



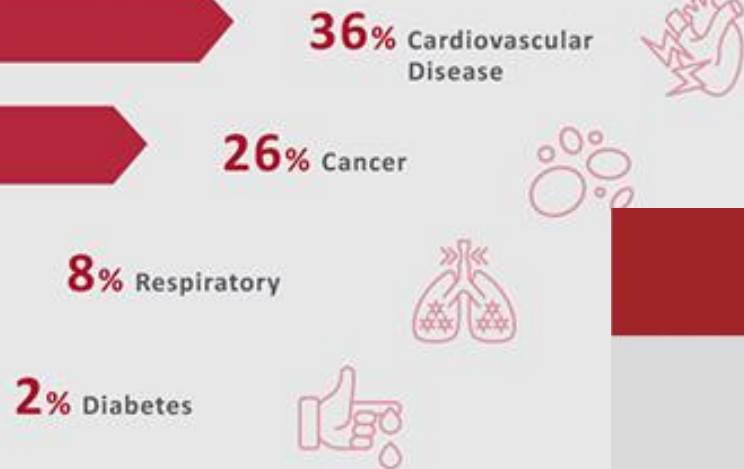
**iDNA**  
GENOMICS



Στα επόμενα 60',  
14 άνθρωποι  
θα αυτοκτονήσουν στην Ευρώπη  
κυρίως λόγω κατάθλιψης...

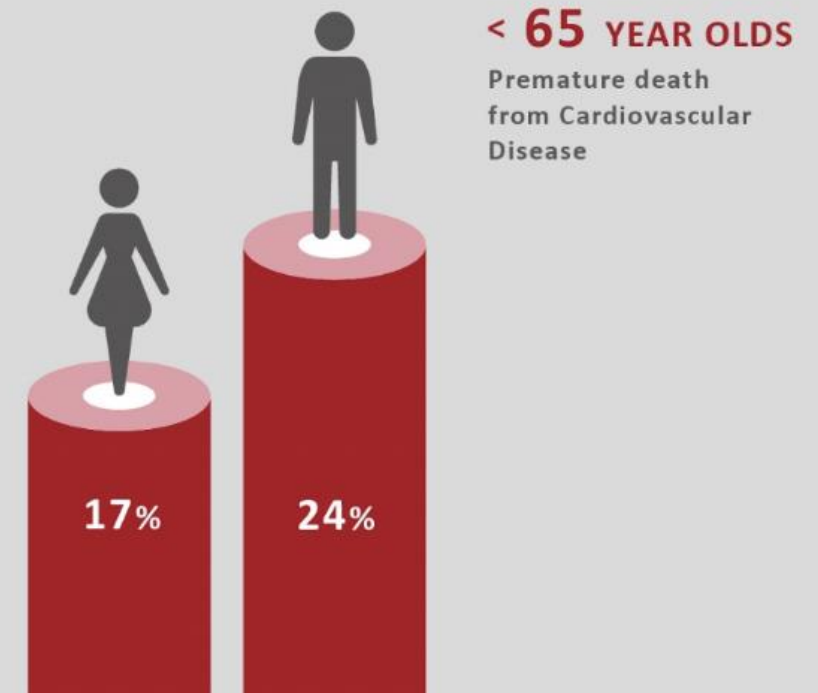
## DYING FROM CARDIOVASCULAR DISEASE (EU)

**1.8** MILLION  
Cardiovascular Disease deaths per year  
=  
**5000**  
Cardiovascular Disease deaths per day



Στα επόμενα 60',  
205 άνθρωποι  
θα πεθάνουν στην Ευρώπη  
λόγω καρδιαγγειακών παθήσεων...

## DYING FROM CARDIOVASCULAR DISEASE (EU)





**Precision Medicine**  
Prevention, Diagnosis and Treatment

The background features a dark blue to teal gradient with numerous faint, white chemical structures scattered throughout. A prominent structure in the upper right is a purine derivative, specifically caffeine, with the SMILES string CN1C=NC2=C1C(=O)N(C)N2C. Other structures include various rings, chains, and functional groups, all rendered in a light, semi-transparent style.





