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Individual variations and Human herd Immunity

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Abstract

Variations in genes ,proteins and/or cells within an individual took part in the overall variations in human herd. Herd variations are facing concurrent, present , past or forthcoming infections and/or vaccinations are the invaders. Such invaders are the stimulants for the immune conversion from naïve B or naïve T or both into effector or memory lymphocytes. The herd immune response to these invaders can be as; high, moderate low and/or non. CD4+ and CD8+ lymphocytes counts, IL12 P40, as well as S.typhi H specific antibody titers were given as study cases where human herd immunity do operate in which both Gaussian distribution curve and skewing graphs were also evident.

Key Words; Individual ,Herd ,Herd Immunity ,Genes, Protein ,Major Histocompatability System.

1- Synopsis; Individual, population and environment interplayed mutual influential effects on each other(John&Smuel 2000)
2- Individual; A single autonomus biological system that performs various biotic activities which render it viable within its own population or herd. It is either uni, or multicellular organism(Hallgrimssion & Brain 2011)
3- variation; The litteral meaning of variation is the difference occurred between one another within same molecule, organelle, organism. Such variation can be of adaptive or genetic type(Crawford et al.2007).

4-Variations within the individuals; These variations are mainly of

Molecular and cellular levels Table 1.Leukocyte antigen genes, erythrocyte antigen genes as well as immunoglobulin gene families, immunoglobulin allotypes and ideotypes.The genetic variations are including gene copy number variation, single nucleotide polymorphism.These molecular variations are either of genes or proteins and are forming the major determinants of human herd immunity .Cellular variations can be of common occurrence in lymphocytes such as B1,B2,B10,Th1,Th2,Th9,Th22.(Tan,Gery.2012,Tesmer et al2008,Eyerich et al2009,Palomares et al 2010) As well as;A1,A2,B,BH,AB,H.Tables2,3(Bryant1982,Tizzard 2012,Lewis et al. 2001).

5- Variations among individuals: Human individuals forming a herd do variate in one or more of the followings; HLA type, Erythrocyte type ,Allotype as well as ideotype.Such single or combined variations may be of influencial effects on disease susceptibility(Boyed et al3

6-Herd: Herd constitute a number of individuals forming a population harbouring certain geographic place affecting on another and affecting their environment .The environment ,however, may in turn affect them. Such interacting biotic and abiotic factors forms a community together with the place they will form the niche. A niche can be ,hospital ward ,military camp or a school class room(Jone&Smuel 2000).

7-Herd Immunity:It is the fraction or fractions of the individuals forming the herd who are immune against certain infectious disease .Such immunities are resulting from ;pre immunity ,vaccination or infection(Ali et al.,2005,John& Smuel 2000,Fine 1993)

8-Determinants of herd immunity: The dominance nature of MHS ,Ig gene sets, erythrocyte antigen genes, limits of parasitism, past vaccination program as well as the limits of cellular immune conversion of the main ,B or T lymphocytes into effectors and/or memory phenotypes These all together determine the baseline natural and adaptive immune functions(John &Smuel 2000;Newman&Antczack 1983).

Thus, individuals among human herd do variate within their selves ,and among each others. The nature of such variations can be of natural or induced type.

9-Responses: The degree of responses of the individuals within a human herd can be in one of four classes ;High responder ,moderate responder ,low responder and non responder .These classes are generally encoded by the MHS system(Newman&Antczack1983).

10-Biometery:The mathematical modulation of human herd immunity are mostly represented by the Guassian distribution curves ;At times ,however, skewing do happened in such distributon(Steel et al .1998

11-CD4+vsCD8+ lymphocytes; The numbers of CD4+T cells were used to plot the herd immunity curve. It was with an apparent skewing patterns.TheCD8+T cell count were showing normal distribution curve Figures 1,2(Shnawa, et al. 2009).

12-Cytokine:IL12 P40 was detected in 18 pulmonary tuberculosis patients and plotted.The plot was with an evident skewing patternFigure3(Shnawa et al.,2013).
13-Salmonella typhi antiH :S.typhi anti-H titres were used to map herd immunity curve among enteric fever patients .The plot looks like normal distribution curve(Shnawa&Hindi 1996,Lloyd-Smith et al.,2005).
14-Conclusion:

CD4,CD8,IL12P40 and S.typhi antiH antibody titre are helpful as a probe for infectious and tumor invasion in human herd and be use -full in mapping herd immunity.The herd response curves were either of guassian or skewed types. Individuals forming the herd were ;non ,low, moderate and high responders

Table 1:Major Histocompatability System of Vertebrate including man.

