUBJID + AESEQ composite index, and all observations in the ADLIVER_SQL data set are unique by the SUBJID + ADT + PARAMCD composite index.

PROC SQL offers several practical advantages over the DATA step for the DOSEON derivation: It does not require prior sorting; it supports joins on variables with the same name through the use of aliases without overwriting values; it requires fewer lines of code; and it provides an intuitive BETWEEN–AND operator for interval-based matching.

Note that the resultant ADAE_SQL and ADLIVER_SQL data sets are used as the baseline data sets against which all functionally equivalent methods will be validated. That is, the COMPARE procedure is repeatedly utilized to demonstrate that subsequent procedural and functional solutions are, in fact, producing identical results.

PROCEDURAL: MERGING WITH SAS MACRO

A SAS macro is compiled code that can be *executed* (i.e., “called”) within a SAS program, making it well suited for repeated and standardized tasks. Reusing the same DATA step and/or PROC SQL code across multiple analysis data set programs increases code maintenance and can become unnecessarily cumbersome over time. SAS macro code can be written to emulate a function and therefore be called using a single SAS statement; however, macros are not inherently functional by design. In the context of this paper, the SAS macro presented is classified as a procedural solution because it expands the procedural PROC SQL statements that perform the DOSEON derivation. This classification does not preclude the possibility of implementing DOSEON as a functional SAS macro, as the final program in this text demonstrates by combining the flexibility of SAS macros with the modular design of FCMP user-defined functions.

When DOSEON has a stable definition that must be derived consistently across all analysis data sets, encapsulating the DOSEON derivation logic within a SAS macro provides abstraction and modularity (Hughes, 2022). This approach minimizes maintenance effort and reduces the risk of inconsistencies by centralizing the DOSEON derivation logic in a single, well-defined location.

Program 3. DOSEON in a SAS Macro

```
/* Define the SAS macro DERIVE_DOSEON */
%macro DERIVE_DOSEON(indata =, indate = );
PROC SQL;
```

```
    create table &INDATA._MACRO as
        select indata.*,
               ex.exdose as DOSEON,
               ex.exdoseu as DOSEU
        from &INDATA as indata
        left join adex as ex
        on ex.subjid=indata.subjid and
            &INDATA..&INDATE BETWEEN ex.astdt AND ex.aendt and
            NOT MISSING(&INDATA..&INDATE)
        ;
QUIT ;
%mend ;
/* Call DERIVE_DOSEON for ADAE and ADLIVER */
%derive_doseon(indata = ADAE, indate = ASTDT) ;
%derive_doseon(indata = ADLIVER, indate = ADT );
```

Program 3 is a macro is built upon PROC SQL given the benefits mentioned in the previous section. This sample macro code is intended as a starting point and may need to be adapted to fit your production environment and analysis requirements. For example, although the INDATE parameter can flexibly configure the start date, the end date (ADEX.AENDT) is consistently populated in ADEX, so this variable name is not configurable.

Note that the SQL procedure in Program 2 uses the ORDER BY clause to sort the resultant data sets (ADAE by SUBJID and AESEQ; ADLIVER by SUBJID, ADT, and PARAMCD), the SQL procedure in Program 3 has no inherent sort functionality, and thus is unordered. While this sorting is not required to perform the lookup operation, it is required to order the data sets so that they can be validated. Thus, the following SORT procedures and COMPARE procedures validate (not shown) that the resultant data sets Program 3 are identical to those produced in Program 2:

```
proc sort data=adae_macro out=adae_macro_sorted;
   by subjid aeseq;
run;
proc compare base=adae_sql compare=adae_macro_sorted;
run;

proc sort data=adliver_macro out=adliver_macro_sorted;
   by subjid adt paramcd ;
run;
proc compare base=adliver_sql compare=adliver_macro_sorted;
run;
```

Two additional functionally equivalent procedural methods are demonstrated in the next two sections.

PROCEDURAL: DATA STEP HASH OBJECT LOOK-UP

The SAS hash object is an efficient, in-memory data structure that can be leveraged by both the DATA step and FCMP user-defined functions for lookup operations. That is, given some key (or composite keys), one or more associated values (i.e., key-value pairs) can be returned from a hash object during a lookup operation. The ADEX data set, previously described and ingested with code provided in Appendix B: ADEX, operates as the lookup table to be ingested into a hash object.

Two functionally equivalent methods of instantiating and querying a hash object are demonstrated in the next two subsections. The first method instantiates an empty hash object, after which hash key-value pairs are iteratively added by leveraging the SET statement (coupled with the hash ADD method) within a DO loop. The second method instead relies on the hash iterator object to iterate the hash object—both to add new key-value pairs and to skip key-value pairs that have been exploded. The significance of the two solutions is that although the SET statement cannot be ported to the FCMP procedure, the hash iterator object is viable within FCMP, so the second solution can be subsequently transformed from procedural to functional design.

INSTANTIATING AN EMPTY HASH OBJECT

The DATA step in Program 4 ingests the ADEX data set to initialize the hash object; the hash object is exploded to append unique dates for each subject; and the hash object is queried to determine if each observation in the ADAE data set matches an ADEX key-value pair.

Program 4. ADAE.DOSEON in a SAS DATA Step with an Empty Hash Object

```
data ADAE_HASH ;
    declare hash h_adex() ;
        rc_1 = h_adex.DefineKey('subjid', 'ASTDT') ; /* Note 1 */
        rc_2 = h_adex.DefineData('DOSEON', 'DOSEU') ;/* Note 2 */
        rc_3 = h_adex.DefineDone() ; /* Note 3 */
```

```
    /* Load the hash table with ADEX */
    do until (eof_adex) ;
        set adex (keep = subjid astdt aendt exdose exdoseu
                  rename=(astdt=ex_stdt  aendt=ex_endt
                          exdose=DOSEON exdoseu=DOSEU)) /* Note 4 */
                  end=eof_adex ;
        /* Exploding data set to one record per SUBJID per ADEX.ASTDT */
        do ASTDT = ex_stdt to ex_endt ; /* Note 5 */
            rc_4 = h_adex.add() ;
        end ;
    end ;
    /* Bring in analysis data, ADAE */
    do until (eof_ae) ;
        set adae end=eof_ae ; /* Note 6 */
        rc_5 = h_adex.find() ; /* Note 7 */
        if rc_5 then do ;
            DOSEON = . ;
            DOSEU  = ' ' ;
        end ;
        output ;
    end ;
    drop rc_: ex_: ;
stop ; /* Note 8 */
run ;
```

The hash object (H_ADEX) comprises only those ADEX variables found in either the hash keys (SUBJID and ASTDT) and/or values (EXDOSE [renamed to EX_DOSE], and EXDOSEU [renamed to EX_DOSEU]); the remaining ADEX variables are not retained in memory.

1. DEFINEKEY specifies hash key variables. Unlike array indices, hash keys can be numeric or character. The two keys are SUBJID and ASTDT.
2. DEFINEDATA specifies hash value variables that are returned by hash lookup operations. For example, the variables EX_DOSE and EX_DOSEU are returned during any successful hash lookup.
3. DEFINEDONE closes the declaration of the hash object.
4. The SET statement for the exposure data is placed inside of a DO loop, which tells SAS to read all ADEX data in a single pass of the DATA step. Thus, all ADEX data are ingested before any observation from the analysis data set is evaluated.
5. The nested DO loop expands the ADEX data set to have one record per subject per date, and the ADD hash method loads these exploded observations into the hash object.
6. Now that the hash table is loaded as one record per subject per date of the expanded ADEX, the analysis data set (ADAE) is loaded using a DO loop.
7. The FIND hash method extracts associated key-value pairs from the hash table, and a return code of 0 indicates a successful lookup. That is, when ADAE.SUBJID and ADAE.ASTDT are found in the hash object, the values of ADAE.DOSEON and ADAE.DOSEU are initialized to the corresponding values of DOSEON and DOSEU, respectively, in the hash object.
8. STOP statement prevents subsequent passes of the DATA Step.

The DATA step in Program 4 has no inherent sort functionality, and thus is unordered. It is important to note that sorting is not required to perform the lookup operation and demonstrates a strength of utilizing the hash object; however, it is required to order the data sets so that they can be validated against the initial SQL solution (Program 2). Thus, the following SORT procedure and COMPARE procedure demonstrate that the DATA step is otherwise functionally equivalent to the preceding SQL solution:

```
proc sort data=adae_hash out=adae_hash_sorted;
   by subjid aeseq;
run;
proc compare base=adae_sql compare=adae_hash_sorted;
run;
```

One benefit of a DATA step solution (over a functionally equivalent SQL procedure solution) can thus be inferred—that the DATA step maintains the original order of the ADAE data set that is ingested using the SET statement. The SQL procedure, on the other hand, often reorders data as necessary during a JOIN to maximize computational efficiency, and this efficiency can come at the cost of a reordered data set. It is for this reason that the SQL ORDERED BY statement is

required to reorder the data (in Program 2), and thus why all subsequent functionally equivalent methods also require the SORT procedure to reorder data sets.

Program 5. ADLIVER.DOSEON in a SAS Data Step with an Empty Hash Object

```
data ADLIVER_HASH ;
    declare hash h_adex() ;
        rc_1 = h_adex.DefineKey('subjid', 'ADT') ;
        rc_2 = h_adex.DefineData('DOSEON', 'DOSEU') ;
        rc_3 = h_adex.DefineDone() ;
    /* Load the hash table with ADEX */
    do until (eof_adex) ;
        set adex (keep = subjid astdt aendt exdose exdoseu
                  rename=(astdt=ex_stdt  aendt=ex_endt
                          exdose=DOSEON exdoseu=DOSEU))
                  end=eof_adex ;
        /* Exploding data set to one record per SUBJID per ADEX.ADT */
        do ADT = ex_stdt to ex_endt ;
            rc_4 = h_adex.add() ;
        end ;
    end ;
    /* Bring in analysis data, ADLIVER */
    do until (eof_lb) ;
        set adliver end=eof_lb ;
        rc_5 = h_adex.find() ;
        if rc_5 then do ;
            DOSEON = . ;
            DOSEU  = ' ' ;
        end ;
        output ;
    end ;
    drop rc_: ex_: ;
stop ;
run ;
```

Program 5, which derives DOSEON within ADLIVER, is incredibly similar to Program 4, which derives ADAE.DOSEON, with the notable difference that the variable name ADT is used for the analysis date. The ADLIVER_HASH data set is sorted only to facilitate its comparison to the validated solution:

```
proc sort data=adliver_hash out=adliver_hash_sorted;
   by subjid adt paramcd;
run;
proc compare base=adliver_sql compare=adliver_hash_sorted;
run;
```

Hash facilitates a speedy, efficient evaluation of key membership, owing to its in-memory evaluation. Moreover, no sorting of the ADAE transactional data set or the ADEX lookup table is required, as might be required by other DATA step solutions, so this procedural approach is accomplished within a single DATA step.

INSTANTIATING AND INITIALIZING A HASH OBJECT WITH HITER

The DATA step in Program 6 ingests the ADEX data set to initialize the hash object; the hash object is exploded to append unique dates for each subject; and the hash object is queried to determine if each observation in the ADAE data set matches an ADEX key-value pair. In contrast to Program 5, the hash iterator object is additionally leveraged in Program 6 to iterate through the hash object using the hash NEXT method.

Program 6. ADAE.DOSEON in a SAS Data Step with ADEX Instantiated in Hash Object

```
data ADAE_data_step_hash (drop=_dt _rc _aendt_temp _skip rename=(exdose=DOSEON
exdoseu=DOSEU));
   length _dt 8 subjid $10 astdt 8 aendt 8 exdose 8 exdoseu $20 _aendt_temp 8;
   if _n_ = 1 then do;
      * initialize the hash object using the lookup table;
      declare hash h(dataset: 'adex', ordered: 'a');
      declare hiter iter('h');
      _rc = h.defineKey('subjid', 'astdt');
      _rc = h.defineData('subjid', 'astdt', 'aendt', 'exdose', 'exdoseu');
      call missing(exdose, exdoseu);
      _rc = h.defineDone();
      * explode the date ranges into new obs (keys);
      do while(iter.next()=0);
```

```
         _dt = astdt;
         do astdt = _dt to aendt;
            _rc = h.add();
            end;
         * skip past key-values that were just added;
         do _skip = 1 to (aendt-_dt);
            _rc = iter.next();
            end;
         end;
      * reset variables used to initialize hash object;
      call missing(subjid, astdt, aendt, exdose, exdoseu);
      end;
   * read the transactional data;
   set adae;
   * perform lookup operation;
   _aendt_temp = aendt;
   _rc = h.find();
   aendt = _aendt_temp;
run;
```

The hash object (H) is initialized to the data maintained in the ADEX data set, and the ORDERED keyword further denotes that the hash object should be ordered by the keys, SUBJID and ASTDT. However, only those variables found in either the hash keys (SUBJID and ASTDT) and/or values (SUBJID, ASTDT, AENDT, EXDOSE, and EXDOSEU) are ingested into the hash object; the remaining variables are not retained in memory.

Note that in addition to declaring the hash object (H), because the hash object must be subsequently iterated to *explode* that missing dates (extrapolated from the ASTDT to AENDT date range), the hash iterator object (ITER) also must be declared, which enables a pointer to move from one hash observation to another. The NEXT method is required to iterate the initialized hash object from one date range to the next, and is subsequently required to increment the pointer past the newly added key-value pairs, which is required to ensure that the newly added key-value pairs are not themselves subsequently exploded.

Additionally, because some of the hash key variables and value variables are also contained within the ADAE data set, the MISSING subroutine reinitializes these variables to missing before the SET statement. Without this intervention, the final ADEX observation ingested into the hash object would persist to the SET statement and could result in incorrect EXDOSE or EXDOSEU values.

The following procedures demonstrate (log not shown) that the ADAE_data_step_hash data set matches the data set produced by the previous SQL procedure solutions:

```
proc sort data=ADAE_data_step_hash out=ADAE_data_step_hash_sorted;
   by subjid aeseq;
run;
proc compare base=adae_sql compare=ADAE_data_step_hash_sorted;
run;
```

Despite the speed and efficiency of hash, the complexity of hash methods can arguably reduce software readability. This detractor can be overcome by instantiating hash objects not inside DATA steps but rather inside user-defined functions (or subroutines), and these functional methods are demonstrated in the following sections.

FUNCTIONAL: USER-DEFINED FUNCTION HASH OBJECT LOOKUP

The SAS Function Compiler procedure (aka PROC FCMP) empowers SAS practitioners to create user-defined functions and subroutines—independent code modules that can be called from DATA steps and some procedures. Thereafter, user-defined functions can be saved for later reuse. The FCMP procedure is not fully described in this text, although its greatness is fully described in the legendary textbook: *PROC FCMP User-Defined Functions: An Introduction to the SAS® Function Compiler, Second Edition* (Hughes, 2026).

Functional design (or solutions), as distinguished from *procedural* design, implements functionality as a function—that is, called in a single statement rather than requiring oodles of exposed code. Despite the efficiency of the previous hash-based solution, the many hash methods and loops and guts inarguably messy the DATA step in which the hash object is instantiated, initialized, exploded, and finally queried. Functional approaches are no less complex, although they hide (i.e., abstract) their complexity inside a function definition, adopting modular software design that facilitates greater software readability, reusability, and configurability.

