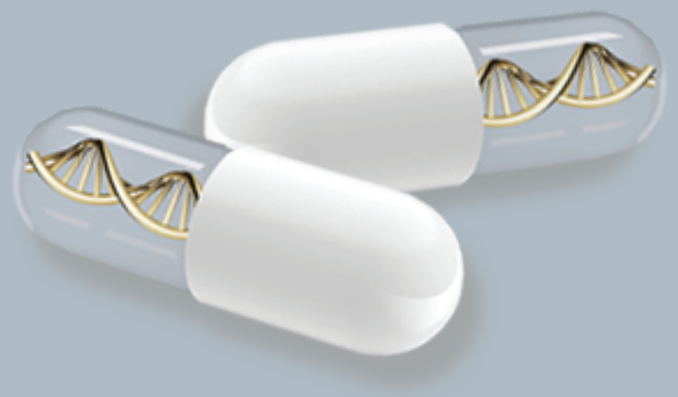


PHARMACOGENETICS

MZ-MEDICAL

science with humanity

THE SAME DRUG IN THE SAME DOSE CAN HAVE
VERY DIFFERENT EFFECTS ON EACH PERSON

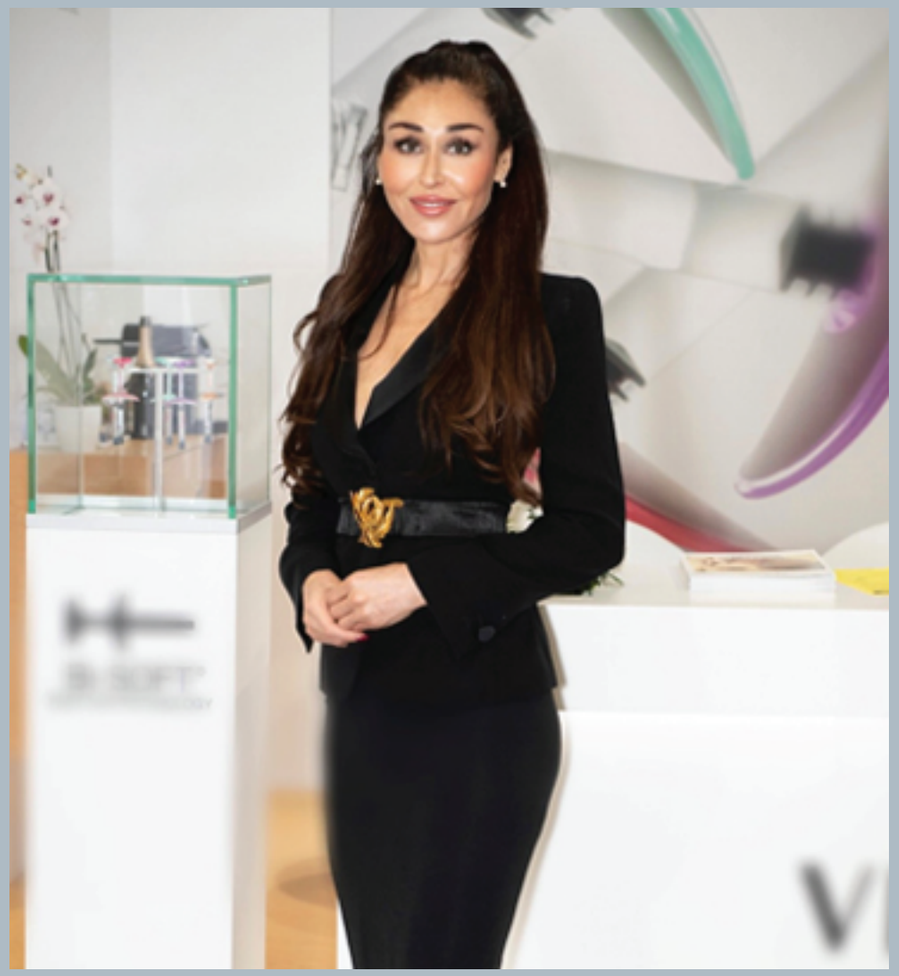
Precision medicine is at the heart of medicine of the future. Pharmacogenetics, one of the pillars of precision medicine, allows us to make wiser decisions about lifestyle choices and treatments. Pharmacogenetics is the science that studies how a person's genes affect the way he or she responds to drugs.