# DNA: We are all different !

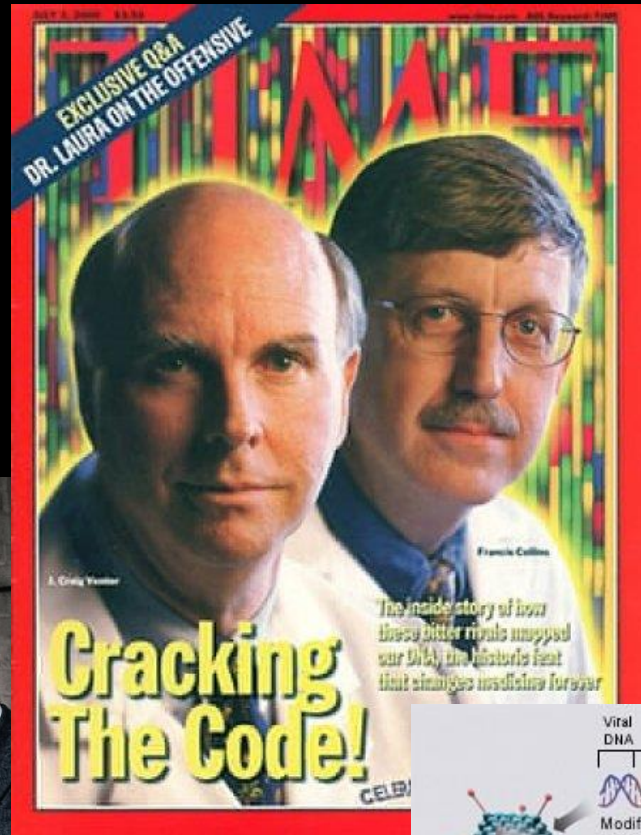
## Although we share a large amount of our DNA, we all have differences in our genomes

On average, a person's genome sequence is ~99.6% identical to a reference human genome sequence; that person's set of genomic variants accounts for the ~0.4% difference

## Our DNA Could Change the Future of Health

Precision medicine focuses on identifying optimal care based on a unique personal profile and constitutes a world class shift in HealthCare