For example, Program 7 demonstrates a functionally equivalent DATA step solution, albeit a functional approach that appends the EXDOSE and EXDOSEU values through a single line of code:

```
rc=set_doseon_doseu_from_adex(subjid, astdt, aendt, exdose, exdoseu);
```

The high-level functionality of Program 7 is far clearer than functionally equivalent solutions demonstrated previously, yielding more readable software. Moreover, if other lookup operations are required to add different variables from different lookup tables, those operations, too, could be designed functionally (as opposed to procedurally), and similarly added through single-line statements—all within the same DATA step.

Program 7. Calling a User-Defined Function That Instantiates, Initializes, and Queries a Hash Object

```
options cmplib=work.funcs;

data ADAE_function_hash_v1 (drop=rc rename=(exdose=DOSEON exdoseu=DOSEU));
   set adae;
   length exdose 8 exdoseu $20;
   call missing(exdose, exdoseu);
   * initialize the EXDOSE and EXDOSEU variables from the ADEX lookup table;
   rc=set_doseon_doseu_from_adex(subjid, astdt, aendt, exdose, exdoseu);
run;
```

Note that the CMPLIB (i.e., compile or compilation library) option is required and must reference the library and data set (in dot notation) to which the OUTLIB FCMP option had specified user-defined functions and subroutines would be saved. That is, OUTLIB tells SAS where to *save* our functions, and CMPLIB tells SAS where later to *find* our functions.

The following two subsections demonstrate two functionally equivalent solutions that embrace functional design techniques, and define the SET_DOSEON_DOSEU_FROM_ADEX user-defined function that is called in Program 7.

CALLING A FUNCTION THAT CALLS A SUBROUTINE

Program 8 defines the SET_DOSEON_DOSEU_FROM_ADEX function, although the function cannot be run (i.e., the function cannot be compiled) until after running Program 9, which is demonstrated subsequently. This dependency results because the SET_DOSEON_DOSEU_FROM_ADEX function calls a subordinate EXPLODE_HASH user-defined subroutine that first must be compiled.

Program 8. Instantiating, Initializing, and Exploding the ADEX-Derived Hash Object

```
proc fcmp outlib=work.funcs.pharma;
   function set_doseon_doseu_from_adex(subjid $, astdt, aendt, exdose, exdoseu $);
      outargs exdose, exdoseu;
      static called 0;

      * instantiate the hash object and iterator object;
      declare hash h(dataset: 'adex', ordered: 'a');
      declare hiter iter('h');
      rc = h.defineKey('subjid', 'astdt');
      rc = h.defineData('subjid', 'astdt', 'aendt', 'exdose', 'exdoseu');
      rc = h.defineDone();

      * explode the dates when function is first called;
      if called=0 then do;
         called = 1;
         call explode_hash(h, iter);
         end;

      * query hash object to return values;
      rc = h.find();
      return(rc);
      endfunc;
quit;
```

Note that the high-level steps are identical to those demonstrated in the preceding DATA step hash solution (i.e., Program 6), in which the hash object is first instantiated and initialized to the data inside the ADEX data set; the hash object is subsequently exploded to add key-value pairs across each date range; and the hash object is finally queried repeatedly to determine which observations in the ADAE data set have a corresponding key in the hash object.

The OUTLIB option specifies (in dot notation) the library, data set, and package in which the function definition will be saved; the option is, well, *optional*, although omitting OUTLIB will result in a function that is not saved and cannot be called:

```
outlib=work.funcs.pharma;
```

The FUNCTION statement declares (and names) the function, as well as declares its parameters (and their position, data types, data structure, and dimensionality):

```
function set_doseon_doseu_from_adex(subjid $, astdt, aendt, exdose, exdoseu $);
```

That is, when SET_DOSEON_DOSEU_FROM_ADEX is called from the DATA step, the *arguments* passed *to* the function must align positionally with the *parameters* declared *in* the function.

Note that the FCMP procedure STATIC statement operates somewhat equivalently to the DATA step RETAIN statement, in that variables that are declared by STATIC have their values retained across multiple function calls:

```
static called 0;
```

Thus, when SET_DOSEON_DOSEU_FROM_ADEX is first called by the DATA step, STATIC initializes the variable Called to 0, which subsequently facilitates performing operations (i.e., the explosion of the hash object) only the first time the function is called. Thereafter, `called` is reinitialized to 1, so on all subsequent function calls, the IF block will not be executed.

The DECLARE HASH statement instantiates the hash object, and the DECLARE HITER statement instantiates the hash iterator object. Thereafter, the DEFINEKEY and DEFINEDATA hash methods further define the hash object, after which the DEFINEDONE method finalizes initialization by ingesting the ADEX data set into the hash object. It is important to note that each of the following five statements is only executed the first time the function is called, so unlike the DATA step equivalent, there is no need for an _N_=1 block to execute this code conditionally:

```
declare hash h(dataset: 'adex', ordered: 'a');
declare hiter iter('h');
rc = h.defineKey('subjid', 'astdt');
rc = h.defineData('subjid', 'astdt', 'aendt', 'exdose', 'exdoseu');
rc = h.defineDone();
```

However, all other code between the FUNCTION and ENDFUNC statements does execute each time the function is called, so it is necessary (by leveraging STATIC) to test and ensure that the hash object is only exploded once:

```
if called=0 then do;
   called = 1;
   call explode_hash(h, iter);
   end;
```

After the hash object has been instantiated, initialized, and exploded, the hash FIND method performs the hash object query each time the function is called. FIND returns a 0 when the composite keys (SUBJID and ASTDT) are found in the hash object, and additionally initializes the values of AENDT, EXDOSE, and EXDOSEU (in the function) to the corresponding values (retrieved from the hash lookup):

```
rc = h.find();
```

However, because the OUTARGS statement only specifies EXDOSE and EXDOSEU (as being declared as *call-by-reference* parameters, as opposed to *call-by-value* parameters), only EXDOSE and EXDOSEU are modified in the calling DATA step—and not AENDT:

```
outargs exdose, exdoseu;
```

Thus, the ultimate result of the DATA step calling SET_DOSEON_DOSEU_FROM_ADEX is that the EXDOSE and EXDOSEU variables are initialized—to *values*, when the SUBJID and ASDTD match a key-value pair in the ADEX hash object, or to *missing values*, if the composite keys are not found in the hash object.

User-defined functions and subroutines can also call other user-defined functions and subroutines, and inside SET_DOSEON_DOSEU_FROM_ADEX, the CALL statement calls the EXPLODE_HASH user-defined subroutine and passes two arguments—the hash object (H) and the hash iterator object (ITER):

```
call explode_hash(h, iter);
```

Thus, in addition to declaring character and numeric scalar parameters, as well as character and numeric array parameters, functions can also declare hash parameters and even hash iterator parameters!

Despite SAS Institute documentation omitting this FCMP functionality, it does exist. No white paper has ever before been published that demonstrates declaring (or passing) a hash iterator parameter, and only one white paper has ever demonstrated declaring and passing a hash object parameter (Andrew Henrick, 2013).

Program 9 defines the EXPLODE_HASH user-defined subroutine, which declares a hash object parameter (H) and a hash iterator parameter (ITER), both of which are instantiated in SET_DOSEON_DOSEU_FROM_ADEX and passed (by reference) to EXPLODE_HASH. That is, EXPLODE_HASH is able to modify both the hash object and its iterator, and these modifications persist when EXPLODE_HASH terminates and returns program control back to SET_DOSEON_DOSEU_FROM_ADEX. No OUTARGS statement is necessary because both hash object parameters and hash iterator parameters are declared *by reference* by default, as opposed to scalar and array parameters, which are

declared *by value* by default. Additionally, no RETURN statement is required (or allowed, for that matter) because subroutines, unlike functions, do not return a value.

Program 9. User-Defined Subroutine to Explode Date Ranges, Version 1

```
proc fcmp outlib=work.funcs.pharma;
   subroutine explode_hash(h hash, iter hiter);
      length dt 8 subjid $10 astdt 8 aendt 8 exdose 8 exdoseu $20;
      do while(iter.next()=0);
         dt=astdt;
         * explode each date to add incremental key-value pairs;
         do astdt = dt to aendt;
            rc = h.add();
            end;
         * skip past key-values that were just added;
         do i = 1 to (aendt-astdt);
            rc = iter.next();
            end;
         end;
   endsub;
quit;
```

Thus, although SET_DOSEON_DOSEU_FROM_ADEX is unable to modify the ADEX date values directly (to increment dates from ASTDT to AENDT), SET_DOSEON_DOSEU_FROM_ADEX can pass the entire hash object and hash iterator to the subroutine to update both objects.

As previously demonstrated within Program 4, Program 5, and Program 6, the hash ADD method explodes the hash object (by adding new key-value pairs) so that all dates exist as keys. The hash NEXT method is subsequently required to skip past those newly added key-value pairs so that they themselves will not be unnecessarily exploded.

To execute the programs in this section, Program 9 must be run first (to compile the subroutine), followed by Program 8 (to compile the function), followed by Program 7 (to run the DATA step). Thereafter, the ADAE_function_hash_v1 data set is sorted only to facilitate validation against the baseline data set:

```
proc sort data=ADAE_function_hash_v1 out=ADAE_function_hash_v1_sorted;
   by subjid aeseq;
run;

proc compare base=adae_sql compare=ADAE_function_hash_v1_sorted;
run;
```

In the next section, a functionally equivalent (and only subtly different) user-defined function is defined to highlight some design considerations.

CALLING A FUNCTION THAT CALLS A SUBROUTINE THAT CALLS ANOTHER SUBROUTINE

A second, functionally equivalent solution also demonstrating functional design now decomposes the EXPLODE_HASH user-defined subroutine (Program 9) into two subroutines—an updated EXPLODE_HASH subroutine (Program 10) and a new ADD_HASH subroutine (Program 11). This decomposition is not required, but illustrates some of the flexibility in function and subroutine design while highlighting how modular software design can be refactored behind the scenes without exposing the end user to any awareness of these updates. Note that Program 11, shown subsequently, must be compiled prior to Program 10.

Program 10. User-Defined Subroutine to Explode Date Ranges, Version 2

```
proc fcmp outlib=work.funcs.pharma;
   subroutine explode_hash(h hash, iter hiter);
      do while(iter.next()=0);
         do dt = astdt to aendt;
         * explode each date to add incremental key-value pairs;
            call add_hash(h, subjid, dt, aendt, exdose, exdoseu);
            end;
         * skip past key-values that were just added;
         do i = 1 to (aendt-astdt);
            rc = iter.next();
            end;
         end;
   endsub;
quit;
```

This design change makes EXPLODE_HASH subtly cleaner, but at the cost of requiring an additional subroutine to be declared and called. Thus, rather than directly invoking the hash ADD method, EXPLODE_HASH now calls the ADD_HASH user-defined subroutine:

```
call add_hash(h, subjid, dt, aendt, exdose, exdoseu);
```

Note that rather than ASTDT being passed to ADD_HASH, the DT argument is passed in its place—the value that is being iterated from ASTDT to AENDT. However, as noted, this design shift requires the ADD_HASH subroutine to be defined, as demonstrated in Program 11.

Program 11. User-Defined Subroutine to Add New Key-Value Pair to Hash Object

```
proc fcmp outlib=work.funcs.pharma;
   subroutine add_hash(hash_obj hash, subjid $, astdt, aendt, exdose, exdoseu $);
      rc = hash_obj.add();
      endsub;
quit;
```

ADD_HASH is directly passed DT, so the subroutine does not need to initialize DT to ASTDT directly. And, as previously demonstrated, because the HASH_OBJ hash object parameter is declared (by default) as being passed by reference (and because subroutines do not return values), neither the OUTARGS nor RETURN statement is required.

To execute the programs in this section, Program 11 must be run first (to compile the ADD_HASH subroutine), followed by Program 10 (to compile the EXPLODE_HASH subroutine). Next, Program 12 is run, which calls the SET_DOSEON_DOSEU_FROM_ADEX to perform the hash lookup. Note that Program 12 only differs from Program 7 in that the former appends “V2” to the data set, whereas the latter appends “V1” to the data set.

Program 12. Calling a User-Defined Function That Instantiates, Initializes, and Queries a Hash Object

```
options cmplib=work.funcs;

data ADAE_function_hash_v2 (drop=rc rename=(exdose=DOSEON exdoseu=DOSEU));
   set adae;
   length exdose 8 exdoseu $20;
   call missing(exdose, exdoseu);
   * initialize the EXDOSE and EXDOSEU variables from the ADEX lookup table;
   rc=set_doseon_doseu_from_adex(subjid, astdt, aendt, exdose, exdoseu);
run;
```

Thereafter, the resultant data set is sorted and validated against the baseline data set, and this comparison again shows no differences:

```
proc sort data=ADAE_function_hash_v2 out=ADAE_function_hash_v2_sorted;
   by subjid aeseq;
run;

proc compare base=adae_sql compare=ADAE_function_hash_v2_sorted;
run;
```

The added complexity (of adding the ADD_HASH subroutine) may not be worth the reduction of complexity (evinced by removing the DT initialization from the previous EXPLODE_HASH subroutine), and of course performance testing (such as runtime analysis and system resource utilization) should be considered when comparing various solutions.

However, note the salient advantage—that because *functional* design (as opposed to *procedure* design) and modular software design have been embraced, no changes were required to the manner in which the SET_DOSEON_DOSEU_FROM_ADEX was called in both Program 7 and Program 12. Equally impressive, the same SET_DOSEON_DOSEU_FROM_ADEX function could be reused without modification between the two versions—because all changes were confined to the EXPLODE_HASH function—and whether it called a separate subroutine (ADD_HASH) to delegate functionality.

Finally, it is worth noting one last time that the complexity of the DATA step hash functionality has been distilled into a single yet powerful function call that efficiently leverages and even explodes a hash object behind the scenes. And the mechanics that fuel the SET_DOSEON_DOSEU_FROM_ADEX fuzzy matching are obscured from view to maximize readability of the DATA step (or SAS procedure) in which it is called.

CONCLUSION

Although the CDISC definition of DOSEON is conceptually straightforward, its derivation requires careful handling of date-to-date-range matching due to the absence of a true primary key. This paper demonstrated that deriving DOSEON is fundamentally a fuzzy matching problem. Four approaches were presented in Base SAS to address this challenge: hash in the DATA step, joins using the BETWEEN-AND operator in PROC SQL, encapsulation of PROC SQL code

within a reusable SAS macro, and the use of a user-defined function implemented with PROC FCMP. Each method has strengths and limitations, and the most appropriate choice depends on factors such as data set size, programming standards, reuse requirements, and production environment constraints. PROC SQL offers a concise and intuitive solution for interval-based joins, whereas SAS macros and PROC FCMP provide opportunities for abstraction, reuse, and consistent application of DOSEON logic across OCCDS and BDS data sets. By understanding these techniques, programmers can implement robust and traceable DOSEON derivations that align with CDISC standards and study-specific analysis requirements. Reliable date-range matching supports accurate downstream analyses while reinforcing CDISC ADaM traceability by ensuring a clear link between analysis results and the underlying source data, as well as promoting consistent, maintainable ADaM production.

