

```

proc gee data=original;
class group id time;
Model PH1=time group CVP BE / dist= mult;
repeated subject=id / logor=exch;
run;

```

Parameter Estimates for Response Model							
with Empirical Standard Error Estimates							
Parameter		Estimate	Standard Error	95% Confidence Limits		Z	Pr > Z
Intercept1		-3.9121	0.5927	-5.0738	-2.7503	-6.60	<.0001
Intercept2		-0.1848	0.5736	-1.3090	0.9395	-0.32	0.7474
time		0.1446	0.0472	0.0520	0.2372	3.06	0.0022
group	L cartenine	0.0233	0.3209	-0.6057	0.6523	0.07	0.9421
group	control	0.0000	0.0000	0.0000	0.0000	.	.
CVP		0.0184	0.0468	-0.0733	0.1100	0.39	0.6946
BE		-0.4327	0.0538	-0.5381	-0.3273	-8.04	<.0001
Alpha1		1.1861	0.2408	0.7142	1.6580	4.93	<.0001

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proc gee data=original;
class group id time;
Model lacl=time group CVP BE /dist= mult;
repeated subject=id / logor=exch;
run;

```

Parameter Estimates for Response Model							
with Empirical Standard Error Estimates							
Parameter		Estimate	Standard Error	95% Confidence Limits		Z	Pr > Z
Intercept1		-2.7366	0.7541	-4.2146	-1.2587	-3.63	0.0003
Intercept2		1.7151	0.6670	0.4077	3.0225	2.57	0.0101
time		0.0659	0.0605	-0.0526	0.1844	1.09	0.2756
group	L cartenine	-0.4781	0.3244	-1.1140	0.1577	-1.47	0.1405
group	control	0.0000	0.0000	0.0000	0.0000	.	.
CVP		-0.1177	0.0540	-0.2236	-0.0118	-2.18	0.0293
BE		0.2585	0.0514	0.1578	0.3592	5.03	<.0001
Alpha1		1.0776	0.2385	0.6102	1.5449	4.52	<.0001

```

proc nlmixed data=original noad tech=quanew;
  parms a1=-3.9121 a2=-0.1848 Time_a=0.1446 group_a=0.0233 CVP_a=0.0184 BE_a=-
0.4327
      b1=-2.7366 b2=1.7151 Time_b=0.066 group_b=-0.4781 CVP_b=-0.1177
BE_b=0.2585
      s1=1.2 s2=2.4 s12=1;
*y1 = PH_ordinal;
if repeat in (1,3,5,7,9,11,13) then do;
  eta1 = Time_a*Time + group_a*group + CVP_a* CVP + BE_a* BE ;
  delta11= sqrt(1+s1**2) * PROBIT( exp(a1+eta1)/(1+exp(a1+eta1)));
  delta12= sqrt(1+s1**2) * PROBIT( exp(a2+eta1)/(1+exp(a2+eta1)));
  if ordinal=0 then do;
    lik= PROBNORM (delta11+u1);
  end;
  if ordinal=1 then do;
    lik= 1- PROBNORM (delta12+u1);
  end;
  if (lik > 1e-10) then loglik = log(lik);
  else loglik = 1e100;
end;
*y2 = Lactate_ordinal;
if repeat in (2,4,6,8,10,12,14) then do;
  eta2 = Time_b*Time + group_b*group + CVP_b* CVP + BE_b* BE ;
  delta21 = sqrt(1+s2**2) * PROBIT( exp(b1+eta2)/(1+exp(b1+eta2)));
  delta22 = sqrt(1+s2**2) * PROBIT( exp(b2+eta2)/(1+exp(b2+eta2)));
  if ordinal=0 then do;
    lik = PROBNORM(delta21+u2);
  end;
  if ordinal=1 then do;
    lik= 1- PROBNORM(delta22+u2);
  end;
  if (lik > 1e-10) then loglik = log(lik);
  else loglik = 1e100;
end;
model ordinal ~ general(loglik);
random u1 u2 ~ normal ([0,0] , [s1**2,s12,s2**2]) subject=id;
estimate "Rho" s12/(s1*s2);
run;

```

Fit Statistics	
-2 Log Likelihood	-2E103
AIC (smaller is better)	-2E103
AICC (smaller is better)	-2E103
BIC (smaller is better)	-2E103

Parameter Estimates								
Parameter	Estimate	Standard Error	DF	t Value	Pr > t	95% Confidence Limits		Gradient
a1	-3.9079	152.60	62	-0.03	0.9797	-308.96	301.14	-0.02567
a2	-0.1849	136.27	62	-0.00	0.9989	-272.59	272.22	0.000432
Time_a	0.1487	1.5407	62	0.10	0.9234	-2.9312	3.2286	-0.02524
group_a	0.02846	26.8099	62	0.00	0.9992	-53.5637	53.6206	-0.03349
CVP_a	0.06547	10.1454	62	0.01	0.9949	-20.2148	20.3457	-0.28719
BE_a	-0.4188	4.1430	62	-0.10	0.9198	-8.7006	7.8629	-0.08090
b1	-2.7333	23.7873	62	-0.11	0.9089	-50.2835	44.8168	-0.00490
b2	1.7084	27.1674	62	0.06	0.9501	-52.5985	56.0153	0.003888
Time_b	0.06259	38.4951	62	0.00	0.9987	-76.8881	77.0133	-0.00101
group_b	-0.4849	75.1634	62	-0.01	0.9949	-150.73	149.76	-0.00202
CVP_b	-0.1677	16.8881	62	-0.01	0.9921	-33.9265	33.5911	-0.00633
BE_b	0.2540	22.3076	62	0.01	0.9910	-44.3384	44.8463	0.004756
s1	1.2298	3.5315	62	0.35	0.7288	-5.8297	8.2892	-0.10332
s2	2.4085	12.7435	62	0.19	0.8507	-23.0654	27.8825	-0.00415
s12	0.9938	9.0594	62	0.11	0.9130	-17.1156	19.1033	-0.01084
Time	1.0004	0	62	Infty	<.0001	-Infty	Infty	-0.00382