1953



2017



**BREAKING NEWS**

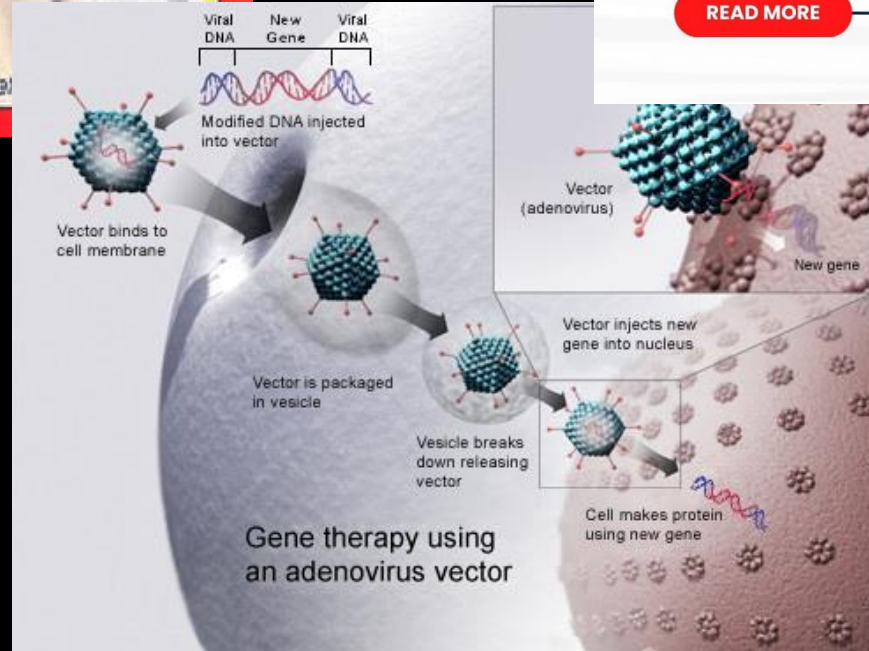
**WORLD'S FIRST MEDICINE THAT UTILIZES CRISPR GENE-EDITING TECHNOLOGY**

The United States Food and Drug Administration (FDA) has made a groundbreaking decision by approving the world's first medicine that utilizes Crispr gene-editing technology for sickle cell disease

[READ MORE](#)

[www.biotechnika.org](http://www.biotechnika.org)  
 biotechnika  
 THE NEW FRONTIER

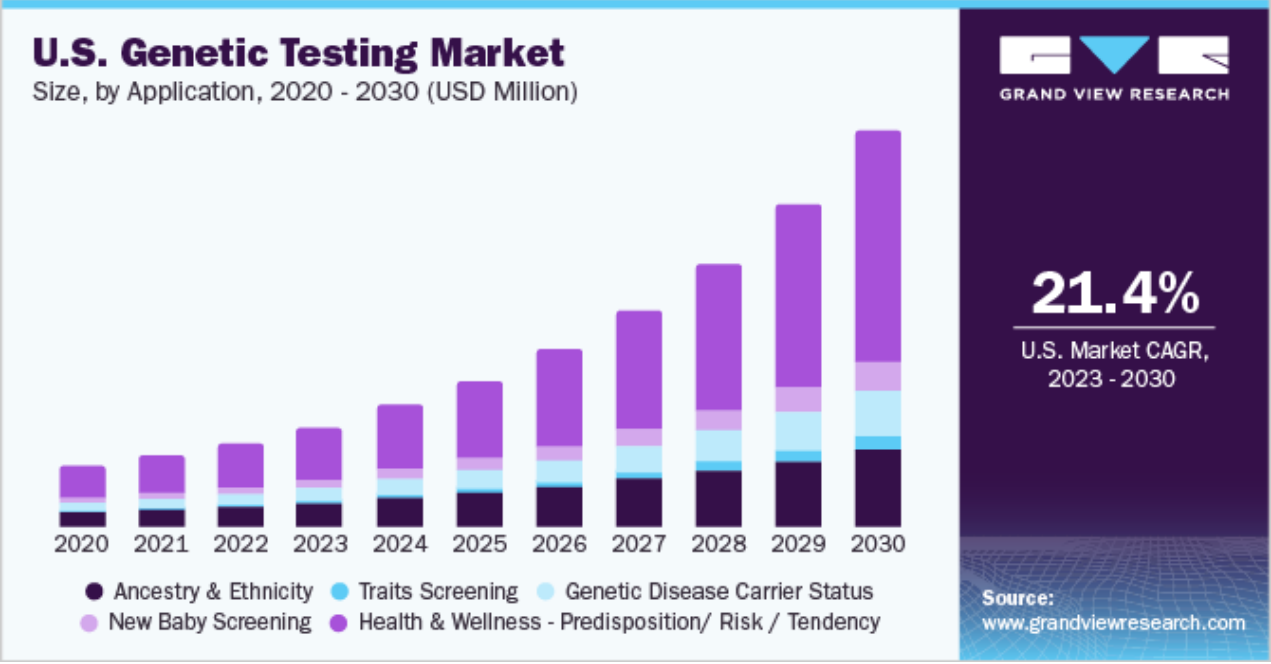
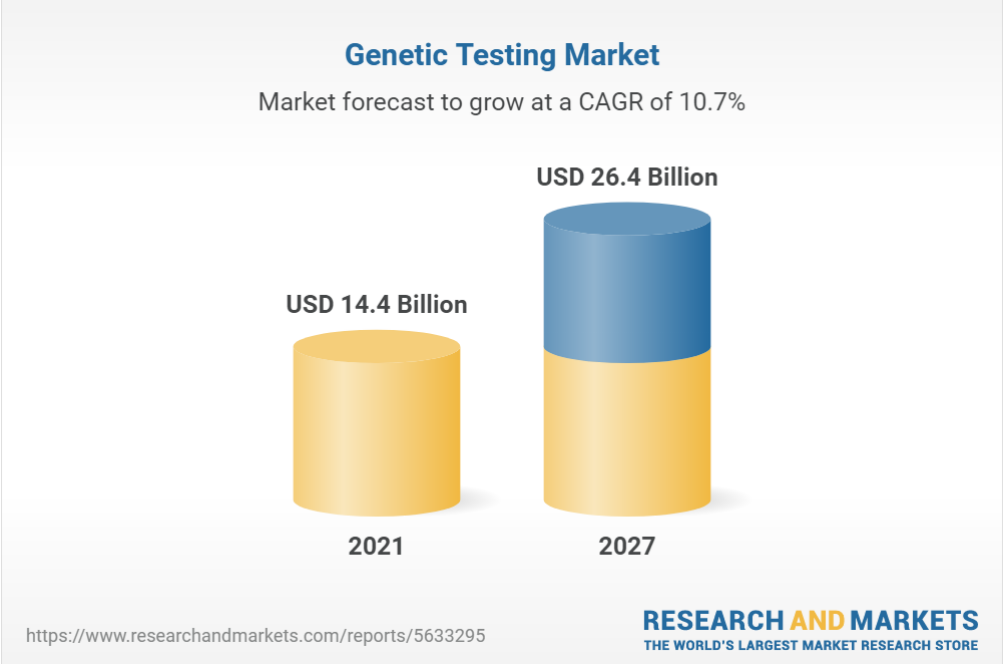
2003