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CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the authors at:

Inka Leprince
InkaStat Solutions, LLC
leprince@inkastat.com

Troy Martin Hughes
troymartinhughes@gmail.com

APPENDIX A: ADSL

```
data ADSL;
   infile datalines dsd delimiter=',';
   length STUDYID $7 SUBJID $5 AGE 8 SEX $1 RACE $25 ETHNIC $22 SAFFL $1 ARMCD $4 ARM $17 TRT01P $17
          TRTSDT 8          TRTEDT 8          EOTSTT $12 DCTREAS $32 EOSDT 8  EOSSTT $12 DCSREAS $21 ;
   input  STUDYID $  SUBJID $  AGE   SEX $  RACE $   ETHNIC $   SAFFL $  ARMCD $  ARM $   TRT01P $
          TRTSDT :yymmdd10. TRTEDT :yymmdd10. EOTSTT $   DCTREAS $   EOSDT :yymmdd10. EOSSTT $   DCSREAS $ ;
   format TRTSDT TRTEDT EOSDT yymmdd10. ;
   label STUDYID='Study Identifier' SUBJID='Subject Identifier for the Study' AGE='Age' SEX='Sex' RACE='Race'
ETHNIC='Ethnicity' SAFFL='Safety Population Flag' ARMCD='Planned Arm Code' ARM='Description of Planned Arm' TRT01P='Planned
Treatment for Period 01' TRTSDT='Date of First Exposure to Treatment' TRTEDT='Date of Last Exposure to Treatment' EOTSTT='End
of Treatment Status' DCTREAS='Reason for Discontinuation of Treatment' EOSDT='End of Study Date' EOSSTT='End of Study Status'
DCSREAS='Reason for Discontinuation from Study' ;
   datalines ;
CAMELOT,BLAZE,61,M,WHITE,HISPANIC OR LATINO,Y,750,750 ML CAMILK QD,750 ML CAMILK QD,2025-11-16,2026-08-
17,DISCONTINUED,WITHDRAWAL BY SUBJECT,2026-08-17,DISCONTINUED,WITHDRAWAL BY SUBJECT
CAMELOT,BUMPY,57,M,WHITE,NOT HISPANIC OR LATINO,Y,500,500 ML CAMILK QD,500 ML CAMILK QD,2025-10-11,2026-09-
14,DISCONTINUED,WITHDRAWAL BY SUBJECT,2026-10-12,DISCONTINUED,WITHDRAWAL BY SUBJECT
CAMELOT,CAMMY,65,F,ASIAN,NOT HISPANIC OR LATINO,Y,750,750 ML CAMILK QD,750 ML CAMILK QD,2025-12-18,2026-07-
16,DISCONTINUED,WITHDRAWAL BY SUBJECT,2026-08-16,DISCONTINUED,WITHDRAWAL BY SUBJECT
CAMELOT,DUNEY,70,M,WHITE,NOT HISPANIC OR LATINO,Y,500,500 ML CAMILK QD,500 ML CAMILK QD,2025-06-29,2026-01-
24,DISCONTINUED,RADIOGRAPHIC PROGRESSIVE DISEASE,2026-09-23,DISCONTINUED,WITHDRAWAL BY SUBJECT
CAMELOT,OASIS,67,F,WHITE,NOT HISPANIC OR LATINO,Y,500,500 ML CAMILK QD,500 ML CAMILK QD,2025-08-31,2026-07-
30,DISCONTINUED,WITHDRAWAL BY SUBJECT,2026-08-28,DISCONTINUED,WITHDRAWAL BY SUBJECT
CAMELOT,ROCCO,56,M,BLACK OR AFRICAN AMERICAN,HISPANIC OR LATINO,Y,750,750 ML CAMILK QD,750 ML CAMILK QD,2025-10-12,2026-02-
14,DISCONTINUED,RADIOGRAPHIC PROGRESSIVE DISEASE,2026-04-14,DISCONTINUED,WITHDRAWAL BY SUBJECT
CAMELOT,SANDY,83,F,WHITE,HISPANIC OR LATINO,Y,1000,1000 ML CAMILK QD,1000 ML CAMILK QD,2026-03-27,2026-09-
09,DISCONTINUED,WITHDRAWAL BY SUBJECT,2026-10-12,DISCONTINUED,WITHDRAWAL BY SUBJECT
CAMELOT,SUNNY,77,F,ASIAN,NOT HISPANIC OR LATINO,Y,1000,1000 ML CAMILK QD,1000 ML CAMILK QD,2026-01-02,2026-08-
21,DISCONTINUED,WITHDRAWAL BY SUBJECT,2026-09-21,DISCONTINUED,WITHDRAWAL BY SUBJECT
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run;
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APPENDIX B: ADEX

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data ADEX ;
infile datalines dsd delimiter=',';
   length STUDYID $7 SUBJID $5 ACYCLE $8 ACYCLEN 8 EXPLDOS 8 EXTRT $6 EXCAT $13 EXDOSE 8
          EXDOSEU $2 EXDOSFRQ $2 EXDOSFRM $10 EXROUTE $4 ASTDT 8          AENDT 8
          EXADJ $35 EXREASND $44 ;
   input  STUDYID $  SUBJID $  ACYCLE $  ACYCLEN   EXPLDOS   EXTRT $  EXCAT $   EXDOSE
          EXDOSEU $  EXDOSFRQ $  EXDOSFRM $   EXROUTE $  ASTDT :yymmdd10. AENDT :yymmdd10.
          EXADJ $   EXREASND $ ;
   format ASTDT AENDT yymmdd10. ;
   label STUDYID='Study Identifier' SUBJID='Subject Identifier for the Study' ACYCLE='Analysis Cycle' ACYCLEN='Analysis Cycle
(N)' EXPLDOS='Planned Dose' EXTRT='Name of Treatment' EXCAT='Category of Treatment' EXDOSE='Dose' EXDOSEU='Dose Units'
EXDOSFRQ='Dosing Frequency per Interval' EXDOSFRM='Dose Form' EXROUTE='Route of Administration' ASTDT='Analysis Start Date'
AENDT='Analysis End Date' EXADJ='Reasons for Dose Adjustment' EXREASND='Reason Not Done';
   datalines ;
CAMELOT,DUNEY,CYCLE 01,1,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-06-29,2025-07-19,,
CAMELOT,DUNEY,CYCLE 02,2,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-07-20,2025-08-09,,
CAMELOT,DUNEY,CYCLE 03,3,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-08-10,2025-08-29,,
CAMELOT,DUNEY,CYCLE 04,4,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-08-30,2025-09-16,,
CAMELOT,DUNEY,CYCLE 04,4,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2025-09-17,2025-09-20,,CAMILK WENT RANCID
CAMELOT,DUNEY,CYCLE 05,5,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2025-09-21,2025-10-10,,CAMILK WENT RANCID
CAMELOT,DUNEY,CYCLE 06,6,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-10-11,2025-11-01,,
CAMELOT,DUNEY,CYCLE 07,7,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-11-02,2025-11-16,,
CAMELOT,DUNEY,CYCLE 07,7,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-11-17,2025-11-22,,
CAMELOT,DUNEY,CYCLE 08,8,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2025-11-23,2025-12-12,DOSE ESCALATION,
CAMELOT,DUNEY,CYCLE 09,9,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2025-12-13,2025-12-16,,
CAMELOT,DUNEY,CYCLE 09,9,750,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2025-12-17,2025-12-17,,ADVERSE EVENT
CAMELOT,DUNEY,CYCLE 09,9,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2025-12-18,2026-01-02,,
CAMELOT,CAMMY,CYCLE 01,1,500,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2025-12-18,2026-01-07,,
CAMELOT,CAMMY,CYCLE 02,2,500,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-01-08,2026-01-28,,
CAMELOT,CAMMY,CYCLE 03,3,500,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-01-29,2026-02-21,,
CAMELOT,CAMMY,CYCLE 04,4,500,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-02-22,2026-03-11,,
CAMELOT,CAMMY,CYCLE 05,5,500,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-03-12,2026-04-01,,
CAMELOT,CAMMY,CYCLE 06,6,500,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-04-02,2026-04-23,,
CAMELOT,CAMMY,CYCLE 07,7,500,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-04-24,2026-05-13,,
CAMELOT,CAMMY,CYCLE 08,8,500,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-05-14,2026-06-03,,
CAMELOT,CAMMY,CYCLE 09,9,500,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-06-04,2026-06-25,,
CAMELOT,CAMMY,CYCLE 10,10,500,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-06-26,2026-07-15,,
CAMELOT,CAMMY,CYCLE 11,11,750,CAMILK,ADJUSTED DOSE,1000,mL,QD,SUSPENSION,ORAL,2026-07-16,2026-07-16,DOSE ESCALATION,
CAMELOT,SANDY,CYCLE 01,1,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-03-27,2026-04-16,,
CAMELOT,SANDY,CYCLE 02,2,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-04-17,2026-04-21,,
CAMELOT,SANDY,CYCLE 02,2,1000,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-04-22,2026-04-23,,FORGOT TO DRINK CAMILK
CAMELOT,SANDY,CYCLE 02,2,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-04-24,2026-04-26,,
CAMELOT,SANDY,CYCLE 02,2,1000,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-04-27,2026-04-30,,ADVERSE EVENT
CAMELOT,SANDY,CYCLE 02,2,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-05-01,2026-05-02,,
CAMELOT,SANDY,CYCLE 02,2,1000,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-05-03,2026-05-03,,FORGOT TO DRINK CAMILK
CAMELOT,SANDY,CYCLE 02,2,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-05-04,2026-05-05,,
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CAMELOT,SANDY,CYCLE 02,2,1000,CAMILK,ADJUSTED DOSE,500,mL,QD,SUSPENSION,ORAL,2026-05-06,2026-05-06,DOSING ERROR,
CAMELOT,SANDY,CYCLE 03,3,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-05-07,2026-05-07,,
CAMELOT,SANDY,CYCLE 03,3,1000,CAMILK,ADJUSTED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-05-08,2026-05-08,,SUBJECT TOOK (PARTIAL) DOSE
AND THEN VOMITED
CAMELOT,SANDY,CYCLE 03,3,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-05-09,2026-05-09,,
CAMELOT,SANDY,CYCLE 03,3,1000,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-05-10,2026-05-10,,ADVERSE EVENT
CAMELOT,SANDY,CYCLE 03,3,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-05-11,2026-05-15,,
CAMELOT,SANDY,CYCLE 03,3,1000,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-05-16,2026-05-16,,ADVERSE EVENT
CAMELOT,SANDY,CYCLE 03,3,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-05-17,2026-05-18,,
CAMELOT,SANDY,CYCLE 03,3,1000,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-05-19,2026-05-20,,ADVERSE EVENT
CAMELOT,SANDY,CYCLE 03,3,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-05-21,2026-05-22,,
CAMELOT,SANDY,CYCLE 03,3,1000,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-05-23,2026-05-27,,FORGOT TO DRINK CAMILK
CAMELOT,SANDY,CYCLE 04,4,500,CAMILK,ADJUSTED DOSE,500,mL,QD,SUSPENSION,ORAL,2026-05-28,2026-06-04,DOSE REDUCTION DUE TO ADVERSE
EVENT,
CAMELOT,SANDY,CYCLE 04,4,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-06-05,2026-06-05,,FORGOT TO DRINK CAMILK
CAMELOT,SANDY,CYCLE 04,4,500,CAMILK,ADJUSTED DOSE,500,mL,QD,SUSPENSION,ORAL,2026-06-06,2026-06-06,,
CAMELOT,SANDY,CYCLE 04,4,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-06-07,2026-06-07,,ADVERSE EVENT
CAMELOT,SANDY,CYCLE 04,4,500,CAMILK,ADJUSTED DOSE,500,mL,QD,SUSPENSION,ORAL,2026-06-08,2026-06-10,,
CAMELOT,SANDY,CYCLE 04,4,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-06-11,2026-06-11,,FORGOT TO DRINK CAMILK
CAMELOT,SANDY,CYCLE 04,4,500,CAMILK,ADJUSTED DOSE,500,mL,QD,SUSPENSION,ORAL,2026-06-12,2026-06-12,,
CAMELOT,SANDY,CYCLE 04,4,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-06-13,2026-06-13,,FORGOT TO DRINK CAMILK
CAMELOT,SANDY,CYCLE 04,4,500,CAMILK,ADJUSTED DOSE,500,mL,QD,SUSPENSION,ORAL,2026-06-14,2026-06-14,,
CAMELOT,SANDY,CYCLE 04,4,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-06-15,2026-06-17,,FORGOT TO DRINK CAMILK
CAMELOT,SANDY,CYCLE 05,5,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-06-18,2026-06-20,,
CAMELOT,SANDY,CYCLE 05,5,500,CAMILK,ADJUSTED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-06-21,2026-06-21,,SUBJECT TOOK (PARTIAL) DOSE
AND THEN VOMITED
CAMELOT,SANDY,CYCLE 05,5,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-06-22,2026-07-03,,
CAMELOT,SANDY,CYCLE 05,5,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-07-04,2026-07-04,,ADVERSE EVENT
CAMELOT,SANDY,CYCLE 05,5,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-07-05,2026-07-06,,
CAMELOT,SANDY,CYCLE 05,5,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-07-07,2026-07-07,,FORGOT TO DRINK CAMILK
CAMELOT,SANDY,CYCLE 05,5,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-07-08,2026-07-08,,
CAMELOT,SANDY,CYCLE 06,6,500,CAMILK,ADJUSTED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-07-09,2026-07-09,,SUBJECT TOOK (PARTIAL) DOSE
AND THEN VOMITED
CAMELOT,SANDY,CYCLE 06,6,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-07-10,2026-07-14,,
