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Norma Pugh
June 15, 2007

Integrity Check for the Epidemiology of Diabetes Interventions and Complications Study (EDIC) Four Year Retinopathy and Nephropathy Files

As a partial check of the integrity of the EDIC Four Year Retinopathy and Nephropathy datasets archived in the NIDDK data repository, a set of tabulations was performed to verify that published results can be reproduced using the archived datasets. Analyses were performed to duplicate published results for the data reported by Lachin et al [1] in *The New England Journal of Medicine* in February 2000. The results of this integrity check are described below. The full text of *The New England Journal of Medicine* article can be found in Attachment 1, and the SAS code for our tabulations is included in Attachment 2.

Background. The Diabetes Control and Complications Trial (DCCT), 1983-1993, was a multi-center trial designed to determine whether intensive therapy to maintain blood glucose and glycosolated hemoglobin concentrations as close to the normal range as possible would prevent or delay long-term complications in patients with Type 1 diabetes. This trial showed a markedly reduced risk of microvascular complications as compared with conventional therapy. Most participants were then enrolled in the EDIC study, a long-term observational study. One of the objectives of the EDIC study was to compare the long-term effects of the intensive or conventional therapy provided during the DCCT on the development of more advanced retinal and renal complications of diabetes. The published data describes differences between the two original treatment groups in the incidence of these complications four years after the close of the DCCT [1].

In summary, in 1994, 96% of the DCCT participants were enrolled in EDIC for regular observational follow-up of metabolic and complications status. Diabetes care was obtained from the EDIC participants' own physicians [2].

Preliminary Tabulations. Initial tabulations of the archived datasets showed 16 participants without a treatment assignment. The Data Coordinating Center (DCC) was notified of the discrepancy and reported that the treatment assignment variable on the retinopathy dataset is not the appropriate one to use. Instead, the treatment assignment variable found on the DCCT baseline dataset should be used for this analysis. Use of this baseline variable yields accurate tabulations.

Baseline Data. Table 1 of the 2000 *New England Journal of Medicine* article reports on baseline characteristics. Variables summarized in this baseline table (Table 1. Characteristics Of the 1208 Patients Enrolled in the EDIC Study Who Were Evaluated after Four Years of Follow-up) are taken from both analysis datasets (GEE_RET and RENEUR04) created for this study and the DCCT baseline dataset (BASELINE, for treatment assignment). Table A lists the variables used in our replication of the Table 1 variables.

Table A: Variables Used to Replicate Table 1

Table 1 Variable	Variables Used in Replication
Sample size	GEE_RET dataset: y4retpop (where y4retpop=1); BASELINE: group
At DCCT entry	
Women (%)	GEE_RET dataset: sex
Age (yr)	GEE_RET dataset: age
Duration of diabetes (yr)	GEE_RET dataset: duration
Glycosolated hemoglobin (%)	GEE_RET dataset: hbael
At EDIC entry	
Age (yr)	GEE_RET dataset: closeage
Duration of diabetes (yr)	GEE_RET dataset: closedur
DCCT follow-up (yr)	GEE_RET dataset: dcctyr
Glycosolated hemoglobin (%)	GEE_RET dataset: edicyear (where edicyear=0), dcct_hba†
Level of retinopathy (%)	
None	GEE_RET dataset: dcct10 (where dcct10=1)
Microaneurysms only	GEE_RET dataset: dcct20 (where dcct20=1)
Mild nonproliferative retinopathy	GEE_RET dataset: dcct30 (where dcct30=1)
Moderate or severe nonproliferative retinopathy	GEE_RET dataset: dcct40, dcct50 (where dcct40=1 or dcct50=1)
Photocoagulation during DCCT (%)	
Scatter, for retinopathy	GEE_RET dataset: dcctscat
Focal, for macular edema	GEE_RET dataset: dcct_foc
Nephropathy at EDIC entry (%)‡	
Albumin excretion > 28 µg/min	RENEUR04 dataset: dc_aer40
Albumin excretion > 208 µg/min	RENEUR04 dataset: dcaer300
Creatinine clearance < 70 ml/min/1.73m^2	RENEUR04 dataset: dc_clr70
Treatment at EDIC year 4 (%)	
Continuous subcutaneous insulin infusion (pump) or multiple daily injections	GEE_RET dataset: insreg
Self-monitoring of blood glucose ≥ 4 times per day	GEE_RET dataset: sbgm_4

† Variable is labeled as 'Mean HbA1c during DCCT'. DCC confirmed this is the variable to summarize for glycosolated hemoglobin at EDIC entry.