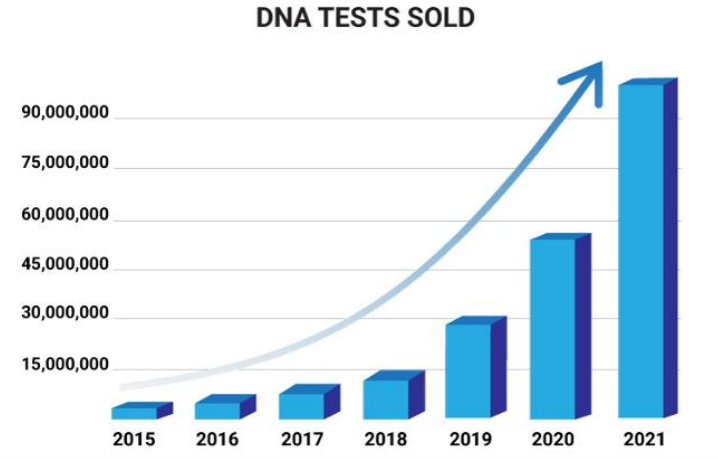
2023

# Industry evolution

## Genetic Testing Market



- Booming market
- Health & Wellness- Predisposition/Risk/Tendency is the fastest growing segment





# The company

## 1. Structure

- iDNA Laboratories: Medical company, Licensed Diagnostic Laboratory
- iDNA Genomics: Commercial company



## 2. Fully integrated company, from concept to product

- Unique certified in vitro Diagnostics (IVD) DNA tests available
- New DNA tests development expertise



## 3. Advanced Science

- Combined Genetic & Epigenetics concepts
- Own algorithms
- Bioinformatics platform