CAMELOT,SANDY,CYCLE 06,6,500,CAMILK,ADJUSTED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-07-15,2026-07-15,,SUBJECT TOOK (PARTIAL) DOSE
AND THEN VOMITED
CAMELOT,SANDY,CYCLE 06,6,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-07-16,2026-07-19,,
CAMELOT,SANDY,CYCLE 06,6,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-07-20,2026-07-20,,ADVERSE EVENT
CAMELOT,SANDY,CYCLE 06,6,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-07-21,2026-07-22,,
CAMELOT,SANDY,CYCLE 06,6,500,CAMILK,ADJUSTED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-07-23,2026-07-23,,SUBJECT TOOK (PARTIAL) DOSE
AND THEN VOMITED
CAMELOT,SANDY,CYCLE 06,6,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-07-24,2026-07-25,,
CAMELOT,SANDY,CYCLE 06,6,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-07-26,2026-07-26,,ADVERSE EVENT
CAMELOT,SANDY,CYCLE 06,6,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-07-27,2026-07-27,,
CAMELOT,SANDY,CYCLE 06,6,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-07-28,2026-07-28,,ADVERSE EVENT
CAMELOT,SANDY,CYCLE 06,6,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-07-29,2026-07-29,,
CAMELOT,SANDY,CYCLE 07,7,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-07-30,2026-08-04,,
CAMELOT,SANDY,CYCLE 07,7,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-08-05,2026-08-05,,ADVERSE EVENT
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CAMELOT,SANDY,CYCLE 07,7,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-08-06,2026-08-11,,
CAMELOT,SANDY,CYCLE 07,7,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-08-12,2026-08-12,,ADVERSE EVENT
CAMELOT,SANDY,CYCLE 07,7,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-08-13,2026-08-18,,
CAMELOT,SANDY,CYCLE 07,7,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-08-19,2026-08-19,,
CAMELOT,SANDY,CYCLE 08,8,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-08-21,2026-09-05,,
CAMELOT,SANDY,CYCLE 08,8,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-09-06,2026-09-07,,ADVERSE EVENT
CAMELOT,SANDY,CYCLE 08,8,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-09-08,2026-09-09,,
CAMELOT,ROCCO,CYCLE 01,1,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2025-10-12,2025-10-31,,
CAMELOT,ROCCO,CYCLE 01,1,750,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2025-11-01,2025-11-01,,FORGOT TO DRINK CAMILK
CAMELOT,ROCCO,CYCLE 02,2,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2025-11-02,2025-11-22,,
CAMELOT,ROCCO,CYCLE 03,3,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2025-11-23,2025-12-12,,
CAMELOT,ROCCO,CYCLE 04,4,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2025-12-13,2026-01-03,,
CAMELOT,ROCCO,CYCLE 05,5,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-01-04,2026-01-24,,
CAMELOT,ROCCO,CYCLE 06,6,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-01-25,2026-02-14,,
CAMELOT,BLAZE,CYCLE 01,1,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2025-11-16,2025-12-06,,
CAMELOT,BLAZE,CYCLE 02,2,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2025-12-07,2025-12-28,,
CAMELOT,BLAZE,CYCLE 03,3,500,CAMILK,ADJUSTED DOSE,500,mL,QD,SUSPENSION,ORAL,2025-12-29,2026-01-18,DOSE REDUCTION DUE TO ADVERSE
EVENT,
CAMELOT,BLAZE,CYCLE 04,4,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-01-19,2026-02-08,,
CAMELOT,BLAZE,CYCLE 05,5,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-02-09,2026-03-01,,
CAMELOT,BLAZE,CYCLE 06,6,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-03-02,2026-03-22,,
CAMELOT,BLAZE,CYCLE 07,7,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-03-23,2026-04-12,,
CAMELOT,BLAZE,CYCLE 08,8,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-04-13,2026-05-03,,
CAMELOT,BLAZE,CYCLE 09,9,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-05-04,2026-05-24,,
CAMELOT,BLAZE,CYCLE 10,10,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-05-25,2026-06-14,,
CAMELOT,BLAZE,CYCLE 11,11,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-06-15,2026-07-05,,
CAMELOT,BLAZE,CYCLE 12,12,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-07-06,2026-07-26,,
CAMELOT,BLAZE,CYCLE 13,13,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-07-27,2026-08-17,,
CAMELOT,SUNNY,CYCLE 01,1,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-01-02,2026-01-22,,
CAMELOT,SUNNY,CYCLE 02,2,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-01-23,2026-02-12,,
CAMELOT,SUNNY,CYCLE 03,3,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-02-13,2026-03-05,,
CAMELOT,SUNNY,CYCLE 04,4,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-03-06,2026-03-26,,
CAMELOT,SUNNY,CYCLE 05,5,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-03-27,2026-04-17,,
CAMELOT,SUNNY,CYCLE 05,5,1000,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-04-18,2026-04-23,,FORGOT TO DRINK CAMILK
CAMELOT,SUNNY,CYCLE 06,6,750,CAMILK,ADJUSTED DOSE,750,mL,QD,SUSPENSION,ORAL,2026-04-24,2026-05-14,DOSE REDUCTION DUE TO ADVERSE
EVENT,
CAMELOT,SUNNY,CYCLE 07,7,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-05-15,2026-06-04,,
CAMELOT,SUNNY,CYCLE 08,8,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-06-05,2026-06-25,,
CAMELOT,SUNNY,CYCLE 09,9,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-06-26,2026-07-09,,
CAMELOT,SUNNY,CYCLE 10,10,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-07-10,2026-07-30,,
CAMELOT,SUNNY,CYCLE 11,11,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-07-31,2026-08-21,,
CAMELOT,OASIS,CYCLE 01,1,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2025-08-31,2025-08-31,,ADVERSE EVENT
CAMELOT,OASIS,CYCLE 01,1,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-09-01,2025-09-02,,
CAMELOT,OASIS,CYCLE 01,1,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2025-09-03,2025-09-03,,ADVERSE EVENT
CAMELOT,OASIS,CYCLE 01,1,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-09-04,2025-09-09,,
CAMELOT,OASIS,CYCLE 01,1,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2025-09-10,2025-09-10,,FORGOT TO DRINK CAMILK
CAMELOT,OASIS,CYCLE 01,1,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-09-11,2025-09-13,,
CAMELOT,OASIS,CYCLE 01,1,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2025-09-14,2025-09-14,,ADVERSE EVENT
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CAMELOT,OASIS,CYCLE 01,1,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-09-15,2025-09-20,,
CAMELOT,OASIS,CYCLE 02,2,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-09-21,2025-10-10,,
CAMELOT,OASIS,CYCLE 03,3,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-10-11,2025-10-30,,
CAMELOT,OASIS,CYCLE 04,4,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-10-31,2025-11-20,,
CAMELOT,OASIS,CYCLE 05,5,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-11-21,2025-11-24,,
CAMELOT,OASIS,CYCLE 05,5,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2025-11-25,2025-11-25,,FORGOT TO DRINK CAMILK
CAMELOT,OASIS,CYCLE 05,5,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-11-26,2025-11-30,,
CAMELOT,OASIS,CYCLE 05,5,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2025-12-01,2025-12-01,,FORGOT TO DRINK CAMILK
CAMELOT,OASIS,CYCLE 05,5,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-12-02,2025-12-11,,
CAMELOT,OASIS,CYCLE 06,6,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-12-12,2026-01-01,,
CAMELOT,OASIS,CYCLE 07,7,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-01-02,2026-01-17,,
CAMELOT,OASIS,CYCLE 07,7,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-01-18,2026-01-18,,FORGOT TO DRINK CAMILK
CAMELOT,OASIS,CYCLE 07,7,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-01-19,2026-01-22,,
CAMELOT,OASIS,CYCLE 08,8,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-01-23,2026-02-04,,
CAMELOT,OASIS,CYCLE 08,8,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-02-05,2026-02-05,,FORGOT TO DRINK CAMILK
CAMELOT,OASIS,CYCLE 08,8,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-02-06,2026-02-10,,
CAMELOT,OASIS,CYCLE 08,8,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-02-11,2026-02-11,,FORGOT TO DRINK CAMILK
CAMELOT,OASIS,CYCLE 08,8,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-02-12,2026-02-12,,
CAMELOT,OASIS,CYCLE 09,9,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-02-13,2026-02-15,,
CAMELOT,OASIS,CYCLE 09,9,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-02-16,2026-02-16,,FORGOT TO DRINK CAMILK
CAMELOT,OASIS,CYCLE 09,9,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-02-17,2026-02-23,,
CAMELOT,OASIS,CYCLE 09,9,500,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-02-24,2026-02-24,,FORGOT TO DRINK CAMILK
CAMELOT,OASIS,CYCLE 09,9,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-02-25,2026-03-05,,
CAMELOT,OASIS,CYCLE 10,10,750,CAMILK,ADJUSTED DOSE,750,mL,QD,SUSPENSION,ORAL,2026-03-06,2026-03-06,DISEASE PROGRESSION DURING
CYCLE,
CAMELOT,OASIS,CYCLE 10,10,750,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-03-07,2026-03-07,,FORGOT TO DRINK CAMILK
CAMELOT,OASIS,CYCLE 10,10,750,CAMILK,ADJUSTED DOSE,750,mL,QD,SUSPENSION,ORAL,2026-03-08,2026-03-08,,
CAMELOT,OASIS,CYCLE 10,10,750,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-03-09,2026-03-09,,FORGOT TO DRINK CAMILK
CAMELOT,OASIS,CYCLE 10,10,750,CAMILK,ADJUSTED DOSE,750,mL,QD,SUSPENSION,ORAL,2026-03-10,2026-03-25,,
CAMELOT,OASIS,CYCLE 10,10,750,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-03-26,2026-03-26,,CAMILK MISPLACED
CAMELOT,OASIS,CYCLE 11,11,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-03-27,2026-03-29,,
CAMELOT,OASIS,CYCLE 11,11,750,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-03-30,2026-03-30,,FORGOT TO DRINK CAMILK
CAMELOT,OASIS,CYCLE 11,11,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-03-31,2026-04-04,,
CAMELOT,OASIS,CYCLE 11,11,750,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-04-05,2026-04-16,,ADVERSE EVENT
CAMELOT,OASIS,CYCLE 12,12,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-04-17,2026-05-03,,
CAMELOT,OASIS,CYCLE 12,12,750,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-05-04,2026-05-04,,FORGOT TO DRINK CAMILK
CAMELOT,OASIS,CYCLE 12,12,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-05-05,2026-05-07,,
CAMELOT,OASIS,CYCLE 13,13,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-05-08,2026-05-28,,
CAMELOT,OASIS,CYCLE 14,14,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-05-29,2026-05-29,,
CAMELOT,OASIS,CYCLE 14,14,750,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-05-30,2026-05-30,,FORGOT TO DRINK CAMILK
CAMELOT,OASIS,CYCLE 14,14,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-05-31,2026-06-09,,
CAMELOT,OASIS,CYCLE 14,14,750,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-06-10,2026-06-10,,FORGOT TO DRINK CAMILK
CAMELOT,OASIS,CYCLE 14,14,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-06-11,2026-06-18,,
