Stratified versus personalised medicine

The term **personalised medicine** includes both **stratification** and **personalisation**, which are often incorrectly used as synonyms. However, the two are different, as explained further below.

Stratified Medicine

Stratification, in our context, means defining sub-populations (a group or proportion of patients) according to which disease 'sub-type' an individual has been diagnosed with. For example, some breast cancers are 'hormone-receptor positive', some are 'HER-2 positive', and some are neither.

Breast cancer can be linked with the hormones oestrogen and progesterone. Most breast cancer cells have a large number of molecules (receptors) that bind with oestrogen and allow the cells to grow when oestrogen is present — these cells are 'ER positive'. Many of these cells also grow in response to progesterone — they are 'PR positive'.

Breast cancer cells that are ER and/or PR positive are likely to respond to medicines that block the action of oestrogen or progesterone. Around 60 in every 100 breast cancer patients respond to these medicines. The same medicines will only be effective for around 5 or 10 cases in every 100 if the tumour is not ER and/or PR positive.

Some breast cancer cells also make too much of a protein called 'Her2/neu'. They are known as 'HER-2 positive'. These cancers tend to be aggressive. However, the medicine trastuzumab binds to the Her2/neu protein. This improves overall survival for HER-2 positive patients with advanced breast cancer.

Some breast cancers are neither ER, PR, nor HER-2 positive. These tumours are called 'triple negative', and as yet no targeted therapies are available. Therefore, more usual types of chemotherapy will be prescribed.

Personalised Medicine

Personalised medicine is based on a **detailed profile of the individual,** including the sub-population that a patient belongs to. However, personalised medicine takes other information into account, such as the individual's lifestyle and environment (UV light exposure, diet, smoking, stress). A doctor giving personalised medicine will be able to use targeted (stratified) treatments, but will consider more than just which sub-population the patient belongs to. This should help to make the best decisions about managing the patient's disease.

Another way of adding much more detail to an individual's profile is the 'whole genome sequencing'. This is the analysis of the whole of a person's DNA rather than testing for variations in just one or a few genes. This technique is not a standard clinical technique as yet, but many people predict that this will change. If so, whole genome sequencing and other related technologies will help drive forward truly personalised medicine.

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