

ECE 302, Diagnosing a rare disease

Question 1: Consider a rare but deadly disease. Statistically, 1 out of 100000 people will have this disease. We have a powerful diagnosis test and the corresponding “conditional probabilities” are as follows. (We use P/N to denote positive/negative and D/ND to denote a person has or does not have this disease.

$$P(P|D) = 0.999 \quad (1)$$

$$P(N|D) = 0.001 \quad (2)$$

$$P(P|ND) = 0.001 \quad (3)$$

$$P(N|ND) = 0.999 \quad (4)$$

A family member recently took the test and the result was positive.
Which one of the following methods would you suggest? Why?

1. Start a costly therapy immediately.
2. Ignore the result, since all your other family members do not have that disease.
3. Take other types of tests.