CAMELOT,OASIS,CYCLE 15,15,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-06-19,2026-07-07,,
CAMELOT,OASIS,CYCLE 15,15,750,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-07-08,2026-07-08,,CAMILK MISPLACED
CAMELOT,OASIS,CYCLE 15,15,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-07-09,2026-07-09,,
CAMELOT,OASIS,CYCLE 16,16,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-07-10,2026-07-30,,
CAMELOT,BUMPY,CYCLE 01,1,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-10-11,2025-10-26,,
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CAMELOT,BUMPY,CYCLE 01,1,500,CAMILK,ADJUSTED DOSE,0,mL,QD,SUSPENSION,ORAL,2025-10-27,2025-10-30,,SUBJECT TOOK (PARTIAL) DOSE
AND THEN VOMITED
CAMELOT,BUMPY,CYCLE 01,1,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-10-31,2025-10-31,,
CAMELOT,BUMPY,CYCLE 02,2,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-11-01,2025-11-23,,
CAMELOT,BUMPY,CYCLE 03,3,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-11-24,2025-12-12,,
CAMELOT,BUMPY,CYCLE 04,4,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2025-12-13,2026-01-04,,
CAMELOT,BUMPY,CYCLE 05,5,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-01-05,2026-01-25,,
CAMELOT,BUMPY,CYCLE 06,6,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-01-26,2026-02-15,,
CAMELOT,BUMPY,CYCLE 07,7,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-02-16,2026-03-08,,
CAMELOT,BUMPY,CYCLE 08,8,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-03-09,2026-03-27,,
CAMELOT,BUMPY,CYCLE 09,9,750,CAMILK,ADJUSTED DOSE,750,mL,QD,SUSPENSION,ORAL,2026-03-28,2026-04-09,DOSE ESCALATION,
CAMELOT,BUMPY,CYCLE 09,9,750,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-04-10,2026-04-10,,FORGOT TO DRINK CAMILK
CAMELOT,BUMPY,CYCLE 09,9,750,CAMILK,ADJUSTED DOSE,750,mL,QD,SUSPENSION,ORAL,2026-04-11,2026-04-12,,
CAMELOT,BUMPY,CYCLE 09,9,750,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-04-13,2026-04-13,,FORGOT TO DRINK CAMILK
CAMELOT,BUMPY,CYCLE 09,9,750,CAMILK,ADJUSTED DOSE,750,mL,QD,SUSPENSION,ORAL,2026-04-14,2026-04-16,,
CAMELOT,BUMPY,CYCLE 09,9,750,CAMILK,MISSED DOSE,0,mL,QD,SUSPENSION,ORAL,2026-04-17,2026-04-17,,FORGOT TO DRINK CAMILK
CAMELOT,BUMPY,CYCLE 09,9,750,CAMILK,ADJUSTED DOSE,750,mL,QD,SUSPENSION,ORAL,2026-04-18,2026-04-19,,
CAMELOT,BUMPY,CYCLE 10,10,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-04-20,2026-05-10,,
CAMELOT,BUMPY,CYCLE 11,11,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-05-11,2026-05-31,,
CAMELOT,BUMPY,CYCLE 12,12,750,CAMILK,,750,mL,QD,SUSPENSION,ORAL,2026-06-01,2026-06-21,,
CAMELOT,BUMPY,CYCLE 13,13,1000,CAMILK,ADJUSTED DOSE,1000,mL,QD,SUSPENSION,ORAL,2026-06-22,2026-06-22,DOSE ESCALATION,
CAMELOT,BUMPY,CYCLE 13,13,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-06-23,2026-07-12,,
CAMELOT,BUMPY,CYCLE 14,14,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-07-13,2026-08-02,,
CAMELOT,BUMPY,CYCLE 15,15,1000,CAMILK,,1000,mL,QD,SUSPENSION,ORAL,2026-08-03,2026-08-23,,
CAMELOT,BUMPY,,,0,CAMILK,,0,mL,QD,SUSPENSION,ORAL,2026-08-24,2026-09-03,,
CAMELOT,BUMPY,CYCLE 16,16,500,CAMILK,,500,mL,QD,SUSPENSION,ORAL,2026-09-04,2026-09-14,DOSE REDUCTION DUE TO ADVERSE EVENT,
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APPENDIX C: ADAE

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data ADAE ;
infile datalines dsd delimiter=',';
   length STUDYID $7 SUBJID $5 AESEQ 8 AETERM $45 AEDECOD $21 ASTDT 8 AENDT 8 AEACN $16 AEREL $11 ;
   input  STUDYID $  SUBJID $  AESEQ   AETERM $   AEDECOD $  ASTDT :yymmdd10. AENDT :yymmdd10. AEACN $ AEREL $ ;
   format ASTDT AENDT yymmdd10. ;
   label  STUDYID='Study Identifier' SUBJID='Subject Identifier for the Study' AESEQ='Sequence Number' AETERM='Reported Term
for the Adverse Event' AEDECOD='Dictionary-Derived Term' ASTDT='Analysis Start Date' AENDT='Analysis End Date' AEACN='Action
Taken with Study Treatment' AEREL='Causality' ;
datalines ;
CAMELOT,BUMPY,1,BAD BREATH,Bad breath,2025-10-10,,DOSE NOT CHANGED,RELATED
CAMELOT,BUMPY,2,NAUSEA,Nausea,2025-10-11,,DOSE NOT CHANGED,RELATED
CAMELOT,BUMPY,3,BURPING,Eructation,2025-10-25,2025-11-15,DRUG INTERRUPTED,NOT RELATED
CAMELOT,BUMPY,4,TINGLING IN FEET,Peripheral neuropathy,2025-10-25,2025-12-01,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BUMPY,5,JAUNDICE,Jaundice,2025-10-30,2026-05-11,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BUMPY,6,DYSGEUSIA,Dysgeusia,2025-11-15,,DOSE NOT CHANGED,RELATED
CAMELOT,BUMPY,7,SEEING MIRAGES,Visual hallucinations,2025-11-21,2025-11-24,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BUMPY,8,INCREASED WEIGHT,Weight increased,2025-11-24,2025-12-01,DRUG INTERRUPTED,RELATED
CAMELOT,BUMPY,9,WORSENING EDEMA,Generalised oedema,2025-11-24,2026-03-27,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BUMPY,10,TINGLING IN FEET,Peripheral neuropathy,2025-12-01,2025-12-13,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BUMPY,11,ACNE,Acne vulgaris,2025-12-05,2025-12-13,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BUMPY,12,TINGLING IN FEET,Peripheral neuropathy,2026-01-05,2026-04-20,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BUMPY,13,SOLAR ELASTOSIS,Actinic elastosis,2026-03-28,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BUMPY,14,POLYURIA,Polyuria,2026-06-01,2026-06-22,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BUMPY,15,FATIGUE,Fatigue,2026-09-11,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BUMPY,16,CHARLEY HORSE,Leg cramps,2026-09-15,2026-09-17,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BUMPY,17,KNOCK KNEES,Genu valgum,2026-10-12,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,CAMMY,1,DIARRHEA,Diarrhoea,2026-01-08,,DOSE NOT CHANGED,RELATED
CAMELOT,CAMMY,2,ANKLE SWELLING,Lower leg edema,2026-04-19,2026-04-21,DOSE NOT CHANGED,NOT RELATED
CAMELOT,CAMMY,3,VOMITING,Vomiting,2026-05-02,,DOSE NOT CHANGED,RELATED
CAMELOT,CAMMY,4,NAUSEA,Nausea,2026-06-22,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,DUNEY,1,BACK PAIN,Back pain,2025-06-15,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,DUNEY,2,WORSENING NAUSEA,Nausea,2025-07-06,,DOSE NOT CHANGED,RELATED
CAMELOT,DUNEY,3,CONSTIPATION,Constipation,2025-07-23,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,DUNEY,4,SEEING MIRAGES,Visual hallucinations,2025-12-27,2025-12-29,DOSE NOT CHANGED,NOT RELATED
CAMELOT,OASIS,1,VOMITING,Vomiting,2025-08-31,2025-09-14,DOSE NOT CHANGED,RELATED
CAMELOT,OASIS,2,NAUSEA,Nausea,2025-08-31,2025-10-05,DOSE NOT CHANGED,RELATED
CAMELOT,OASIS,3,DIARRHEA,Diarrhoea,2025-09-04,2025-12-12,DOSE NOT CHANGED,RELATED
CAMELOT,OASIS,4,ABDOMINAL PAIN,Abdominal pain,2025-09-07,2025-09-14,DOSE NOT CHANGED,RELATED
CAMELOT,OASIS,5,VIVID DREAMS,Abnormal dreams,2025-09-07,2025-09-21,DOSE NOT CHANGED,NOT RELATED
CAMELOT,OASIS,6,HYPERTENSION,Hypertension,2025-11-20,,DOSE NOT CHANGED,RELATED
CAMELOT,OASIS,7,WEIGHT INCREASED,Weight increased,2025-11-21,2025-12-12,DOSE NOT CHANGED,RELATED
CAMELOT,OASIS,8,"WEIGHT INCREASED, WORSENING",Weight increased,2026-01-02,2026-01-08,DOSE NOT CHANGED,RELATED
CAMELOT,OASIS,9,"WEIGHT INCREASED, IMPROVING",Weight increased,2026-01-23,2026-02-13,DOSE NOT CHANGED,RELATED
CAMELOT,OASIS,10,RIGHT KNEE PAIN,Arthralgia,2026-02-13,2026-03-26,DOSE NOT CHANGED,NOT RELATED
CAMELOT,OASIS,11,"RIGHT KNEE PAIN, INCREASED",Arthralgia,2026-03-27,2026-04-16,DOSE NOT CHANGED,NOT RELATED
CAMELOT,OASIS,12,ARTHRITIS,Arthritis,2026-03-27,,DOSE NOT CHANGED,NOT RELATED
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CAMELOT,OASIS,13,RIGHT KNEE PAIN,Arthralgia,2026-04-17,2026-05-08,DOSE NOT CHANGED,NOT RELATED
CAMELOT,OASIS,14,RIGHT KNEE PAIN,Arthralgia,2026-05-29,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,OASIS,15,DYSGEUSIA,Dysgeusia,2026-06-19,,DOSE NOT CHANGED,RELATED
CAMELOT,OASIS,16,WEIGHT LOSS,Weight decreased,2026-06-19,,DOSE NOT CHANGED,RELATED
CAMELOT,ROCCO,1,NAUSEA,Nausea,2025-10-12,2025-10-13,DOSE NOT CHANGED,RELATED
CAMELOT,ROCCO,2,SEEING MIRAGES,Visual hallucinations,2025-10-12,2025-10-13,DOSE NOT CHANGED,NOT RELATED
CAMELOT,ROCCO,3,SUNBURN,Sunburn,2025-10-12,2025-10-18,DOSE NOT CHANGED,NOT RELATED
CAMELOT,ROCCO,4,DIARRHEA,Diarrhoea,2025-10-17,2025-10-20,DOSE NOT CHANGED,RELATED
CAMELOT,ROCCO,5,FLATULENCE,Flatulence,2025-10-17,,DOSE NOT CHANGED,RELATED
CAMELOT,ROCCO,6,ABDOMINAL PAIN,Abdominal pain,2025-10-20,2026-02-27,DOSE NOT CHANGED,RELATED
CAMELOT,ROCCO,7,ANOREXIA,Decreased appetite,2025-10-26,,DOSE NOT CHANGED,RELATED
CAMELOT,ROCCO,8,FATIGUE,Fatigue,2025-10-26,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,ROCCO,9,KNOCK KNEES,Genu valgum,2025-10-26,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,ROCCO,10,SKIN ABRASION RIGHT FRONT FOOT,Skin abrasion,2025-11-08,2025-11-11,DOSE NOT CHANGED,NOT RELATED
CAMELOT,ROCCO,11,ANOREXIA,Decreased appetite,2025-11-08,2026-01-25,DOSE NOT CHANGED,NOT RELATED
CAMELOT,ROCCO,12,NAUSEA,Nausea,2025-11-08,,DOSE NOT CHANGED,RELATED
CAMELOT,ROCCO,13,DYSGEUSIA,Dysgeusia,2025-11-13,2026-01-25,DOSE NOT CHANGED,RELATED
CAMELOT,ROCCO,14,ABDOMINAL PAIN,Abdominal pain,2025-11-13,,DOSE NOT CHANGED,RELATED
CAMELOT,ROCCO,15,BAD BREATH,Bad breath,2025-11-16,2026-02-15,DOSE NOT CHANGED,RELATED
CAMELOT,ROCCO,16,BLOATING,Abdominal distension,2025-11-23,2026-02-15,DOSE NOT CHANGED,RELATED
CAMELOT,ROCCO,17,DYSGEUSIA,Dysgeusia,2025-12-06,2026-01-25,DOSE NOT CHANGED,RELATED
CAMELOT,ROCCO,18,FLATULENCE,Flatulence,2026-01-25,2026-02-15,DOSE NOT CHANGED,RELATED
CAMELOT,ROCCO,19,DYSGEUSIA,Dysgeusia,2026-01-25,2026-02-27,DOSE NOT CHANGED,RELATED
CAMELOT,ROCCO,20,ANOREXIA,Decreased appetite,2026-01-25,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,SANDY,1,WORSENING DIARRHEA,Diarrhoea,2026-04-09,2026-04-09,DOSE NOT CHANGED,RELATED
CAMELOT,SANDY,2,DYSGEUSIA,Dysgeusia,2026-04-13,2026-04-13,DOSE NOT CHANGED,RELATED
CAMELOT,SANDY,3,WORSENING NAUSEA,Nausea,2026-04-26,,DRUG INTERRUPTED,RELATED
CAMELOT,SANDY,4,SWELLING,Generalised oedema,2026-05-07,2026-05-10,DOSE NOT CHANGED,NOT RELATED
CAMELOT,SANDY,5,VOMITING,Vomiting,2026-05-23,,DOSE REDUCED,RELATED
CAMELOT,SUNNY,1,CHARLEY HORSE,Leg cramps,2026-01-02,2026-01-02,DOSE NOT CHANGED,NOT RELATED
CAMELOT,SUNNY,2,BLURRED VISION,Vision blurred,2026-01-06,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,SUNNY,3,INSOMNIA,Insomnia,2026-01-08,2026-04-15,DOSE NOT CHANGED,NOT RELATED
CAMELOT,SUNNY,4,BLOATING,Abdominal distension,2026-01-22,,DOSE NOT CHANGED,RELATED
CAMELOT,SUNNY,5,APPETITE LOSS,Decreased appetite,2026-03-28,2026-04-18,DOSE NOT CHANGED,RELATED
CAMELOT,SUNNY,6,WORSENING OF NAUSEA,Nausea,2026-03-28,2026-04-18,DOSE NOT CHANGED,RELATED
CAMELOT,SUNNY,7,SUNBURN,Sunburn,2026-03-28,2026-04-18,DOSE NOT CHANGED,NOT RELATED
CAMELOT,SUNNY,8,TINGLING IN FEET,Peripheral neuropathy,2026-03-28,2026-07-10,DOSE NOT CHANGED,NOT RELATED
CAMELOT,SUNNY,9,ABDOMINAL PAIN,Abdominal pain,2026-03-28,,DOSE NOT CHANGED,RELATED