‡ Label is incorrectly written as 'Nephropathy at EDIC year 3 or 4 (%)' in published paper (as confirmed by DCC).

In Table B, we compare the results for characteristics calculated from the archived dataset to the results published in the 2000 *New England Journal of Medicine* article. As Table B shows, the results obtained from the archived data are the same as those in the published tabulations, with a few minor exceptions.

Table B: Comparison of Baseline Table Values Computed in Integrity Check to Reference Article Values

Table 1 Variable	Treatment: Conventional		
	Lachin et al (2000)	Integrity Check	Difference
Sample size	603	603	0
At DCCT entry			
Women (%)	47	47	0
Age (yr)	27 ± 7	27 ± 7	0
Duration of diabetes (yr)	5.6 ± 4.1	5.6 ± 4.1	0
Glycosolated hemoglobin (%)	9.0 ± 1.6	9.0 ± 1.6	0
At EDIC entry			
Age (yr)	33 ± 7	33 ± 7	0
Duration of diabetes (yr)	11.7 ± 4.8	11.7 ± 4.8	0
DCCT follow-up (yr)	6.1 ± 1.7	6.1 ± 1.7	0
Glycosolated hemoglobin (%)	9.0 ± 1.2	9.0 ± 1.2	0
Level of retinopathy (%)			
None	18	18	0
Microaneurysms only	30	31	1
Mild nonproliferative retinopathy	30	30	0
Moderate or severe nonproliferative retinopathy	22	22	0
Photocoagulation during DCCT (%)			
Scatter, for retinopathy	4	4	0
Focal, for macular edema	5	5	0
Nephropathy at EDIC entry (%)†			
Albumin excretion > 28 μg/min	13	13	0
Albumin excretion > 208 μg/min	3	3	0
Creatinine clearance < 70 ml/min/1.73m^2	1	1	0
Treatment at EDIC year 4 (%)			
Continuous subcutaneous insulin infusion (pump) or multiple daily injections	75	74	1
Self-monitoring of blood glucose ≥ 4 times per day	40	40	0

† Label is incorrectly written as 'Nephropathy at EDIC year 3 or 4 (%)' in published paper (as confirmed by DCC).

Table B: Comparison of Baseline Table Values Computed in Integrity Check to Reference Article Values (cont.)

Table 1 Variable	Treatment: Intensive		
	Lachin et al (2000)	Integrity Check	Difference
Sample size	605	605	0
At DCCT entry			
Women (%)	48	48	0
Age (yr)	27 ± 7	27 ± 7	0
Duration of diabetes (yr)	5.9 ± 4.2	5.9 ± 4.2	0
Glycosolated hemoglobin (%)	9.0 ± 1.6	9.0 ± 1.6	0
At EDIC entry			
Age (yr)	34 ± 7	34 ± 7	0
Duration of diabetes (yr)	12.1 ± 4.9	12.1 ± 4.9	0
DCCT follow-up (yr)	6.2 ± 1.7	6.2 ± 1.7	0
Glycosolated hemoglobin (%)	7.3 ± 0.9	7.3 ± 0.9	0
Level of retinopathy (%)			
None	29	29	0
Microaneurysms only	38	39	1
Mild nonproliferative retinopathy	22	22	0
Moderate or severe nonproliferative retinopathy	11	11	0
Photocoagulation during DCCT (%)			
Scatter, for retinopathy	2	2	0
Focal, for macular edema	2	2	0
Nephropathy at EDIC entry (%)†			
Albumin excretion > 28 μg/min	7	7	0
Albumin excretion > 208 μg/min	2	2	0
Creatinine clearance < 70 ml/min/1.73m^2	2	2	0
Treatment at EDIC year 4 (%)			
Continuous subcutaneous insulin infusion (pump) or multiple daily injections	95	95	0
Self-monitoring of blood glucose ≥ 4 times per day	45	45	0

† Label is incorrectly written as 'Nephropathy at EDIC year 3 or 4 (%)' in published paper (as confirmed by DCC).

Table B: Comparison of Baseline Table Values Computed in Integrity Check to Reference Article Values (cont.)