## 4. Regulatory clearance

- CE IVD Status
- ISO 9001:2015, ISO 13485:2016, ISO 27001:2013



## 5. Competitive Pricing



## 6. Team

- Successful track record & expertise, int'l know how
- Opinion leaders on board



iDNA  
GENOMICS

iDNA  
LABORATORIES





# Industry challenges & our solutions

*We meet the needs*

## 4 Key challenges

## Our solutions

- |                                       |   |  |
|---------------------------------------|---|--|
| 1. New global regulatory requirements |    | Regulatory clearance in EU   |
| 2. Privacy of data                    |    | ISO 27001:2013 – Data Protection   |
| 3. Genetics only are not enough       |   | Combined genetics with phenotype* for lifetime health monitoring -UNIQUE |
| 4. Pricing & Reimbursement            |  | Highly competitive pricing & Reimbursement option in pharmacogenetics    |

*\* Phenotype is defined as any observable trait such as blood pressure, body weight etc., that can be affected by lifestyle*

# Our Products

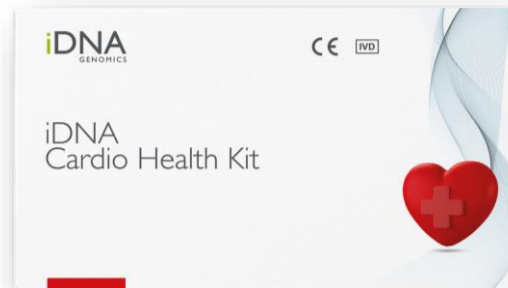
## Medical Genomics

### 1. Pharmacogenetics - iDNA PGx CNS DEPRESSION



- 322 million people suffer from Depression

### 2. Genetic Predisposition - iDNA Cardio Health CARDIOVASCULAR DISEASES



- 523 million suffer from CVD

### 3. Personalized Nutrigenetic Analysis - iDNA NutriGenetix OBESITY



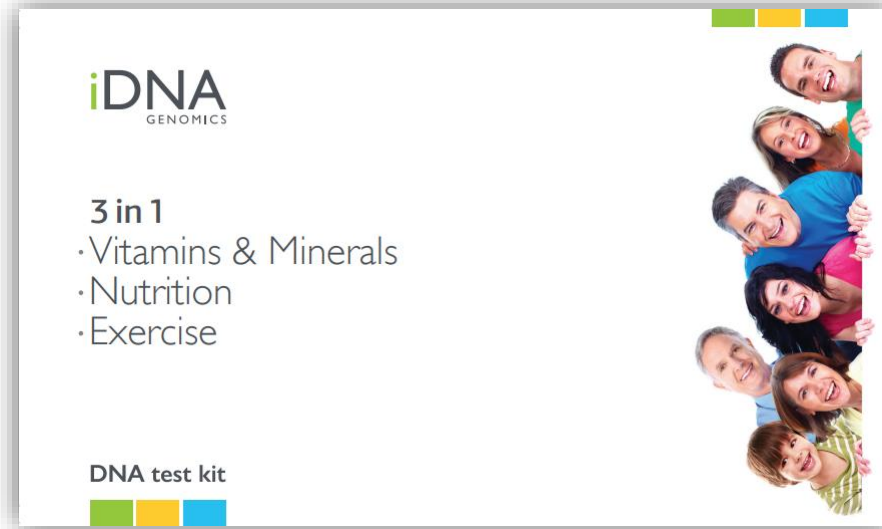
- 650 million people are obese

# Our Products

## Scientific Wellness Genomics

### 3 in 1 holistic genetic report on :

- Nutrition
- Vitamins & minerals
- Exercise

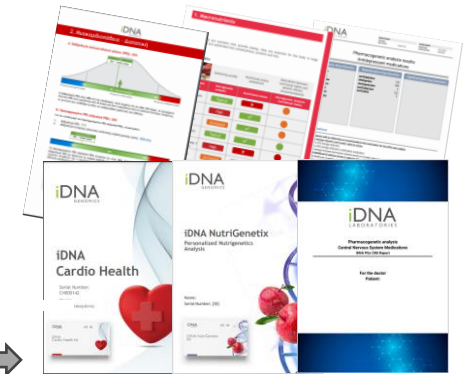
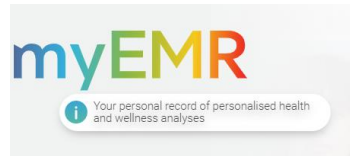


47% of people are overwhelmed by conflicting advice on health & wellness.