Taking a patient's genetics into account and detecting interactions between drugs, herbal medicines and nutritional supplements, we can prescribe more safely, reduce side effects and avoid lack of efficacy. Clinical implementation of pharmacogenetics for safer drug prescription is only possible when a comprehensive clinical history is taken and relevant data that influences drug response is collected alongside genetic information.

Use of pharmacogenetics is part of our commitment to empower patients. We believe care should be transformed from being reactive to being preventive. We may wait until we are sick before acting or we can take a preventive, predictable and participative approach, prioritising wellbeing.

The best investment is in our health. We know it may not always be an easy journey, but "no one is ever defeated until defeat has been accepted as a reality"

We look forward to meeting you and working together.



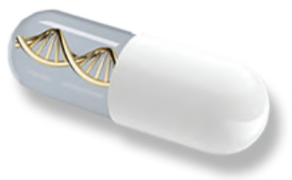
Dr Maria Zalazar
MZ-Medical
Founder and Medical Director

PHARMACOGENETICS INTRODUCTION

We can evaluate overall risk to adverse drug events by analysing almost 100 clinically significant genetic variants that can influence drug metabolism. We can also study individual responses to a particular drug.

Using specialised software, we can also:

- Compare a patient's genetic and clinical information with more than 2000 active ingredients and analyse these interactions
- Determine if there are any interactions with a patient's lifestyle
- Recommend doses of different drugs
- Warn about the increased risk of undesirable effects with some drugs
- Produce a personalised report with all the recommendations.



Pharmacogenetics
A Tool That Can Change Everything P. 4

Some of the most common pharmacogenetic tests study gene variations involved in the metabolism of:

PHARMACOGENETICS
A TOOL THAT CAN CHANGE EVERYTHING

In midlife there is an increase in the utilisation of prescribed and over-the counter (OTC) medications as well as supplements. Statins may be one of the most common drugs prescribed while non-steroid anti-inflammatories (e.g. aspirin, ibuprofen, diclofenac) are the most common OTC drugs, and vitamin D the most used supplement. Taking more than two prescribed or OTC medications is not unusual in this period of life.

As the number of drugs taken increases, the risk of adverse effects increases as well, leading to poor quality of life or hospitalisation. Moreover, adverse effects can be misinterpreted as a disease and a new drug is added to the current prescribed treatment, increasing the risk of further adverse drug reactions (ADRs).

A considerable proportion of these undesirable effects can be avoided through personalisation of drug treatments. Genetic testing provides a significant tool to optimise individual treatments.

Role of Genetics in Adverse Drug Reaction

Individual variations in a few genes can affect the response to medication.

These variations can compromise absorption, distribution, metabolism and excretion (pharmacokinetics), as well as the interaction between drug metabolites and receptors (pharmacodynamics).
The family of genes called CYP encodes the vast majority of enzymes regulating both pharmacokinetics and pharmacodynamics.

Genetic Testing

Genetic tests can be used to evaluate overall risk of adverse drug events. Over 100 genetic variants can influence drug metabolism (the activation, transport and elimination of drugs). In addition, test results can help to evaluate the risk of drug-drug interactions, allowing us to select safer and more effective drug regimens that can improve drug treatment outcomes and help to reduce adverse side effects.

The activation, transport or elimination of medications are modulated by genetic variants present in the genome of each person. The risk of developing adverse effects from drug treatments or the treatment having no effect is determined by the presence of these genetic factors.