	Human	Rabbit	Mice	Dog	Swine	Cattle	Horse	Sleep	Goat
Nomecla Ture	HLA	RLA	H2	DLA	SLA	BOLA	ELA	OLA	GLA
Class I	ABCD	ABC	KD	ABCDE	ABC	AB	A	AB	A1 A2
Class I loci allels	102	?	-	5-10	20-25	10-15	10-13	5-10	5
Class II DR	DR	?		I(I1)	+	+	+	-	+
M	+		+	+	+	+	+	-	-
Serology	+		10	?	?	?	?	?	?
MHC restriction of T cell Function	+	+	+	+	+	+	+	+	+
Class III	CH, QG	-	(S)	-	+	-	-	-	-

Adapted from Newman and Antczack 1983,Roitt et al 2001

Table 2 : Erythrocyte Antigens Systems

Specious	No. of Systems	Most important
Human	12	ABH, RH
Bovine	12	B, J
Ovine	8	B, R
Swine	15	A, E
Equine	8	Q, A, E
Canine	11	A

Adapted from; Bryant,1983,Tizzard,2012

Table 3 : Haemolytic Disease of Newborn

Specious	Cause
Human	Rh
Equine	Aa
Dog	A-/A+

Adapted from;Bryant,1982;Tizzard,2012

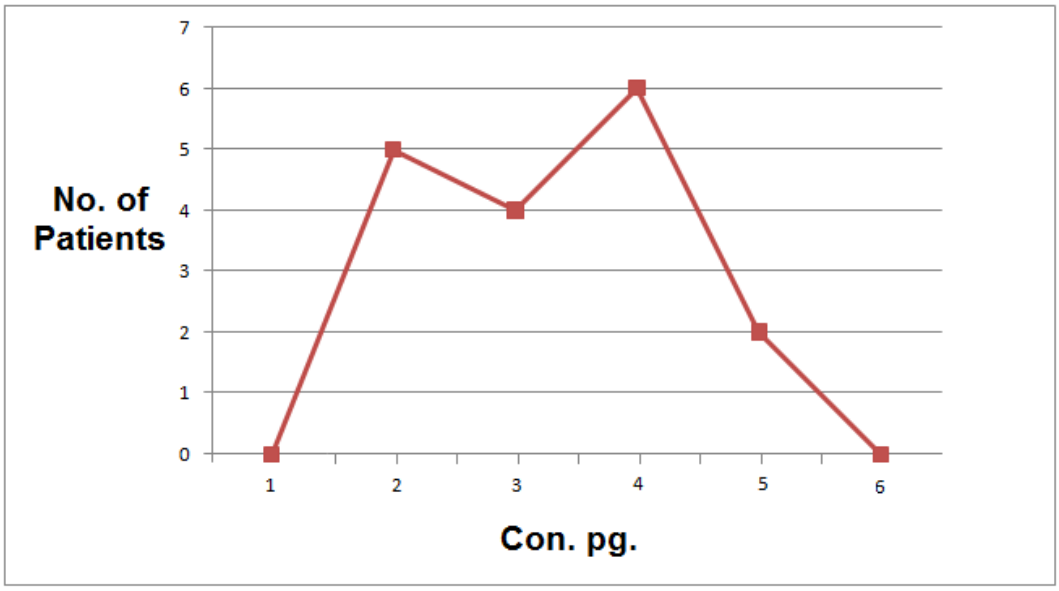
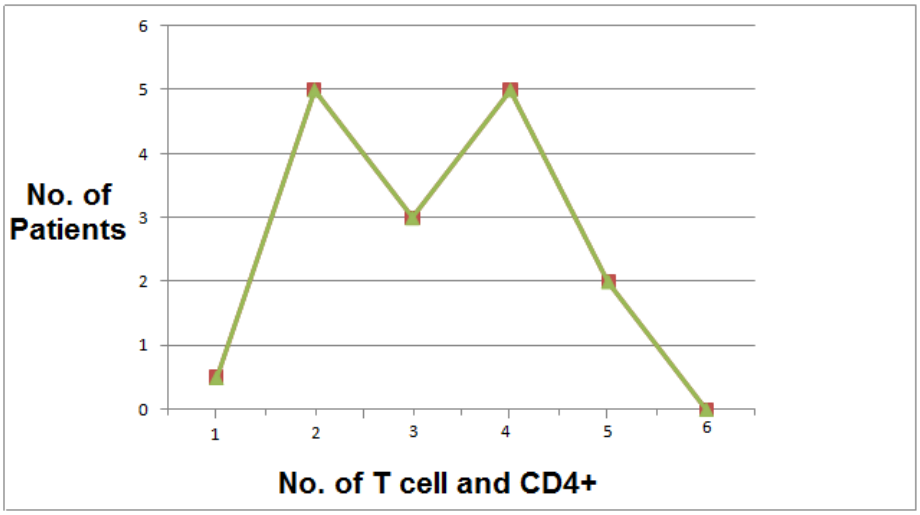


Figure 1
IL12 P40 as a probe for herd immunity

	IL12 P40 in PTB
1 – 0	0
2 – 1-200	5
3 – 201-400	4
4 – 401-600	6
5 – 601-800	3
6 – 801-1000	0



CD4+ as a probe for herd immunity : Figure 2

1 – 300-599	0
2 – 600-899	5
3 – 900-1200	3
4 – 901-1500	5
5 – 1501-1800	2
6 – 1801-2001	0