# What is our process

*From saliva DNA to personalized Health report*



## Kit Supply

- Online
- Physical

## Kit Registration

- On MyEMR platform by serial number
- B2B: By Health professionals
- B2C: By End users

## Saliva sample

- To be sent to the certified genetic lab free of logistics charge
- Genotyping of the sample by certified scientists

## Bioinformatics

- AI analysis
- Genetic report development

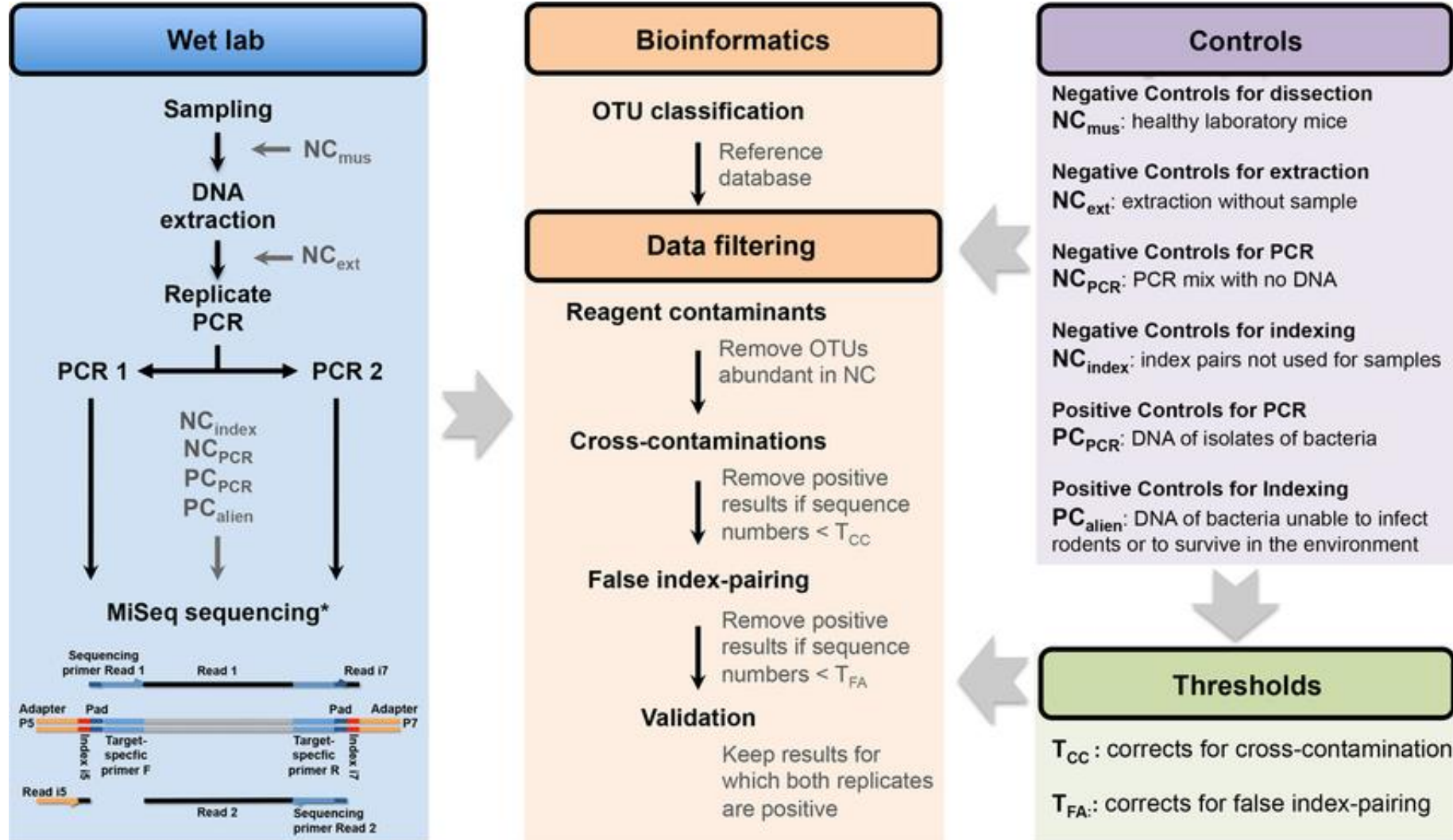
## MyEMR platform

- B2B: Personalized Reports uploaded to Health professionals' profile
- B2C: Personalized Report uploaded to End Users' profile



# What is our process

From saliva DNA to personalized Health report



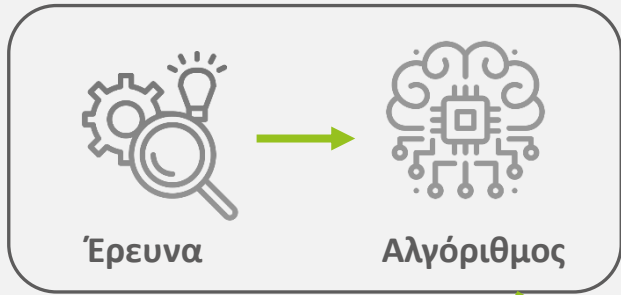
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GSGT Version 2.0.4  
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 Num SNPs 730059  
 Total SNPs 730059  
 Num Samples 92  
 Total Samples 92  
 File 1 of 92

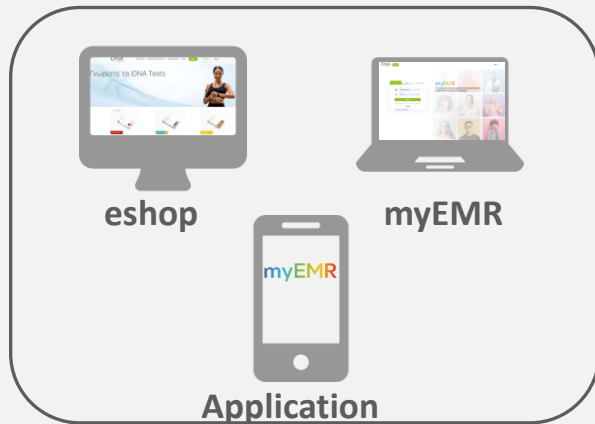
[Data]

Sample ID	RsID	GC Score	SNP Name	SNP Index	Sample Index	Sample Name	Sample Group	SNP Aux	Chr	Position	GT							
Score	Cluster	Sep	SNP	ILMN	Strand	Customer	Strand	Top	Genomic	Sequence	Plus/Minus	Strand	Allele1 - AB	Allele2 - AB	Allele1 -			
Top	Allele2 - Top	Allele1 - Plus	Allele2 - Plus	Allele1 - Forward	Allele2 - Forward	Allele1 - Design	Allele2 - Design	Theta	R	X	Y	X Raw	Y Raw	B Allele	Freq	Log R Ratio	CNV Value	CNV Confidence