CAMELOT,SUNNY,10,WATERING EYES,Lacrimation increased,2026-04-05,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,SUNNY,11,DIARRHEA,Diarrhoea,2026-04-15,2026-04-18,DRUG INTERRUPTED,RELATED
CAMELOT,SUNNY,12,VOMITING,Vomiting,2026-04-16,2026-04-16,NOT APPLICABLE,RELATED
CAMELOT,SUNNY,13,DIARRHEA,Diarrhoea,2026-04-19,2026-07-10,DOSE NOT CHANGED,RELATED
CAMELOT,SUNNY,14,FALL,Fall,2026-06-05,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,SUNNY,15,FLATULENCE,Flatulence,2026-06-05,,DOSE NOT CHANGED,RELATED
CAMELOT,SUNNY,16,CONSTIPATION,Constipation,2026-07-10,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,SUNNY,17,BAD BREATH,Bad breath,2026-07-10,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,SUNNY,18,FALL,Fall,2026-08-17,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BLAZE,1,SOMNOLENCE,Somnolence,2025-11-16,2025-11-17,DOSE NOT CHANGED,NOT RELATED
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CAMELOT,BLAZE,2,LEG CRAMP,Leg cramps,2025-11-17,2025-11-17,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BLAZE,3,ARTHRITIS,Arthritis,2025-11-17,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BLAZE,4,BLOATING,Bloating,2025-11-17,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BLAZE,5,NAUSEA,Nausea,2025-11-17,,DOSE REDUCED,RELATED
CAMELOT,BLAZE,6,SOLAR ELASTOSIS,Actinic elastosis,2025-11-30,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BLAZE,7,FALL,Fall,2025-12-11,2025-12-11,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BLAZE,8,TWISTED ANKLE,Ankle sprain,2025-12-11,2026-01-19,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BLAZE,9,CHARLEY HORSE,Leg cramps,2025-12-17,2025-12-17,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BLAZE,10,ANOREXIA,Decreased appetite,2025-12-21,2025-12-21,DOSE NOT CHANGED,RELATED
CAMELOT,BLAZE,11,HYPOTENSION,Hypotension,2025-12-21,2025-12-21,DOSE NOT CHANGED,RELATED
CAMELOT,BLAZE,12,FLATULENCE,Flatulence,2025-12-21,,DOSE NOT CHANGED,RELATED
CAMELOT,BLAZE,13,HYPOTENSION,Hypotension,2025-12-21,,DOSE NOT CHANGED,RELATED
CAMELOT,BLAZE,14,DIARRHEA,Diarrhoea,2025-12-25,2026-03-02,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BLAZE,15,ANOREXIA,Decreased appetite,2026-02-09,,DOSE NOT CHANGED,RELATED
CAMELOT,BLAZE,16,BRUISED LEFT HIND LEG,Ecchymosis,2026-03-17,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BLAZE,17,SWELLING,Generalised oedema,2026-04-06,2026-04-20,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BLAZE,18,SUNBURN,Sunburn,2026-04-12,2026-04-12,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BLAZE,19,DENTAL CARIES,Dental caries,2026-04-14,,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BLAZE,20,FALL,Fall,2026-05-17,2026-06-15,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BLAZE,21,FALL,Fall,2026-05-26,2026-05-26,DOSE NOT CHANGED,NOT RELATED
CAMELOT,BLAZE,22,FALL,Fall,2026-06-15,2026-06-15,DOSE NOT CHANGED,NOT RELATED
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APPENDIX D: ADLIVER

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CAMELOT,DUNEY,Screening,2025-06-20,ALP,Alkaline Phosphatase (U/L),101,101,.,N,
CAMELOT,DUNEY,Cycle 01 Day 1,2025-06-29,ALP,Alkaline Phosphatase (U/L),101,101,.,N,Y
CAMELOT,DUNEY,Cycle 02 Day 1,2025-07-19,ALP,Alkaline Phosphatase (U/L),101,101,0,N,
CAMELOT,DUNEY,Cycle 03 Day 1,2025-08-09,ALP,Alkaline Phosphatase (U/L),101,101,0,N,
CAMELOT,DUNEY,Cycle 04 Day 1,2025-08-29,ALP,Alkaline Phosphatase (U/L),98,101,-3,N,
CAMELOT,DUNEY,Cycle 05 Day 1,2025-09-20,ALP,Alkaline Phosphatase (U/L),112,101,11,H,
CAMELOT,DUNEY,Cycle 06 Day 1,2025-10-09,ALP,Alkaline Phosphatase (U/L),94,101,-7,N,
CAMELOT,DUNEY,Cycle 07 Day 1,2025-10-31,ALP,Alkaline Phosphatase (U/L),95,101,-6,N,
CAMELOT,DUNEY,Cycle 08 Day 1,2025-11-23,ALP,Alkaline Phosphatase (U/L),104,101,3,N,
CAMELOT,DUNEY,Cycle 09 Day 1,2025-12-12,ALP,Alkaline Phosphatase (U/L),104,101,3,N,
CAMELOT,DUNEY,Cycle 10 Day 1,2026-01-01,ALP,Alkaline Phosphatase (U/L),93,101,-8,N,
CAMELOT,DUNEY,Screening,2025-06-20,ALT,Alanine Aminotransferase (U/L),12,9,.,N,
CAMELOT,DUNEY,Cycle 01 Day 1,2025-06-29,ALT,Alanine Aminotransferase (U/L),9,9,.,N,Y
CAMELOT,DUNEY,Cycle 02 Day 1,2025-07-19,ALT,Alanine Aminotransferase (U/L),8,9,-1,N,
CAMELOT,DUNEY,Cycle 03 Day 1,2025-08-09,ALT,Alanine Aminotransferase (U/L),8,9,-1,N,
CAMELOT,DUNEY,Cycle 04 Day 1,2025-08-29,ALT,Alanine Aminotransferase (U/L),8,9,-1,N,
CAMELOT,DUNEY,Cycle 05 Day 1,2025-09-20,ALT,Alanine Aminotransferase (U/L),8,9,-1,N,
CAMELOT,DUNEY,Cycle 06 Day 1,2025-10-09,ALT,Alanine Aminotransferase (U/L),8,9,-1,N,
CAMELOT,DUNEY,Cycle 07 Day 1,2025-10-31,ALT,Alanine Aminotransferase (U/L),7,9,-2,N,
CAMELOT,DUNEY,Cycle 08 Day 1,2025-11-23,ALT,Alanine Aminotransferase (U/L),9,9,0,N,
CAMELOT,DUNEY,Cycle 09 Day 1,2025-12-12,ALT,Alanine Aminotransferase (U/L),7,9,-2,N,
CAMELOT,DUNEY,Cycle 10 Day 1,2026-01-01,ALT,Alanine Aminotransferase (U/L),9,9,0,N,
CAMELOT,DUNEY,Screening,2025-06-20,AST,Aspartate Aminotransferase (U/L),14,13,.,N,
CAMELOT,DUNEY,Cycle 01 Day 1,2025-06-29,AST,Aspartate Aminotransferase (U/L),13,13,.,N,Y
CAMELOT,DUNEY,Cycle 02 Day 1,2025-07-19,AST,Aspartate Aminotransferase (U/L),12,13,-1,N,
CAMELOT,DUNEY,Cycle 03 Day 1,2025-08-09,AST,Aspartate Aminotransferase (U/L),15,13,2,N,
CAMELOT,DUNEY,Cycle 04 Day 1,2025-08-29,AST,Aspartate Aminotransferase (U/L),14,13,1,N,
CAMELOT,DUNEY,Cycle 05 Day 1,2025-09-20,AST,Aspartate Aminotransferase (U/L),14,13,1,N,
CAMELOT,DUNEY,Cycle 06 Day 1,2025-10-09,AST,Aspartate Aminotransferase (U/L),12,13,-1,N,
CAMELOT,DUNEY,Cycle 07 Day 1,2025-10-31,AST,Aspartate Aminotransferase (U/L),14,13,1,N,
CAMELOT,DUNEY,Cycle 08 Day 1,2025-11-23,AST,Aspartate Aminotransferase (U/L),16,13,3,N,
CAMELOT,DUNEY,Cycle 09 Day 1,2025-12-12,AST,Aspartate Aminotransferase (U/L),13,13,0,N,
CAMELOT,DUNEY,Cycle 10 Day 1,2026-01-01,AST,Aspartate Aminotransferase (U/L),12,13,-1,N,
CAMELOT,CAMMY,Screening,2025-12-07,ALP,Alkaline Phosphatase (U/L),111,128,.,H,
CAMELOT,CAMMY,Cycle 01 Day 1,2025-12-18,ALP,Alkaline Phosphatase (U/L),128,128,.,H,Y
CAMELOT,CAMMY,Cycle 02 Day 1,2026-01-08,ALP,Alkaline Phosphatase (U/L),134,128,6,H,
CAMELOT,CAMMY,Cycle 03 Day 1,2026-01-29,ALP,Alkaline Phosphatase (U/L),117,128,-11,H,
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CAMELOT,CAMMY,Cycle 04 Day 1,2026-02-20,ALP,Alkaline Phosphatase (U/L),106,128,-22,N,
CAMELOT,CAMMY,Cycle 05 Day 1,2026-03-12,ALP,Alkaline Phosphatase (U/L),97,128,-31,N,
CAMELOT,CAMMY,Cycle 06 Day 1,2026-04-02,ALP,Alkaline Phosphatase (U/L),95,128,-33,N,
CAMELOT,CAMMY,Cycle 07 Day 1,2026-04-24,ALP,Alkaline Phosphatase (U/L),92,128,-36,N,
CAMELOT,CAMMY,Cycle 08 Day 1,2026-05-14,ALP,Alkaline Phosphatase (U/L),99,128,-29,N,
CAMELOT,CAMMY,Cycle 09 Day 1,2026-06-04,ALP,Alkaline Phosphatase (U/L),90,128,-38,N,
CAMELOT,CAMMY,Cycle 10 Day 1,2026-06-25,ALP,Alkaline Phosphatase (U/L),102,128,-26,N,
CAMELOT,CAMMY,Cycle 11 Day 1,2026-07-16,ALP,Alkaline Phosphatase (U/L),90,128,-38,N,
CAMELOT,CAMMY,Cycle 12 Day 1,2026-08-06,ALP,Alkaline Phosphatase (U/L),96,128,-32,N,
CAMELOT,CAMMY,Cycle 13 Day 1,2026-08-27,ALP,Alkaline Phosphatase (U/L),87,128,-41,N,
CAMELOT,CAMMY,Screening,2025-12-07,ALT,Alanine Aminotransferase (U/L),13,15,.,N,
CAMELOT,CAMMY,Cycle 01 Day 1,2025-12-18,ALT,Alanine Aminotransferase (U/L),15,15,.,N,Y
CAMELOT,CAMMY,Cycle 02 Day 1,2026-01-08,ALT,Alanine Aminotransferase (U/L),13,15,-2,N,
CAMELOT,CAMMY,Cycle 03 Day 1,2026-01-29,ALT,Alanine Aminotransferase (U/L),13,15,-2,N,
CAMELOT,CAMMY,Cycle 04 Day 1,2026-02-20,ALT,Alanine Aminotransferase (U/L),18,15,3,N,
CAMELOT,CAMMY,Cycle 05 Day 1,2026-03-12,ALT,Alanine Aminotransferase (U/L),13,15,-2,N,
CAMELOT,CAMMY,Cycle 06 Day 1,2026-04-02,ALT,Alanine Aminotransferase (U/L),10,15,-5,N,
CAMELOT,CAMMY,Cycle 07 Day 1,2026-04-24,ALT,Alanine Aminotransferase (U/L),11,15,-4,N,
CAMELOT,CAMMY,Cycle 08 Day 1,2026-05-14,ALT,Alanine Aminotransferase (U/L),9,15,-6,N,
CAMELOT,CAMMY,Cycle 09 Day 1,2026-06-04,ALT,Alanine Aminotransferase (U/L),9,15,-6,N,
CAMELOT,CAMMY,Cycle 10 Day 1,2026-06-25,ALT,Alanine Aminotransferase (U/L),11,15,-4,N,
CAMELOT,CAMMY,Cycle 11 Day 1,2026-07-16,ALT,Alanine Aminotransferase (U/L),9,15,-6,N,
CAMELOT,CAMMY,Cycle 12 Day 1,2026-08-06,ALT,Alanine Aminotransferase (U/L),10,15,-5,N,
CAMELOT,CAMMY,Cycle 13 Day 1,2026-08-27,ALT,Alanine Aminotransferase (U/L),13,15,-2,N,
CAMELOT,CAMMY,Screening,2025-12-07,AST,Aspartate Aminotransferase (U/L),19,25,.,N,
CAMELOT,CAMMY,Cycle 01 Day 1,2025-12-18,AST,Aspartate Aminotransferase (U/L),25,25,.,N,Y
CAMELOT,CAMMY,Cycle 02 Day 1,2026-01-08,AST,Aspartate Aminotransferase (U/L),21,25,-4,N,
CAMELOT,CAMMY,Cycle 03 Day 1,2026-01-29,AST,Aspartate Aminotransferase (U/L),19,25,-6,N,
CAMELOT,CAMMY,Cycle 04 Day 1,2026-02-20,AST,Aspartate Aminotransferase (U/L),30,25,5,N,
CAMELOT,CAMMY,Cycle 05 Day 1,2026-03-12,AST,Aspartate Aminotransferase (U/L),17,25,-8,N,
CAMELOT,CAMMY,Cycle 06 Day 1,2026-04-02,AST,Aspartate Aminotransferase (U/L),16,25,-9,N,
CAMELOT,CAMMY,Cycle 07 Day 1,2026-04-24,AST,Aspartate Aminotransferase (U/L),15,25,-10,N,
CAMELOT,CAMMY,Cycle 08 Day 1,2026-05-14,AST,Aspartate Aminotransferase (U/L),14,25,-11,N,
CAMELOT,CAMMY,Cycle 09 Day 1,2026-06-04,AST,Aspartate Aminotransferase (U/L),15,25,-10,N,
CAMELOT,CAMMY,Cycle 10 Day 1,2026-06-25,AST,Aspartate Aminotransferase (U/L),19,25,-6,N,
CAMELOT,CAMMY,Cycle 11 Day 1,2026-07-16,AST,Aspartate Aminotransferase (U/L),13,25,-12,N,
CAMELOT,CAMMY,Cycle 12 Day 1,2026-08-06,AST,Aspartate Aminotransferase (U/L),18,25,-7,N,
CAMELOT,CAMMY,Cycle 13 Day 1,2026-08-27,AST,Aspartate Aminotransferase (U/L),16,25,-9,N,
CAMELOT,SANDY,Screening,2026-03-12,ALP,Alkaline Phosphatase (U/L),102,86,.,N,
CAMELOT,SANDY,Cycle 01 Day 1,2026-03-26,ALP,Alkaline Phosphatase (U/L),86,86,.,N,Y
CAMELOT,SANDY,Cycle 02 Day 1,2026-04-17,ALP,Alkaline Phosphatase (U/L),123,86,37,H,
CAMELOT,SANDY,Cycle 03 Day 1,2026-05-07,ALP,Alkaline Phosphatase (U/L),180,86,94,H,
CAMELOT,SANDY,Unscheduled Visit,2026-05-10,ALP,Alkaline Phosphatase (U/L),164,86,78,H,
CAMELOT,SANDY,Cycle 04 Day 1,2026-05-28,ALP,Alkaline Phosphatase (U/L),149,86,63,H,
CAMELOT,SANDY,Cycle 05 Day 1,2026-06-18,ALP,Alkaline Phosphatase (U/L),145,86,59,H,
CAMELOT,SANDY,Cycle 06 Day 1,2026-07-09,ALP,Alkaline Phosphatase (U/L),136,86,50,H,
CAMELOT,SANDY,Cycle 07 Day 1,2026-07-30,ALP,Alkaline Phosphatase (U/L),125,86,39,H,
CAMELOT,SANDY,Cycle 08 Day 1,2026-08-20,ALP,Alkaline Phosphatase (U/L),109,86,23,N,
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CAMELOT,SANDY,Cycle 09 Day 1,2026-09-10,ALP,Alkaline Phosphatase (U/L),105,86,19,N,
CAMELOT,SANDY,Screening,2026-03-12,ALT,Alanine Aminotransferase (U/L),29,21,.,N,
CAMELOT,SANDY,Cycle 01 Day 1,2026-03-26,ALT,Alanine Aminotransferase (U/L),21,21,.,N,Y
CAMELOT,SANDY,Cycle 02 Day 1,2026-04-17,ALT,Alanine Aminotransferase (U/L),68,21,47,H,
CAMELOT,SANDY,Cycle 03 Day 1,2026-05-07,ALT,Alanine Aminotransferase (U/L),33,21,12,N,
CAMELOT,SANDY,Unscheduled Visit,2026-05-10,ALT,Alanine Aminotransferase (U/L),34,21,13,N,
