

# Differential diagnosis: Cases with equal Posteriori Likelihoods

ASHUTOSH KUMAR DIXIT

**Sir**

In differential diagnosis, given a diagnostic test finding, the use of Baye's [1] rule helps in improving physician's initial appraisal of disease likelihoods (apriori). Even the diagnostic importance of normal test finding is advocated in this context [2].

The disease likelihoods computed using Baye's rule, given a normal test finding (posteriori) have been shown to cause shift in apriori [2].

In 3 out of 4 cases described by the authors [2], the computed posteriori given normal test finding helped in deciding the most likely diagnosis, which corresponds to maximum posteriori. However in case with normal brain scan, the computed posteriori turned same for the three potential diagnoses at stake, viz. 33.33% each for brain abscess, brain tumour and vascular malformation; putting the physician in an indecisive state, as all the three disorders were equally likely.

The most likely diagnosis corresponding to maximum posteriori is missing in this case. Similar situations are faced in differential diagnosis, where statistically, any choice among equal likelihoods may be preferred but practically each of them happens to be linked with different line of treatment and involves different associated suffering and cost to the patient. A simple solution of it would be to consider the obtained posteriori as physician's afresh apriori and to recalculate the revised posteriori, following same procedure [2].

This is described in Table/Fig 1 for the case of normal brain scan under discussion. From this table, as per the computed revised posteriori, instead of all the equally likely potential diagnoses the vascular malformation now stands as most favoured choice as it then corresponds to maximum revised posteriori. [Table/Fig 1]

	A	B	C	D
<b>Potential Diagnoses</b>	Obtained posteriori likelihoods at first instance (%)	Incidence of normal finding in disease (%)	No. of patients with normal brain scan (A x B)/100	Revised posteriori likelihoods (%) (C/\$) x100
<b>Brain abscess</b>	33.33	15	4.99 ~ 5	11.11
<b>Brain tumour</b>	33.33	30	9.99 ~ 10	22.22
<b>Vascular Malformation</b>	33.33	90	29.99 ~ 30	66.67
<b>Totals</b>	99.99		45 (\$)	100.00

[Table/Fig:1] Computation of revised posteriori likelihoods

The logic to use posteriori as afresh priori derives its justification from the fact that the use of it in cases in which a most favoured posteriori was yielded at first instance, increased further the value of this posteriori and it continued so with further such repetitions. The procedure described here provides solution to situations with equal posteriori in general. However, in extreme cases with equal two or more entries in column C of table 1, the reconsideration of apriori by the physician is suggested; as in such cases, posteriori turn equal even after repetitions.

**REFERENCES:**

[1] Feinstein AR. Clinical judgement. Baltimore. Williams & Wilkins, 1967;443-687  
 [2] Gorry GA, Pauker SG and Schwartz WB. The diagnostic importance of the normal finding. N Engl J Med 298: 486-489, 1978

**AUTHORS:**

1. Dr. ASHUTOSH KUMAR DIXIT

**NAME OF DEPARTMENT(S) / INSTITUTION(S) TO WHICH THE WORK IS ATTRIBUTED:**

Desert Medicine Research Centre (Indian Council of Medical Research) Jodhpur, India

**NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:**

Dr. Ashutosh Kumar Dixit, Desert Medicine Research Centre (Indian Council of Medical Research), New Pali Road, Jodhpur-342005, India  
 E-mail: dixitstat@rediffmail.com, Phone: +91-291-2729717

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