WL008951	rs577266494	0.8339	1:103380393	1	1	WL008951	0	1	102914837	0.8123	0.9535	[T/C]	BOT					
TOP	-	B	B	G	G	G	C	0.974	0.816	0.032	0.783	327	1978					
1.0000	0.0721																	
WL008951	rs577315876	0.8355	1:106737318	2	1	WL008951	0	1	106194696	0.8133	0.5527	[A/C]	TOP					
BOT	-	A	B	A	C	T	G	0.416	0.491	0.278	0.213	1540	563					
0.5330	-0.0192																	
WL008951	rs755970517	0.4783	1:109439680	3	1	WL008951	0	1	108897058	0.8776	1.0000	[A/G]	TOP					
TOP	+	A	A	A	A	A	A	0.042	0.690	0.647	0.042	3160	142					
0.0037	-0.1924																	
WL008951	.	0.1810	1:110228436_CNV_GSTM1	4	1	WL008951	0	1	109685814	0.5536	0.3024	[A/G]	TOP					
BOT	-	B	B	G	G	C	G	0.815	0.277	0.064	0.213	494	608					
1.0000	0.1866																	
WL008951	.	0.2214	1:110228505_CNV_GSTM1	5	1	WL008951	0	1	109685883	0.5798	0.2299	[A/C]	TOP					
TOP	+	A	B	A	C	A	C	0.622	0.092	0.037	0.055	337	206					
0.6634	-1.0783																	
WL008951	.	0.4582	1:110228615_CNV_GSTM1	6	1	WL008951	0	1	109685993	0.8614	0.9994	[T/C]	BOT					
BOT	+	A	A	A	A	T	T	0.073	0.426	0.382	0.044	2180	195					
0.0260	-0.7740																	
WL008951	rs1419817467	0.3448	1:110228695_CNV_GSTM1	7	1	WL008951	0	1	109686073	0.7621	0.5021							
[T/C]	BOT	BOT	+	B	B	C	C	G	G	G	G	G	G	G	0.701	0.120	0.030	