CAMELOT,SANDY,Cycle 04 Day 1,2026-05-28,ALT,Alanine Aminotransferase (U/L),28,21,7,N,
CAMELOT,SANDY,Cycle 05 Day 1,2026-06-18,ALT,Alanine Aminotransferase (U/L),26,21,5,N,
CAMELOT,SANDY,Cycle 06 Day 1,2026-07-09,ALT,Alanine Aminotransferase (U/L),24,21,3,N,
CAMELOT,SANDY,Cycle 07 Day 1,2026-07-30,ALT,Alanine Aminotransferase (U/L),34,21,13,N,
CAMELOT,SANDY,Cycle 08 Day 1,2026-08-20,ALT,Alanine Aminotransferase (U/L),23,21,2,N,
CAMELOT,SANDY,Cycle 09 Day 1,2026-09-10,ALT,Alanine Aminotransferase (U/L),20,21,-1,N,
CAMELOT,SANDY,Screening,2026-03-12,AST,Aspartate Aminotransferase (U/L),62,66,.,H,
CAMELOT,SANDY,Cycle 01 Day 1,2026-03-26,AST,Aspartate Aminotransferase (U/L),66,66,.,H,Y
CAMELOT,SANDY,Cycle 02 Day 1,2026-04-17,AST,Aspartate Aminotransferase (U/L),109,66,43,H,
CAMELOT,SANDY,Cycle 03 Day 1,2026-05-07,AST,Aspartate Aminotransferase (U/L),56,66,-10,H,
CAMELOT,SANDY,Unscheduled Visit,2026-05-10,AST,Aspartate Aminotransferase (U/L),64,66,-2,H,
CAMELOT,SANDY,Cycle 04 Day 1,2026-05-28,AST,Aspartate Aminotransferase (U/L),49,66,-17,H,
CAMELOT,SANDY,Cycle 05 Day 1,2026-06-18,AST,Aspartate Aminotransferase (U/L),63,66,-3,H,
CAMELOT,SANDY,Cycle 06 Day 1,2026-07-09,AST,Aspartate Aminotransferase (U/L),61,66,-5,H,
CAMELOT,SANDY,Cycle 07 Day 1,2026-07-30,AST,Aspartate Aminotransferase (U/L),69,66,3,H,
CAMELOT,SANDY,Cycle 08 Day 1,2026-08-20,AST,Aspartate Aminotransferase (U/L),52,66,-14,H,
CAMELOT,SANDY,Cycle 09 Day 1,2026-09-10,AST,Aspartate Aminotransferase (U/L),41,66,-25,H,
CAMELOT,ROCCO,Screening,2025-10-02,ALP,Alkaline Phosphatase (U/L),72,73,.,N,
CAMELOT,ROCCO,Cycle 01 Day 1,2025-10-12,ALP,Alkaline Phosphatase (U/L),73,73,.,N,Y
CAMELOT,ROCCO,Cycle 02 Day 1,2025-11-02,ALP,Alkaline Phosphatase (U/L),81,73,8,N,
CAMELOT,ROCCO,Cycle 03 Day 1,2025-11-23,ALP,Alkaline Phosphatase (U/L),78,73,5,N,
CAMELOT,ROCCO,Cycle 04 Day 1,2025-12-13,ALP,Alkaline Phosphatase (U/L),74,73,1,N,
CAMELOT,ROCCO,Cycle 05 Day 1,2026-01-04,ALP,Alkaline Phosphatase (U/L),68,73,-5,N,
CAMELOT,ROCCO,Cycle 06 Day 1,2026-01-25,ALP,Alkaline Phosphatase (U/L),74,73,1,N,
CAMELOT,ROCCO,End of Treatment,2026-02-15,ALP,Alkaline Phosphatase (U/L),75,73,2,N,
CAMELOT,ROCCO,Screening,2025-10-02,ALT,Alanine Aminotransferase (U/L),12,12,.,N,
CAMELOT,ROCCO,Cycle 01 Day 1,2025-10-12,ALT,Alanine Aminotransferase (U/L),12,12,.,N,Y
CAMELOT,ROCCO,Cycle 02 Day 1,2025-11-02,ALT,Alanine Aminotransferase (U/L),14,12,2,N,
CAMELOT,ROCCO,Cycle 03 Day 1,2025-11-23,ALT,Alanine Aminotransferase (U/L),14,12,2,N,
CAMELOT,ROCCO,Cycle 04 Day 1,2025-12-13,ALT,Alanine Aminotransferase (U/L),16,12,4,N,
CAMELOT,ROCCO,Cycle 05 Day 1,2026-01-04,ALT,Alanine Aminotransferase (U/L),16,12,4,N,
CAMELOT,ROCCO,Cycle 06 Day 1,2026-01-25,ALT,Alanine Aminotransferase (U/L),10,12,-2,N,
CAMELOT,ROCCO,End of Treatment,2026-02-15,ALT,Alanine Aminotransferase (U/L),10,12,-2,N,
CAMELOT,ROCCO,Screening,2025-10-02,AST,Aspartate Aminotransferase (U/L),15,14,.,N,
CAMELOT,ROCCO,Cycle 01 Day 1,2025-10-12,AST,Aspartate Aminotransferase (U/L),14,14,.,N,Y
CAMELOT,ROCCO,Cycle 02 Day 1,2025-11-02,AST,Aspartate Aminotransferase (U/L),14,14,0,N,
CAMELOT,ROCCO,Cycle 03 Day 1,2025-11-23,AST,Aspartate Aminotransferase (U/L),16,14,2,N,
CAMELOT,ROCCO,Cycle 04 Day 1,2025-12-13,AST,Aspartate Aminotransferase (U/L),17,14,3,N,
CAMELOT,ROCCO,Cycle 05 Day 1,2026-01-04,AST,Aspartate Aminotransferase (U/L),15,14,1,N,
CAMELOT,ROCCO,Cycle 06 Day 1,2026-01-25,AST,Aspartate Aminotransferase (U/L),13,14,-1,N,
CAMELOT,ROCCO,End of Treatment,2026-02-15,AST,Aspartate Aminotransferase (U/L),13,14,-1,N,
CAMELOT,BLAZE,Screening,2025-11-03,ALP,Alkaline Phosphatase (U/L),75,89,.,N,
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CAMELOT,BLAZE,Cycle 01 Day 1,2025-11-16,ALP,Alkaline Phosphatase (U/L),89,89,.,N,Y
CAMELOT,BLAZE,Cycle 02 Day 1,2025-12-07,ALP,Alkaline Phosphatase (U/L),80,89,-9,N,
CAMELOT,BLAZE,Cycle 03 Day 1,2025-12-29,ALP,Alkaline Phosphatase (U/L),96,89,7,N,
CAMELOT,BLAZE,Cycle 04 Day 1,2026-01-19,ALP,Alkaline Phosphatase (U/L),84,89,-5,N,
CAMELOT,BLAZE,Cycle 05 Day 1,2026-02-09,ALP,Alkaline Phosphatase (U/L),74,89,-15,N,
CAMELOT,BLAZE,Cycle 06 Day 1,2026-03-02,ALP,Alkaline Phosphatase (U/L),95,89,6,N,
CAMELOT,BLAZE,Cycle 07 Day 1,2026-03-23,ALP,Alkaline Phosphatase (U/L),78,89,-11,N,
CAMELOT,BLAZE,Cycle 08 Day 1,2026-04-13,ALP,Alkaline Phosphatase (U/L),85,89,-4,N,
CAMELOT,BLAZE,Cycle 09 Day 1,2026-05-04,ALP,Alkaline Phosphatase (U/L),80,89,-9,N,
CAMELOT,BLAZE,Cycle 10 Day 1,2026-05-25,ALP,Alkaline Phosphatase (U/L),82,89,-7,N,
CAMELOT,BLAZE,Cycle 11 Day 1,2026-06-15,ALP,Alkaline Phosphatase (U/L),86,89,-3,N,
CAMELOT,BLAZE,Cycle 12 Day 1,2026-07-06,ALP,Alkaline Phosphatase (U/L),84,89,-5,N,
CAMELOT,BLAZE,Cycle 13 Day 1,2026-07-27,ALP,Alkaline Phosphatase (U/L),85,89,-4,N,
CAMELOT,BLAZE,Cycle 14 Day 1,2026-08-17,ALP,Alkaline Phosphatase (U/L),88,89,-1,N,
CAMELOT,BLAZE,Screening,2025-11-03,ALT,Alanine Aminotransferase (U/L),10,13,.,N,
CAMELOT,BLAZE,Cycle 01 Day 1,2025-11-16,ALT,Alanine Aminotransferase (U/L),13,13,.,N,Y
CAMELOT,BLAZE,Cycle 02 Day 1,2025-12-07,ALT,Alanine Aminotransferase (U/L),9,13,-4,N,
CAMELOT,BLAZE,Cycle 03 Day 1,2025-12-29,ALT,Alanine Aminotransferase (U/L),7,13,-6,N,
CAMELOT,BLAZE,Cycle 04 Day 1,2026-01-19,ALT,Alanine Aminotransferase (U/L),12,13,-1,N,
CAMELOT,BLAZE,Cycle 05 Day 1,2026-02-09,ALT,Alanine Aminotransferase (U/L),8,13,-5,N,
CAMELOT,BLAZE,Cycle 06 Day 1,2026-03-02,ALT,Alanine Aminotransferase (U/L),10,13,-3,N,
CAMELOT,BLAZE,Cycle 07 Day 1,2026-03-23,ALT,Alanine Aminotransferase (U/L),14,13,1,N,
CAMELOT,BLAZE,Cycle 08 Day 1,2026-04-13,ALT,Alanine Aminotransferase (U/L),16,13,3,N,
CAMELOT,BLAZE,Cycle 09 Day 1,2026-05-04,ALT,Alanine Aminotransferase (U/L),11,13,-2,N,
CAMELOT,BLAZE,Cycle 10 Day 1,2026-05-25,ALT,Alanine Aminotransferase (U/L),8,13,-5,N,
CAMELOT,BLAZE,Cycle 11 Day 1,2026-06-15,ALT,Alanine Aminotransferase (U/L),11,13,-2,N,
CAMELOT,BLAZE,Cycle 12 Day 1,2026-07-06,ALT,Alanine Aminotransferase (U/L),12,13,-1,N,
CAMELOT,BLAZE,Cycle 13 Day 1,2026-07-27,ALT,Alanine Aminotransferase (U/L),12,13,-1,N,
CAMELOT,BLAZE,Cycle 14 Day 1,2026-08-17,ALT,Alanine Aminotransferase (U/L),25,13,12,N,
CAMELOT,BLAZE,Screening,2025-11-03,AST,Aspartate Aminotransferase (U/L),75,21,.,H,
CAMELOT,BLAZE,Cycle 01 Day 1,2025-11-16,AST,Aspartate Aminotransferase (U/L),21,21,.,N,Y
CAMELOT,BLAZE,Cycle 02 Day 1,2025-12-07,AST,Aspartate Aminotransferase (U/L),16,21,-5,N,
CAMELOT,BLAZE,Cycle 03 Day 1,2025-12-29,AST,Aspartate Aminotransferase (U/L),24,21,3,N,
CAMELOT,BLAZE,Cycle 04 Day 1,2026-01-19,AST,Aspartate Aminotransferase (U/L),23,21,2,N,
CAMELOT,BLAZE,Cycle 05 Day 1,2026-02-09,AST,Aspartate Aminotransferase (U/L),21,21,0,N,
CAMELOT,BLAZE,Cycle 06 Day 1,2026-03-02,AST,Aspartate Aminotransferase (U/L),22,21,1,N,
CAMELOT,BLAZE,Cycle 07 Day 1,2026-03-23,AST,Aspartate Aminotransferase (U/L),21,21,0,N,
CAMELOT,BLAZE,Cycle 08 Day 1,2026-04-13,AST,Aspartate Aminotransferase (U/L),26,21,5,N,
CAMELOT,BLAZE,Cycle 09 Day 1,2026-05-04,AST,Aspartate Aminotransferase (U/L),20,21,-1,N,
CAMELOT,BLAZE,Cycle 10 Day 1,2026-05-25,AST,Aspartate Aminotransferase (U/L),19,21,-2,N,
CAMELOT,BLAZE,Cycle 11 Day 1,2026-06-15,AST,Aspartate Aminotransferase (U/L),21,21,0,N,
CAMELOT,BLAZE,Cycle 12 Day 1,2026-07-06,AST,Aspartate Aminotransferase (U/L),21,21,0,N,
CAMELOT,BLAZE,Cycle 13 Day 1,2026-07-27,AST,Aspartate Aminotransferase (U/L),23,21,2,N,
CAMELOT,BLAZE,Cycle 14 Day 1,2026-08-17,AST,Aspartate Aminotransferase (U/L),25,21,4,N,
CAMELOT,SUNNY,Screening,2025-12-11,ALP,Alkaline Phosphatase (U/L),60,71,.,N,
CAMELOT,SUNNY,Cycle 01 Day 1,2026-01-02,ALP,Alkaline Phosphatase (U/L),71,71,.,N,Y
CAMELOT,SUNNY,Cycle 02 Day 1,2026-01-23,ALP,Alkaline Phosphatase (U/L),89,71,18,N,
CAMELOT,SUNNY,Cycle 03 Day 1,2026-02-13,ALP,Alkaline Phosphatase (U/L),94,71,23,N,
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CAMELOT,SUNNY,Cycle 04 Day 1,2026-03-06,ALP,Alkaline Phosphatase (U/L),82,71,11,N,
CAMELOT,SUNNY,Cycle 05 Day 1,2026-03-27,ALP,Alkaline Phosphatase (U/L),82,71,11,N,
CAMELOT,SUNNY,Cycle 06 Day 1,2026-04-17,ALP,Alkaline Phosphatase (U/L),78,71,7,N,
CAMELOT,SUNNY,Unscheduled Visit,2026-04-24,ALP,Alkaline Phosphatase (U/L),81,71,10,N,
CAMELOT,SUNNY,Cycle 07 Day 1,2026-05-15,ALP,Alkaline Phosphatase (U/L),79,71,8,N,
CAMELOT,SUNNY,Cycle 08 Day 1,2026-06-05,ALP,Alkaline Phosphatase (U/L),82,71,11,N,
CAMELOT,SUNNY,Cycle 09 Day 1,2026-06-26,ALP,Alkaline Phosphatase (U/L),76,71,5,N,
CAMELOT,SUNNY,Cycle 10 Day 1,2026-07-10,ALP,Alkaline Phosphatase (U/L),89,71,18,N,
CAMELOT,SUNNY,Cycle 11 Day 1,2026-07-31,ALP,Alkaline Phosphatase (U/L),94,71,23,N,
CAMELOT,SUNNY,Cycle 12 Day 1,2026-08-21,ALP,Alkaline Phosphatase (U/L),75,71,4,N,
CAMELOT,SUNNY,Screening,2025-12-11,ALT,Alanine Aminotransferase (U/L),21,19,.,N,
CAMELOT,SUNNY,Cycle 01 Day 1,2026-01-02,ALT,Alanine Aminotransferase (U/L),19,19,.,N,Y
CAMELOT,SUNNY,Cycle 02 Day 1,2026-01-23,ALT,Alanine Aminotransferase (U/L),20,19,1,N,
CAMELOT,SUNNY,Cycle 03 Day 1,2026-02-13,ALT,Alanine Aminotransferase (U/L),13,19,-6,N,
CAMELOT,SUNNY,Cycle 04 Day 1,2026-03-06,ALT,Alanine Aminotransferase (U/L),15,19,-4,N,
CAMELOT,SUNNY,Cycle 05 Day 1,2026-03-27,ALT,Alanine Aminotransferase (U/L),18,19,-1,N,
CAMELOT,SUNNY,Cycle 06 Day 1,2026-04-17,ALT,Alanine Aminotransferase (U/L),26,19,7,N,
CAMELOT,SUNNY,Unscheduled Visit,2026-04-24,ALT,Alanine Aminotransferase (U/L),23,19,4,N,
CAMELOT,SUNNY,Cycle 07 Day 1,2026-05-15,ALT,Alanine Aminotransferase (U/L),23,19,4,N,
CAMELOT,SUNNY,Cycle 08 Day 1,2026-06-05,ALT,Alanine Aminotransferase (U/L),21,19,2,N,
CAMELOT,SUNNY,Cycle 09 Day 1,2026-06-26,ALT,Alanine Aminotransferase (U/L),19,19,0,N,
CAMELOT,SUNNY,Cycle 10 Day 1,2026-07-10,ALT,Alanine Aminotransferase (U/L),22,19,3,N,
CAMELOT,SUNNY,Cycle 11 Day 1,2026-07-31,ALT,Alanine Aminotransferase (U/L),17,19,-2,N,
CAMELOT,SUNNY,Cycle 12 Day 1,2026-08-21,ALT,Alanine Aminotransferase (U/L),17,19,-2,N,
CAMELOT,SUNNY,Screening,2025-12-11,AST,Aspartate Aminotransferase (U/L),29,36,.,N,
CAMELOT,SUNNY,Cycle 01 Day 1,2026-01-02,AST,Aspartate Aminotransferase (U/L),36,36,.,N,Y
CAMELOT,SUNNY,Cycle 02 Day 1,2026-01-23,AST,Aspartate Aminotransferase (U/L),26,36,-10,N,
CAMELOT,SUNNY,Cycle 03 Day 1,2026-02-13,AST,Aspartate Aminotransferase (U/L),24,36,-12,N,
CAMELOT,SUNNY,Cycle 04 Day 1,2026-03-06,AST,Aspartate Aminotransferase (U/L),25,36,-11,N,
CAMELOT,SUNNY,Cycle 05 Day 1,2026-03-27,AST,Aspartate Aminotransferase (U/L),30,36,-6,N,
CAMELOT,SUNNY,Cycle 06 Day 1,2026-04-17,AST,Aspartate Aminotransferase (U/L),40,36,4,N,
CAMELOT,SUNNY,Unscheduled Visit,2026-04-24,AST,Aspartate Aminotransferase (U/L),33,36,-3,N,
CAMELOT,SUNNY,Cycle 07 Day 1,2026-05-15,AST,Aspartate Aminotransferase (U/L),32,36,-4,N,
CAMELOT,SUNNY,Cycle 08 Day 1,2026-06-05,AST,Aspartate Aminotransferase (U/L),33,36,-3,N,
CAMELOT,SUNNY,Cycle 09 Day 1,2026-06-26,AST,Aspartate Aminotransferase (U/L),30,36,-6,N,