STATINS

Skeletal muscle toxicity is an unnecessary pain that can be avoided with a pharmacogenetic test.
This test can help to decide which statin may be best for a patient. Adjustments to the dose of one statin or choosing an alternative to that can make a big difference, especially if stopping a statin abruptly puts a patient at risk of losing the cardiovascular benefits of this therapy.

Statins are among the most used drugs in middle-aged and older people. They are proven very efficacious to lower blood lipid levels as well as to diminish cardiovascular disease and mortality in individuals at risk. However, their efficacy varies according to specific genetic variants present in the genome of the patient.

Unfortunately, statin treatments can also cause secondary effects, affecting muscles in 10-15% of patients treated with them. The occurrence of secondary effects is influenced by age, BMI, drug-drug interactions, type and dosage of statins, but also by genetics.

Testing for genetic variants involved in the metabolism and toxicity of statins allows us to determine the most optimal treatment with fewer secondary effects.

ANTIDEPRESSANTS

A pharmacogenetic test is most appropriate when initiating therapy with an antidepressant as treatment outcomes and adverse effects amongst between individuals taking tricyclic antidepressants (TCA).

These differences are associated with CYP2D6 and/or CYP2C19 genetic variations.

Using the test after months of drug therapy may be less helpful, as the drug dose may have already been adjusted based on plasma concentrations, response or side effects.

To take an example, metoprolol is metabolised predominantly by CYP2D6, an enzyme that is absent in about 8% of Caucasians. Concomitant use of inhibiting drugs in these people will increase blood levels of metoprolol, leading to serious unwanted effects.

NICOTINE

Smoking is one of the principal preventable risk factors for cardiovascular disease in women.

Moreover, it is associated with earlier menopause and is thought to increase the risk of osteoporosis and fractures in some postmenopausal women.

It is estimated that up to 70% of all smokers express a desire to quit, but only 3-5% of them are successful.

Your individual genetic variants might be playing the largest role in driving your addiction and in turn may guide the most effective therapy in reaching your smoking cessation goal.

Smoking cessation medication such as nicotine replacement therapy, bupropion and varenicline are metabolised differently amongst individuals, suggesting that pharmacogenetic tests may be of great help when starting a smoking cessation strategy.

TAMOXIFEN

This drug is a major option for adjuvant endocrine treatment in estrogen receptor positive brest cancer.

Tamoxifen is transformed by CYP2D6 to endoxifen, which has greater anti-estrogenic potency than tamoxifen.

Women with certain CYP2D6 genetic variants and those who receive strong CYP2D6 inhibitors exhibit lower endoxifen concentrations and a higher risk of breast cancer recurrence.

This test can assess a woman's ability to respond to tamoxifen treatment and may be a useful piece of information to consider when making therapeutic choices.

Although genetic variation in CYP2D6 is the primary determinant of tamoxifen metabolism there are a secondary contribution from several other genes including CYP3A4 and CYP2C9. Upon validation that tamoxifen metabolites determine treatment efficacy, personalised treatment integrating relevant genetic and clinical information may help to select the appropriate starting doses.

ANTIHYPERTENSIVE DRUGS

Like all diagnostic tests, genetic tests are one of several pieces of clinical information that should be considered before initiating drug therapy.

Despite the availability of multiple drugs to treat hypertension, the control of blood pressure is not always possible; moreover, the response to different drugs differs amongst individuals.

While factors such as age, gender and other health conditions can help guide the selection of one antihypertensive agent over another, to a large extent the treatment that patients receive is based on trial and error.

A pharmacogenetic test can help in getting the most effective, efficient and well-tolerated drug regimen, and as a result we can reduce both the number of times you need to visit your doctor to re-adjust your medication and the range of side effects. Better blood pressure control would lead to fewer complications and an improvement in quality of life and longevity.

Our genetic consultations are provided by a medical doctor. Many genetic tests can be done by using one simple, painless buccal swab.

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Personalised hormone replacement therapy and health programmes to support middle-aged women.

LET'S GET STARTED

worldwide virtual consultation
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