Table 1 Variable	p-values		
	Lachin et al (2000)	Integrity Check	Difference
At DCCT entry			
Women (%)	0.69	0.68	0.01
Age (yr)	0.13	0.12	0.01
Duration of diabetes (yr)	0.18	0.18	0
Glycosolated hemoglobin (%)	0.41	0.41	0
At EDIC entry			
Age (yr)	0.08	0.07	0.01
Duration of diabetes (yr)	0.11	0.10	0.01
DCCT follow-up (yr)	0.16	0.16	0
Glycosolated hemoglobin (%)	<0.001	<0.001	0
Level of retinopathy (%)	<0.001	<0.001	0
Photocoagulation during DCCT (%)			
Scatter, for retinopathy	0.018	0.018	0
Focal, for macular edema	0.038	0.038	0
Nephropathy at EDIC entry (%)†			
Albumin excretion > 28 µg/min	0.002	0.002	0
Albumin excretion > 208 µg/min	0.14	0.13	0.01
Creatinine clearance < 70 ml/min/1.73m^2	0.63	0.63	0
Treatment at EDIC year 4 (%)			
Continuous subcutaneous insulin infusion (pump) or multiple daily injections	<0.001	<0.001	0
Self-monitoring of blood glucose ≥ 4 times per day	0.064	0.053	DCC confirmed typo. 0.053 is the correct p-value.

† Label is incorrectly written as 'Nephropathy at EDIC year 3 or 4 (%)' in published paper (as confirmed by DCC).

Follow-up Data. Table 2 of the 2000 *New England Journal of Medicine* article reports on progression of retinopathy. Variables summarized in this follow-up table (Table 2. Progression Of Retinopathy Between The End Of The DCCT And After Four Years Of The EDIC Study, According To The DCCT Treatment Group) are taken from one analysis dataset (GEE_RET) and the DCCT baseline dataset (BASELINE, for treatment assignment). Table C lists the variables used in our replication of the Table 2 variables.

Table C: Variables Used to Replicate Table 2

Table 2 Variable	Variables Used in Replication
Level of Retinopathy at End of DCCT	GEE_RET dataset: y4retpop (where y4retpop=1), dcctscat (delete patients with dcctscat=1), stp3f_y4, edicscat (if stp3f_y4=1 or edicscat=1 then "progression" occurred); BASELINE: group
All levels	GEE_RET dataset: dcct10, dcct20, dcct30, dcct40, dcct50 (where dcct10=1 or dcct20=1 or dcct30=1 or dcct40=1 or dcct50=1)
No retinopathy	GEE_RET dataset: dcct10 (where dcct10=1)
Microaneurysms only	GEE_RET dataset: dcct20 (where dcct20=1)
Mild nonproliferative retinopathy	GEE_RET dataset: dcct30 (where dcct30=1)
Moderate nonproliferative retinopathy or worse	GEE_RET dataset: dcct40, dcct50 (where dcct40=1 or dcct50=1)
Adjusted	GEE_RET dataset: dcctetd (Logistic regression analysis was performed with adjustment for the severity of retinopathy at the end of the DCCT according to the Early Treatment Diabetic Retinopathy Study categories.)

In Table D, we compare the follow-up results calculated from the archived dataset to the results published in the 2000 *New England Journal of Medicine* article. As Table D shows, the results obtained from the archived data are the same as those in the published tabulations, with a few minor exceptions.

Table D: Comparison of Progression of Retinopathy Table Values Computed in Integrity Check to Reference Article Values

Table 2 Variable	Number of Patients		
	Lachin et al (2000)	Integrity Check	Difference
All levels			
Conventional therapy	581	581	0
Intensive therapy	596	596	0
No retinopathy			
Conventional therapy	109	109	0
Intensive therapy	173	173	0
Microaneurysms only			
Conventional therapy	184	184	0
Intensive therapy	233	233	0
Mild nonproliferative retinopathy			
Conventional therapy	178	178	0
Intensive therapy	132	132	0
Moderate nonproliferative retinopathy or worse			
Conventional therapy	110	110	0
Intensive therapy	58	58	0

Table 2 Variable	Progression of Retinopathy		
	Lachin et al (2000)	Integrity Check	Difference
All levels			
Conventional therapy	21	21	0
Intensive therapy	6	6	0
No retinopathy			
Conventional therapy	16	16	0
Intensive therapy	6	6	0
Microaneurysms only			
Conventional therapy	14	14	0
Intensive therapy	4	4	0
Mild nonproliferative retinopathy			
Conventional therapy	19	19	0
Intensive therapy	4	4	0
Moderate nonproliferative retinopathy or worse			
Conventional therapy	42	42	0
Intensive therapy	22	22	0

Table D: Comparison of Progression of Retinopathy Table Values Computed in Integrity Check to Reference Article Values (cont.)

