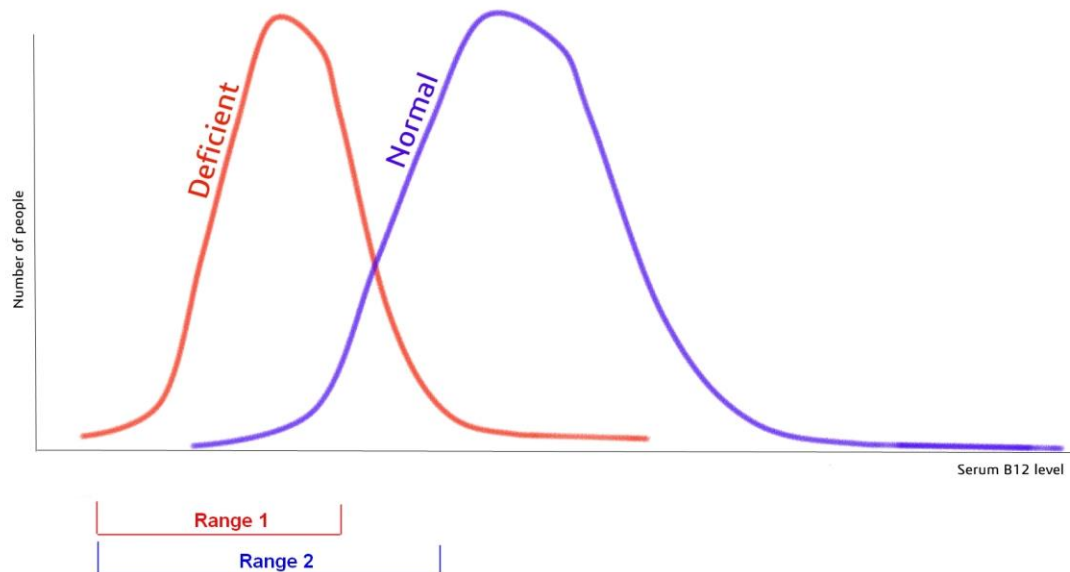


# The problem with ranges

---

One big problem with diagnosing a B12 deficiency is that there is a big variety in the blood levels, not only of people who are deficient, but in those who are not – they are normal with no signs of a deficiency. Here is a stylised graph to show the situation.



As you can see there is quite an overlap between the deficient and the normal people. And that causes a problem when you try to set a range to decide who is, and who is not, deficient.

If you pick Range 1 then you miss a lot of people who are actually deficient. If you pick Range 2 then you catch almost all of the deficient people, but you have erroneously classified a large proportion of the normal people.

Sensible doctors will realise that there is a grey area, above the top of Range 1 but below the top of Range 2. They will decide if a deficiency is present based on symptoms and the patient's response to treatment with B12.

## The problem with choosing ranges

If you select a deficiency range too narrow (Range 1) then you don't classify too many normal people as deficient, but you miss out a lot of people who are deficient. If you set the deficient range too high then you catch most of the deficient people, but a lot of normal people are erroneously classed as deficient.

That latter situation is a problem. If you get 90% of the deficient people and misclassify 10% of normal people, which might seem a good compromise. But it turns out not to be so.

Assume 10% of the population are deficient. Using the above criteria -

Out of 1000 people, 100 will be deficient and 90 will be classified as such. 900 will not be deficiency, but 90 of them will be wrongly classified.

You will have 180 people who are tested deficiency, but only half will be. The other half will be getting unnecessary treatment.