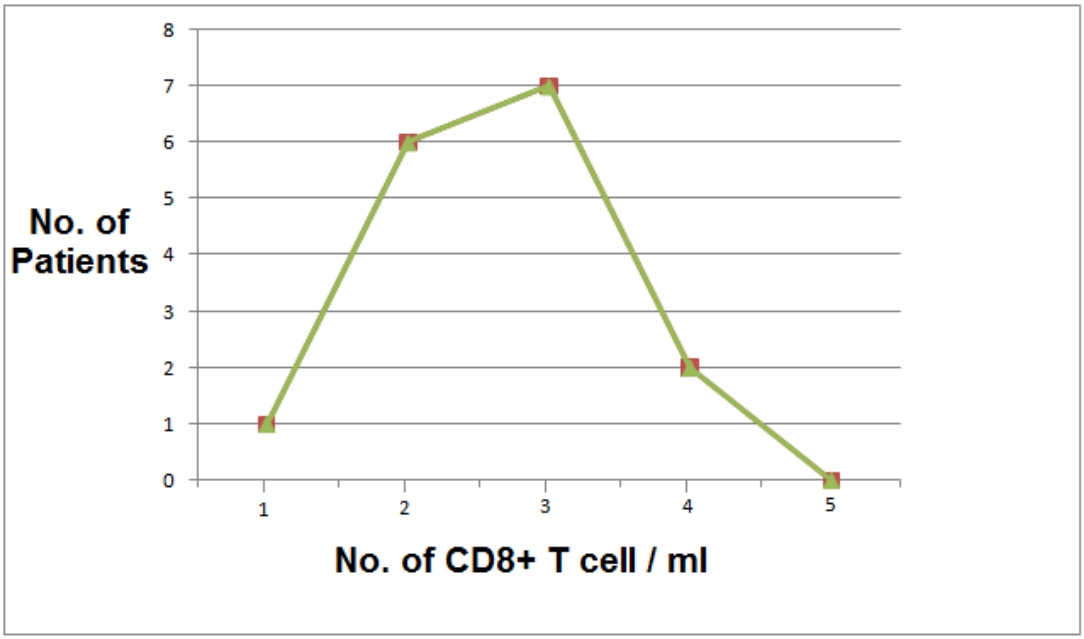


Figure 3: CD8 as a probe for human herd immunity

1 – 1-300	0
2 – 301-600	6
3 – 601-900	7
4 – 901-1200	2
5 – 1201-1500	0

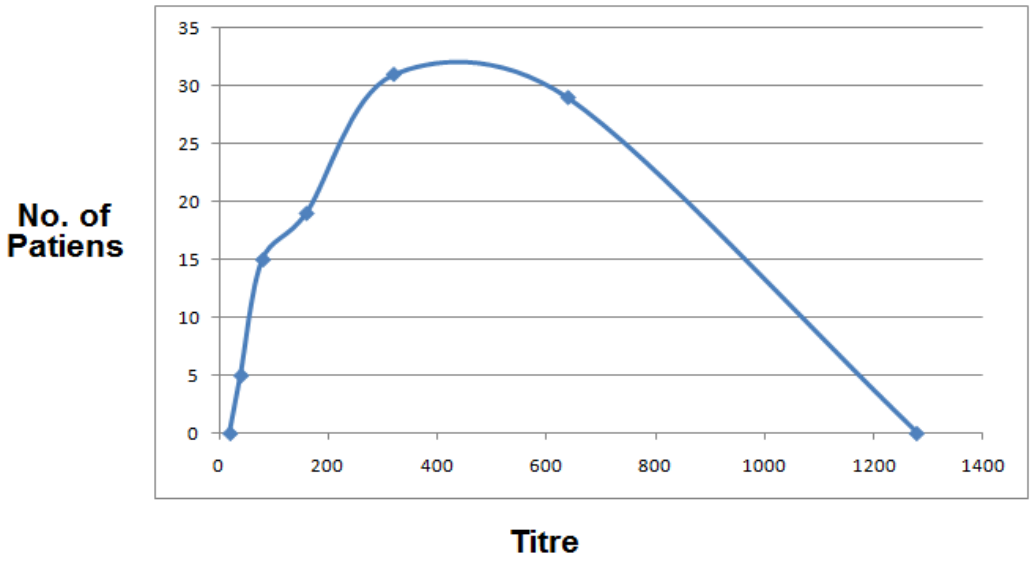


Figure 4:S.typhi anti-H as a probe of human herd immunity among enteric fever patients

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1 – 20	0
2 – 40	5
3 – 80	15
4 – 160	19
5 – 320	31
6 – 640	29
7 – 1280	0

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Biography;

Professor Shnawa IMSAW, Ph.D. Biology department, college of science, University of Babylon since 1995 .He is a ,member of wasets committee of life science 2014 and Senior member of APCBEES since 2012.

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