Table 2 Variable	Odds Reduction (95% CI)		
	Lachin et al (2000)	Integrity Check	Difference
All levels	75 (64-83)	75 (63-83)	0 (1,0)
No retinopathy	66 (26-84)	66 (24-85)	0 (2,1)
Microaneurysms only	76 (49-88)	76 (47-89)	0 (2,1)
Mild nonproliferative retinopathy	83 (60-93)	83 (56-94)	0 (4,1)
Moderate nonproliferative retinopathy or worse	60 (18-80)	60 (17-81)	0 (1,1)
Adjusted	72 (59-81)	72 (62-84)	0 (3,3)

Table 2 Variable	p-values		
	Lachin et al (2000)	Integrity Check	Difference
All levels	<0.001	<0.001	0
No retinopathy	0.006	0.006	0
Microaneurysms only	<0.001	<0.001	0
Mild nonproliferative retinopathy	<0.001	<0.001	0
Moderate nonproliferative retinopathy or worse	0.012	0.013	0.001
Adjusted	<0.001	<0.001	0

Other Results. Remaining figures and follow-up tables from the 2000 *New England Journal of Medicine* article were spot checked and found to be consistent with replicated results. The few discrepancies documented in this report are likely due to data corrections and updates made between the paper data freeze and the final data freeze. The repository has high confidence in the integrity of the Retinopathy and Nephropathy analysis datasets.

Norma Pugh
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Notes

1. Both analysis datasets (Retinopathy: GEE_RET and Nephropathy: RENEUR04) were examined in this replication analysis. In addition to the analysis datasets, the DCCT baseline dataset, which is housed at the repository, should be used for treatment assignment.

References

1. John M. Lachin, Sc.D., Saul Genuth, M.D., Patricia Cleary, M.S., Matthew D. Davis, M.D. and David M. Nathan, M.D., **Retinopathy And Nephropathy In Patients With Type I Diabetes Four Years After A Trial Of Intensive Therapy**, The New England Journal of Medicine, February 2000; Volume 342, Number 6: 381-389.

2. NIDDK Website: EDIC page. NIDDK : Epidemiology of Diabetes Interventions and Complications Study (EDIC)

ATTACHMENT 1

John M. Lachin, Sc.D., Saul Genuth, M.D., Patricia Cleary, M.S., Matthew D. Davis, M.D. and David M. Nathan, M.D., Retinopathy And Nephropathy In Patients With Type I Diabetes Four Years After A Trial Of Intensive Therapy, The New England Journal of Medicine, February 2000; Volume 342, Number 6: 381-389.

The full text of the article referenced will be provided to approved requestors along with the data archive.