CAMELOT,SUNNY,Cycle 10 Day 1,2026-07-10,AST,Aspartate Aminotransferase (U/L),31,36,-5,N,
CAMELOT,SUNNY,Cycle 11 Day 1,2026-07-31,AST,Aspartate Aminotransferase (U/L),27,36,-9,N,
CAMELOT,SUNNY,Cycle 12 Day 1,2026-08-21,AST,Aspartate Aminotransferase (U/L),26,36,-10,N,
CAMELOT,OASIS,Screening,2025-08-25,ALP,Alkaline Phosphatase (U/L),98,89,.,N,
CAMELOT,OASIS,Cycle 01 Day 1,2025-08-31,ALP,Alkaline Phosphatase (U/L),89,89,.,N,Y
CAMELOT,OASIS,Cycle 02 Day 1,2025-09-21,ALP,Alkaline Phosphatase (U/L),75,89,-14,N,
CAMELOT,OASIS,Cycle 03 Day 1,2025-10-10,ALP,Alkaline Phosphatase (U/L),91,89,2,N,
CAMELOT,OASIS,Cycle 04 Day 1,2025-10-31,ALP,Alkaline Phosphatase (U/L),76,89,-13,N,
CAMELOT,OASIS,Cycle 05 Day 1,2025-11-21,ALP,Alkaline Phosphatase (U/L),85,89,-4,N,
CAMELOT,OASIS,Cycle 06 Day 1,2025-12-12,ALP,Alkaline Phosphatase (U/L),82,89,-7,N,
CAMELOT,OASIS,Cycle 07 Day 1,2026-01-02,ALP,Alkaline Phosphatase (U/L),94,89,5,N,
CAMELOT,OASIS,Unscheduled Visit,2026-01-08,ALP,Alkaline Phosphatase (U/L),95,89,6,N,
CAMELOT,OASIS,Cycle 08 Day 1,2026-01-23,ALP,Alkaline Phosphatase (U/L),102,89,13,N,
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CAMELOT,OASIS,Cycle 09 Day 1,2026-02-13,ALP,Alkaline Phosphatase (U/L),90,89,1,N,
CAMELOT,OASIS,Cycle 10 Day 1,2026-03-06,ALP,Alkaline Phosphatase (U/L),89,89,0,N,
CAMELOT,OASIS,Cycle 11 Day 1,2026-03-27,ALP,Alkaline Phosphatase (U/L),105,89,16,N,
CAMELOT,OASIS,Cycle 12 Day 1,2026-04-17,ALP,Alkaline Phosphatase (U/L),109,89,20,N,
CAMELOT,OASIS,Cycle 13 Day 1,2026-05-08,ALP,Alkaline Phosphatase (U/L),93,89,4,N,
CAMELOT,OASIS,Cycle 14 Day 1,2026-05-29,ALP,Alkaline Phosphatase (U/L),98,89,9,N,
CAMELOT,OASIS,Cycle 15 Day 1,2026-06-19,ALP,Alkaline Phosphatase (U/L),105,89,16,N,
CAMELOT,OASIS,Cycle 16 Day 1,2026-07-10,ALP,Alkaline Phosphatase (U/L),108,89,19,N,
CAMELOT,OASIS,Cycle 17 Day 1,2026-07-31,ALP,Alkaline Phosphatase (U/L),123,89,34,H,
CAMELOT,OASIS,Cycle 18 Day 1,2026-08-22,ALP,Alkaline Phosphatase (U/L),124,89,35,H,
CAMELOT,OASIS,Screening,2025-08-25,ALT,Alanine Aminotransferase (U/L),24,14,.,N,
CAMELOT,OASIS,Cycle 01 Day 1,2025-08-31,ALT,Alanine Aminotransferase (U/L),14,14,.,N,Y
CAMELOT,OASIS,Cycle 02 Day 1,2025-09-21,ALT,Alanine Aminotransferase (U/L),11,14,-3,N,
CAMELOT,OASIS,Cycle 03 Day 1,2025-10-10,ALT,Alanine Aminotransferase (U/L),8,14,-6,N,
CAMELOT,OASIS,Cycle 04 Day 1,2025-10-31,ALT,Alanine Aminotransferase (U/L),10,14,-4,N,
CAMELOT,OASIS,Cycle 05 Day 1,2025-11-21,ALT,Alanine Aminotransferase (U/L),7,14,-7,N,
CAMELOT,OASIS,Cycle 06 Day 1,2025-12-12,ALT,Alanine Aminotransferase (U/L),8,14,-6,N,
CAMELOT,OASIS,Cycle 07 Day 1,2026-01-02,ALT,Alanine Aminotransferase (U/L),9,14,-5,N,
CAMELOT,OASIS,Unscheduled Visit,2026-01-08,ALT,Alanine Aminotransferase (U/L),10,14,-4,N,
CAMELOT,OASIS,Cycle 08 Day 1,2026-01-23,ALT,Alanine Aminotransferase (U/L),12,14,-2,N,
CAMELOT,OASIS,Cycle 09 Day 1,2026-02-13,ALT,Alanine Aminotransferase (U/L),11,14,-3,N,
CAMELOT,OASIS,Cycle 10 Day 1,2026-03-06,ALT,Alanine Aminotransferase (U/L),9,14,-5,N,
CAMELOT,OASIS,Cycle 11 Day 1,2026-03-27,ALT,Alanine Aminotransferase (U/L),12,14,-2,N,
CAMELOT,OASIS,Cycle 12 Day 1,2026-04-17,ALT,Alanine Aminotransferase (U/L),32,14,18,N,
CAMELOT,OASIS,Cycle 13 Day 1,2026-05-08,ALT,Alanine Aminotransferase (U/L),13,14,-1,N,
CAMELOT,OASIS,Cycle 14 Day 1,2026-05-29,ALT,Alanine Aminotransferase (U/L),12,14,-2,N,
CAMELOT,OASIS,Cycle 15 Day 1,2026-06-19,ALT,Alanine Aminotransferase (U/L),20,14,6,N,
CAMELOT,OASIS,Cycle 16 Day 1,2026-07-10,ALT,Alanine Aminotransferase (U/L),17,14,3,N,
CAMELOT,OASIS,Cycle 17 Day 1,2026-07-31,ALT,Alanine Aminotransferase (U/L),21,14,7,N,
CAMELOT,OASIS,Cycle 18 Day 1,2026-08-22,ALT,Alanine Aminotransferase (U/L),28,14,14,N,
CAMELOT,OASIS,Screening,2025-08-25,AST,Aspartate Aminotransferase (U/L),20,11,.,N,
CAMELOT,OASIS,Cycle 01 Day 1,2025-08-31,AST,Aspartate Aminotransferase (U/L),11,11,.,N,Y
CAMELOT,OASIS,Cycle 02 Day 1,2025-09-21,AST,Aspartate Aminotransferase (U/L),12,11,1,N,
CAMELOT,OASIS,Cycle 03 Day 1,2025-10-10,AST,Aspartate Aminotransferase (U/L),9,11,-2,N,
CAMELOT,OASIS,Cycle 04 Day 1,2025-10-31,AST,Aspartate Aminotransferase (U/L),10,11,-1,N,
CAMELOT,OASIS,Cycle 05 Day 1,2025-11-21,AST,Aspartate Aminotransferase (U/L),8,11,-3,N,
CAMELOT,OASIS,Cycle 06 Day 1,2025-12-12,AST,Aspartate Aminotransferase (U/L),11,11,0,N,
CAMELOT,OASIS,Cycle 07 Day 1,2026-01-02,AST,Aspartate Aminotransferase (U/L),10,11,-1,N,
CAMELOT,OASIS,Unscheduled Visit,2026-01-08,AST,Aspartate Aminotransferase (U/L),11,11,0,N,
CAMELOT,OASIS,Cycle 08 Day 1,2026-01-23,AST,Aspartate Aminotransferase (U/L),11,11,0,N,
CAMELOT,OASIS,Cycle 09 Day 1,2026-02-13,AST,Aspartate Aminotransferase (U/L),11,11,0,N,
CAMELOT,OASIS,Cycle 10 Day 1,2026-03-06,AST,Aspartate Aminotransferase (U/L),7,11,-4,N,
CAMELOT,OASIS,Cycle 11 Day 1,2026-03-27,AST,Aspartate Aminotransferase (U/L),11,11,0,N,
CAMELOT,OASIS,Cycle 12 Day 1,2026-04-17,AST,Aspartate Aminotransferase (U/L),18,11,7,N,
CAMELOT,OASIS,Cycle 13 Day 1,2026-05-08,AST,Aspartate Aminotransferase (U/L),12,11,1,N,
CAMELOT,OASIS,Cycle 14 Day 1,2026-05-29,AST,Aspartate Aminotransferase (U/L),10,11,-1,N,
CAMELOT,OASIS,Cycle 15 Day 1,2026-06-19,AST,Aspartate Aminotransferase (U/L),15,11,4,N,
CAMELOT,OASIS,Cycle 16 Day 1,2026-07-10,AST,Aspartate Aminotransferase (U/L),12,11,1,N,
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CAMELOT,OASIS,Cycle 17 Day 1,2026-07-31,AST,Aspartate Aminotransferase (U/L),14,11,3,N,
CAMELOT,OASIS,Cycle 18 Day 1,2026-08-22,AST,Aspartate Aminotransferase (U/L),20,11,9,N,
CAMELOT,BUMPY,Screening,2025-10-05,ALP,Alkaline Phosphatase (U/L),56,69,.,N,
CAMELOT,BUMPY,Cycle 01 Day 1,2025-10-11,ALP,Alkaline Phosphatase (U/L),69,69,.,N,Y
CAMELOT,BUMPY,Unscheduled Visit,2025-10-23,ALP,Alkaline Phosphatase (U/L),64,69,-5,N,
CAMELOT,BUMPY,Cycle 02 Day 1,2025-11-01,ALP,Alkaline Phosphatase (U/L),51,69,-18,N,
CAMELOT,BUMPY,Unscheduled Visit,2025-11-21,ALP,Alkaline Phosphatase (U/L),46,69,-23,N,
CAMELOT,BUMPY,Cycle 03 Day 1,2025-11-24,ALP,Alkaline Phosphatase (U/L),50,69,-19,N,
CAMELOT,BUMPY,Unscheduled Visit,2025-12-01,ALP,Alkaline Phosphatase (U/L),60,69,-9,N,
CAMELOT,BUMPY,Cycle 04 Day 1,2025-12-13,ALP,Alkaline Phosphatase (U/L),61,69,-8,N,
CAMELOT,BUMPY,Cycle 05 Day 1,2026-01-05,ALP,Alkaline Phosphatase (U/L),67,69,-2,N,
CAMELOT,BUMPY,Cycle 06 Day 1,2026-01-26,ALP,Alkaline Phosphatase (U/L),69,69,0,N,
CAMELOT,BUMPY,Cycle 07 Day 1,2026-02-16,ALP,Alkaline Phosphatase (U/L),65,69,-4,N,
CAMELOT,BUMPY,Cycle 08 Day 1,2026-03-09,ALP,Alkaline Phosphatase (U/L),74,69,5,N,
CAMELOT,BUMPY,Cycle 09 Day 1,2026-03-28,ALP,Alkaline Phosphatase (U/L),73,69,4,N,
CAMELOT,BUMPY,Cycle 10 Day 1,2026-04-20,ALP,Alkaline Phosphatase (U/L),67,69,-2,N,
CAMELOT,BUMPY,Cycle 11 Day 1,2026-05-11,ALP,Alkaline Phosphatase (U/L),67,69,-2,N,
CAMELOT,BUMPY,Cycle 12 Day 1,2026-06-01,ALP,Alkaline Phosphatase (U/L),75,69,6,N,
CAMELOT,BUMPY,Cycle 13 Day 1,2026-06-22,ALP,Alkaline Phosphatase (U/L),65,69,-4,N,
CAMELOT,BUMPY,Cycle 14 Day 1,2026-07-13,ALP,Alkaline Phosphatase (U/L),68,69,-1,N,
CAMELOT,BUMPY,Cycle 15 Day 1,2026-08-03,ALP,Alkaline Phosphatase (U/L),66,69,-3,N,
CAMELOT,BUMPY,Unscheduled Visit,2026-09-04,ALP,Alkaline Phosphatase (U/L),78,69,9,N,
CAMELOT,BUMPY,Screening,2025-10-05,ALT,Alanine Aminotransferase (U/L),19,18,.,N,
CAMELOT,BUMPY,Cycle 01 Day 1,2025-10-11,ALT,Alanine Aminotransferase (U/L),18,18,.,N,Y
CAMELOT,BUMPY,Unscheduled Visit,2025-10-23,ALT,Alanine Aminotransferase (U/L),15,18,-3,N,
CAMELOT,BUMPY,Cycle 02 Day 1,2025-11-01,ALT,Alanine Aminotransferase (U/L),16,18,-2,N,
CAMELOT,BUMPY,Unscheduled Visit,2025-11-21,ALT,Alanine Aminotransferase (U/L),19,18,1,N,
CAMELOT,BUMPY,Cycle 03 Day 1,2025-11-24,ALT,Alanine Aminotransferase (U/L),18,18,0,N,
CAMELOT,BUMPY,Unscheduled Visit,2025-12-01,ALT,Alanine Aminotransferase (U/L),23,18,5,N,
CAMELOT,BUMPY,Cycle 04 Day 1,2025-12-13,ALT,Alanine Aminotransferase (U/L),17,18,-1,N,
CAMELOT,BUMPY,Cycle 05 Day 1,2026-01-05,ALT,Alanine Aminotransferase (U/L),13,18,-5,N,
CAMELOT,BUMPY,Cycle 06 Day 1,2026-01-26,ALT,Alanine Aminotransferase (U/L),17,18,-1,N,
CAMELOT,BUMPY,Cycle 07 Day 1,2026-02-16,ALT,Alanine Aminotransferase (U/L),13,18,-5,N,
CAMELOT,BUMPY,Cycle 08 Day 1,2026-03-09,ALT,Alanine Aminotransferase (U/L),25,18,7,N,
CAMELOT,BUMPY,Cycle 09 Day 1,2026-03-28,ALT,Alanine Aminotransferase (U/L),21,18,3,N,
CAMELOT,BUMPY,Cycle 10 Day 1,2026-04-20,ALT,Alanine Aminotransferase (U/L),19,18,1,N,
CAMELOT,BUMPY,Cycle 11 Day 1,2026-05-11,ALT,Alanine Aminotransferase (U/L),22,18,4,N,
CAMELOT,BUMPY,Cycle 12 Day 1,2026-06-01,ALT,Alanine Aminotransferase (U/L),21,18,3,N,
CAMELOT,BUMPY,Cycle 13 Day 1,2026-06-22,ALT,Alanine Aminotransferase (U/L),20,18,2,N,
CAMELOT,BUMPY,Cycle 14 Day 1,2026-07-13,ALT,Alanine Aminotransferase (U/L),15,18,-3,N,
CAMELOT,BUMPY,Cycle 15 Day 1,2026-08-03,ALT,Alanine Aminotransferase (U/L),19,18,1,N,
CAMELOT,BUMPY,Unscheduled Visit,2026-09-04,ALT,Alanine Aminotransferase (U/L),24,18,6,N,
CAMELOT,BUMPY,Screening,2025-10-05,AST,Aspartate Aminotransferase (U/L),13,13,.,N,
CAMELOT,BUMPY,Cycle 01 Day 1,2025-10-11,AST,Aspartate Aminotransferase (U/L),13,13,.,N,Y
CAMELOT,BUMPY,Unscheduled Visit,2025-10-23,AST,Aspartate Aminotransferase (U/L),13,13,0,N,
CAMELOT,BUMPY,Cycle 02 Day 1,2025-11-01,AST,Aspartate Aminotransferase (U/L),8,13,-5,N,
CAMELOT,BUMPY,Unscheduled Visit,2025-11-21,AST,Aspartate Aminotransferase (U/L),9,13,-4,N,
CAMELOT,BUMPY,Cycle 03 Day 1,2025-11-24,AST,Aspartate Aminotransferase (U/L),10,13,-3,N,
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CAMELOT,BUMPY,Unscheduled Visit,2025-12-01,AST,Aspartate Aminotransferase (U/L),13,13,0,N,
CAMELOT,BUMPY,Cycle 04 Day 1,2025-12-13,AST,Aspartate Aminotransferase (U/L),11,13,-2,N,
CAMELOT,BUMPY,Cycle 05 Day 1,2026-01-05,AST,Aspartate Aminotransferase (U/L),11,13,-2,N,
CAMELOT,BUMPY,Cycle 06 Day 1,2026-01-26,AST,Aspartate Aminotransferase (U/L),12,13,-1,N,
CAMELOT,BUMPY,Cycle 07 Day 1,2026-02-16,AST,Aspartate Aminotransferase (U/L),10,13,-3,N,
CAMELOT,BUMPY,Cycle 08 Day 1,2026-03-09,AST,Aspartate Aminotransferase (U/L),13,13,0,N,
CAMELOT,BUMPY,Cycle 09 Day 1,2026-03-28,AST,Aspartate Aminotransferase (U/L),13,13,0,N,
CAMELOT,BUMPY,Cycle 10 Day 1,2026-04-20,AST,Aspartate Aminotransferase (U/L),14,13,1,N,
CAMELOT,BUMPY,Cycle 11 Day 1,2026-05-11,AST,Aspartate Aminotransferase (U/L),15,13,2,N,
CAMELOT,BUMPY,Cycle 12 Day 1,2026-06-01,AST,Aspartate Aminotransferase (U/L),11,13,-2,N,
CAMELOT,BUMPY,Cycle 13 Day 1,2026-06-22,AST,Aspartate Aminotransferase (U/L),15,13,2,N,
CAMELOT,BUMPY,Cycle 14 Day 1,2026-07-13,AST,Aspartate Aminotransferase (U/L),12,13,-1,N,
CAMELOT,BUMPY,Cycle 15 Day 1,2026-08-03,AST,Aspartate Aminotransferase (U/L),14,13,1,N,
CAMELOT,BUMPY,Unscheduled Visit,2026-09-04,AST,Aspartate Aminotransferase (U/L),16,13,3,N,
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