962-T1-453 **Robert L. Fulton*** (sharon.beam@med.va.gov), Department of Surgery, University of Louisville, Louisville, KY 40292, and **Beth Bradley**, Department of Mathematics, University of Louisville, Natural Science Building: Room 224, Louisville, KY 40292. *Unit Step and Impulse Functions in Gene Dynamics.* Preliminary report.

In a model of host response to bactera infection, (modified Lotka-Volterra system) it became apparent that Unitstep (US$[t-a]$) and DiracDelta($D(t-a)$) functions are ideal representations of gene activity. During host response, genes are turned on, then off, promoting protein production. Gene $G[t]$ is turned on by a promoter $y[t]$ and off by a second protein $x[t]$. Then: $y[t]$ ==conc. of promoter; $x[t]$ ==conc. of off messenger $G[t] == 1, ify[t] >$ critical amount and $x[t] <$ critical amount; $G[t] == 0$, otherwise. If times when $y[t]$ and $x[t]$ are critical are plugged in, then: $G'[t] == D[t-a] - D[t-b]$. RNA($R[t]$) is manufactured: $R'[t] == KG[t] - JR[t]$. Protein($P[t]$), say an antibody, is built from RNA, then: $P'[t] == MR[t]$. K, J and M are rate coefficients. Explicit solutions were found. $G'[t]$ is an ideal model for the unmasking of a gene. In a simple model, bacterial growth restrained by antibiotics is: $B'[t] == aB[t] - B[t](cf[t])$ where $B[t]$ is the number of bacteria and c is related to the dose and sensitivity of the drug as a function of time $f[t]$. For the usual method of administration, tissue-blood level of antibiotic ($f[t]$) is (1-Cos$[nt]$).If mutation occurs, the solution to $B'[t] == aB[t] - B[t](cf[t]]) + B[t]f[t]$ UnitStep$[t-b]$ is a good model of development of antibiotic resistance. (Received September 14, 2000)