ATTACHMENT 2

SAS Code for Baseline and Follow-Up Tabulations from EDIC Four Year Retinopathy and Nephropathy Datasets in the NIDDK Repository

```
/*****************************************************************************************/
/*
/* Program: R:\05_Users\Norma\EDIC\NEJM-4yrRetinopathy\getdata.sas
/* Author:  Norma Pugh
/* Date:    27 April 07
/* Purpose: Create SAS datasets from the SAS transport files provided to the repository.
/*****************************************************************************************/
/* NEW LOCATION FOR EDIC SAS FILES */
libname newlib 'R:\05_Users\Norma\EDIC\NEJM-4yrRetinopathy';

/* ORIGINAL LOCATION OF EDIC TRANSPORT FILES */
filename file1 'R:\03_Data_And_Tools\Database\Databases\DCCT EDIC\DCCT-EDIC_FINAL\NEW-
Studies\Four Year Retinopathy\edicREN4.xpt';
filename file2 'R:\03_Data_And_Tools\Database\Databases\DCCT EDIC\DCCT-EDIC_FINAL\NEW-
Studies\Four Year Retinopathy\edicRET4.xpt';

/* CREATE THE DATASETS */
proc cimport library=newlib infile=file1; run;
proc cimport library=newlib infile=file2; run;
```

```
/*****************************************************************************************/
/*
/* Program: R:\05_Users\Norma\EDIC\NEJM-4yrRetinopathy\table1.sas
/* Author:  Norma Pugh
/* Date:    15 June 07
/* Purpose: Replicate Table 1 results from NEJM article: Retinopathy and Nephropathy in
/*           Patients With Type 1 Diabetes Four Years After A Trial Of Intensive Therapy
/*           (2000).
/*****************************************************************************************/
/************************/
/* Libnames and formats */
/************************/
libname trt  'R:\03_Data_And_Tools\Database\Databases\DCCT_EDIC\DCCT-
EDIC_FINAL\DCCT\Analyses\Baseline\SAS_DATA';
libname data 'R:\05_Users\Norma\EDIC\NEJM-4yrRetinopathy';

%include 'R:\03_Data_And_Tools\Database\Databases\DCCT_EDIC\DCCT-EDIC_FINAL\NEW-
Studies\Four Year Retinopathy\fmt_ret4.sas';

proc format; value yesno 0='0=no' 1='1=yes'; run;


/*****************************/
/* Get treatment assignments */
/*****************************/
data trt;
 set trt.baseline;
 keep mask_pat group;
run;

proc sort data=trt; by mask_pat; run;


/***************************************/
/* Get Table 1 population & variables */
/***************************************/
data table1;
 set data.gee_ret(where=(y4retpop=1));

 /* Level of retinopathy at EDIC entry */
 length retinop $9 binary_retinop 3;

 if dcct10=1 then retinop='1_none';
  else if dcct20=1 then retinop='2_micro';
  else if dcct30=1 then retinop='3_mild';
  else if dcct40=1 or dcct50=1 then retinop='4_mod_sev';

 if retinop='1_none' then binary_retinop=0;
  else if retinop in('2_micro','3_mild','4_mod_sev') then binary_retinop=1;

 /* Labels */
 label retinop        = 'Level of retinopathy at EDIC entry'
       binary_retinop = 'Retinopathy @ EDIC entry (none vs oth)';

 drop group;
run;
```

```
proc sort data=table1; by mask_pat; run;


/**********************************************/
/* Merge table data with treatment assignment */
/**********************************************/
data table1; merge table1(in=x1) trt(in=x2); by mask_pat; if x1 & x2; run;


/* Characteristics at DCCT entry */
title'Table 1: Characteristics at DCCT Entry';
title2'Categorical Counts & p-values'; run;
proc freq data=table1; tables group*sex / chisq; run;

title2'Quantitative Means & Standard Deviations'; run;
proc sort data=table1; by group; run;
proc means data=table1 n mean std;
 by group;
 var age duration hbael;
run;

title2'Quantitative p-values'; run;
proc npar1way data=table1 wilcoxon;
 class group;
 var age duration hbael;
run;


/* Characteristics at EDIC entry */
title'Table 1: Characteristics at EDIC Entry';
title2'Quantitative Means & Standard Deviations'; run;
proc sort data=table1; by group; run;
proc means data=table1 n mean std;
 by group;
 var closeage closedur dcctyr;
run;

title2'Quantitative p-values'; run;
proc npar1way data=table1 wilcoxon;
 class group;
 var closeage closedur dcctyr;
run;


 /* Glycosylated hemoglobin (EDIC yr 0 results for the N=1208 study population) */
 data subj; set table1; keep mask_pat; run;
 data hemo; set data.gee_ret; keep mask_pat group edicyear dcct_hba; run;

 proc sort data=subj; by mask_pat; run;
 proc sort data=hemo; by mask_pat; run;

 data hemo; merge subj(in=in_popn) hemo; by mask_pat; if in_popn & edicyear=0; run;

 title2'Quantitative Means & Standard Deviations'; run;
 proc sort data=hemo; by group; run;
 proc means data=hemo n mean std;
  by group;
```

```
  var dcct_hba;
 run;

 title2'Quantitative p-values'; run;
 proc npar1way data=hemo wilcoxon;
  class group;
  var dcct_hba;
 run;


title2'Categorical Counts & p-values'; run;
proc freq data=table1; tables group*retinop; run;
