Additional $P(\text{Negative} \mid \text{Not Cancer}) = 0.8$ + $P(\text{cancer}) = 0.1$

$P(\text{positive} \mid \text{cancer}) = 0.95$

EX. Cancer에 걸린 사람이 의료검사(Test)를 실시할때 결과가 양성으로 판정되는 비율=95%이라고 하자.

이때 한 실험자가 Test를 수행한 결과 양성이라는 결과를 얻었다면 이 실험자는 95%로 Cancer에 걸렸다고 할 수 있는가??

$$P(\text{cancer} \mid \text{positive}) \overset{?}{=} \cancel{0.95}$$

$$= \frac{P(\text{Cancer} \cap \text{positive})}{P(\text{positive})} = \frac{P(\text{positive} \mid \text{Cancer}) \times P(\text{cancer})}{P(\text{positive})}$$

cf. $\text{positive} = (\text{positive} \cap \text{Cancer}) \cup (\text{positive} \cap \text{Not Cancer})$

$$P(\text{positive}) = P(\text{positive} \cap \text{Cancer}) + P(\text{positive} \cap \text{Not Cancer})$$

$$= P(\text{positive} \mid \text{Cancer}) \times P(\text{cancer}) + P(\text{positive} \mid \text{Not Cancer}) \times P(\text{Not Cancer})$$

$$= \frac{P(\text{positive} \mid \text{Cancer}) \times P(\text{cancer})}{P(\text{positive} \mid \text{Cancer}) \cdot P(\text{cancer}) + P(\text{positive} \mid \text{Not Cancer}) \cdot P(\text{Not Cancer})}$$

$P(\text{positive} \mid \text{Not Cancer}) = 1 - P(\text{Negative} \mid \text{Not Cancer})$

$$= \frac{0.95 \times 0.1}{0.95 \times 0.1 + (1-0.8) \times (1-0.1)} \fallingdotseq 0.345.$$

cf. 참고

	Cancer: O	Cancer: X
Test: +	True positive (TP)	False positive (FP)
Test: −	False Negative (FN)	True Negative (TN)

$P(\text{positive} \mid \text{Cancer}) = \frac{TP}{TP + FN}$

↳ 민감도 (sensitivity).

- $P(\text{Negative} \mid \text{Not cancer}) = \frac{TN}{TN + FP}$

↳ 특이도 (specificity)