proc freq data=table1; tables group*(binary_retinop dcctscat dcct_foc) / chisq; run;


/* Nephropathy at EDIC entry */
title'Table 1: Nephropathy at EDIC Entry';
title2'Categorical Counts & p-values'; run;

 /* Nephropathy data */
 proc sort data=data.reneur04 out=nephrop; by mask_pat; run;

 /* Merge with treatment assisgnment data */
 data nephrop; merge trt nephrop(in=in_neph); by mask_pat; if in_neph; run;

 /* Results */
 proc freq data=nephrop; tables group*(dc_aer40 dcaer300 dc_clr70) / chisq; run;


/* Treatment at EDIC year 4 */
title1'Table 1: Treatment at EDIC year 4';
title2'Categorical Counts & p-values'; run;
proc freq data=table1; tables group*(insreg sbgm_4) / chisq; run;
```

```
/*****************************************************************************************/
/*
/* Program: R:\05_Users\Norma\EDIC\NEJM-4yrRetinopathy\table2.sas
/* Author:  Norma Pugh
/* Date:    15 June 07
/* Purpose: Replicate Table 2 results from NEJM article: Retinopathy and Nephropathy in
/*           Patients With Type 1 Diabetes Four Years After A Trial Of Intensive Therapy
/*           (2000).
/*****************************************************************************************/
/************************/
/* Libnames and formats */
/************************/
libname trt  'R:\03_Data_And_Tools\Database\Databases\DCCT_EDIC\DCCT-
EDIC_FINAL\DCCT\Analyses\Baseline\SAS_DATA';
libname data 'R:\05_Users\Norma\EDIC\NEJM-4yrRetinopathy';

%include 'R:\03_Data_And_Tools\Database\Databases\DCCT_EDIC\DCCT-EDIC_FINAL\NEW-
Studies\Four Year Retinopathy\fmt_ret4.sas';

proc format; value yesno 0='0=no' 1='1=yes'; run;


/*****************************/
/* Get treatment assignments */
/*****************************/
data trt;
 set trt.baseline;
 keep mask_pat group;
run;

proc sort data=trt; by mask_pat; run;


/***************************************/
/* Get Table 2 population & variables */
/***************************************/
data table2;
 set data.gee_ret(where=(y4retpop=1));

 /* Level of retinopathy at EDIC entry */
 length retinop $9;

 if dcct10=1 then retinop='1_none';
  else if dcct20=1 then retinop='2_micro';
  else if dcct30=1 then retinop='3_mild';
  else if dcct40=1 or dcct50=1 then retinop='4_mod_sev';

 /* Exclude patients with scatter photocoagulation during the DCCT */
 if dcctscat=1 then delete;

 /* Progressions */
 if stp3f_y4=1 or edicscat=1 then progress=1; else progress=0;

 /* Total population */
 output; retinop='0_all'; output;

 /* Labels */
```

```
 label retinop  = 'Level of retinopathy at EDIC entry'
       progress = 'Progression of retinopathy';

 drop group;
run;

proc sort data=table2; by mask_pat; run;


/**********************************************/
/* Merge table data with treatment assignment */
/**********************************************/
data table2; merge table2(in=x1) trt(in=x2); by mask_pat; if x1 & x2; run;


/*****************************************************/
/* Number of patients and progression of retinopathy */
/*****************************************************/
title'Table 2: Progression of Retinopathy (End of DCCT to EDIC Year 4)';
proc freq data=table2 noprint;
 tables retinop*group / out=denom(drop=percent rename=(count=denom));
run;

proc print data=denom; title2'Total Number of Patients'; run;

proc sort data=table2; by retinop; run;

proc freq data=table2 noprint;
 by retinop;
 tables group*progress / out=counts(drop=percent);
run;

data counts;
 merge counts(where=(progress=1)) denom;
 by retinop group;
 pct=(count/denom)*100;
run;

proc print data=counts; title2'Percent of Patients with Progression'; run;


/***********************************/
/* Odds Reduction, 95% CI, p-value */
/***********************************/
%MACRO OR(category,out);
 proc freq data=table2(where=(retinop="&category")) noprint;
  tables group*progress / cmh1;
  output out=&out cmh1;
 run;

 data &out; set &out;
  odds_red=(1-(_mhrrc2_/_mhrrc1_))*100; /* MH Adjusted Col1 RR, MH Adjusted Col2 RR */
  low_ci=(1-(1/l_lgor))*100;            /* Lower CL, Logit Adjusted OR */
  high_ci=(1-(1/u_lgor))*100;           /* Upper CL, Logit Adjusted OR */
  pval=round(p_cmhcor,.0001);           /* P-value for CMH Nonzero Correlation */
  keep odds_red low_ci high_ci pval;
 run;
```

```
 proc print data=&out; TITLE2"&category Stats"; run;
%MEND OR;

%OR(0_all,all_stats);
%OR(1_none,none_stats);
%OR(2_micro,micro_stats);
%OR(3_mild,mild_stats);
%OR(4_mod_sev,modsev_stats);


/*********************************************/
/* Adjusted Odds Reduction, 95% CI, p-value */
/*********************************************/
/* NOTE: Use 1/x for OR and CI */
proc logistic data=table2(where=(retinop^='0_all')) descending;
 class group retinop;
 model progress = group retinop dcctetd;
run;
```