## Προϊοντικός Σχεδιασμός



## Αγορά DNA Test & Εγγραφή



## Εργαστήριο

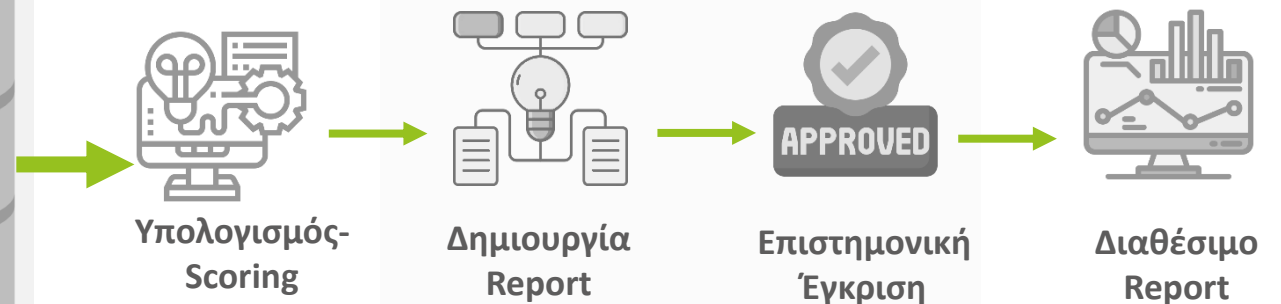


Database

## Ένα μοναδικό οικοσύστημα

Η ιδιόκτητη πλατφόρμα τεχνητής νοημοσύνης, χρησιμεύει ως βάση για το σχεδιασμό του προϊοντικού χαρτοφυλακίου μας και των παρεχόμενων υπηρεσιών.

Αποτελεί το unique selling proposition (USP) μας και βασίζεται σε στατιστική ανάλυση καθώς και σε artificial intelligence (AI), για τον υπολογισμό δεικτών που σχετίζονται με τη γενετική προδιάθεση ενός ατόμου.



Deal	Data quantity	Genomic data type	Price per unit (PPU)	Details
<a href="#">DECODE to Amgen for \$415M (2012)</a>	300,000	Genotype	\$1,383	Company acquisition including genotyped data + medical records.
<a href="#">23andMe to Genentech for \$60M (2015)</a>	3000	Whole genome sequence	\$20,000	Partnership including whole genome sequence data + self reported info from Parkinson's disease patients + ability to recontact.
<a href="#">FinnGen to group of pharmaceutical companies for \$75M (2017)</a>	500,000	Genotype	\$150	7 international pharmaceutical companies funding a study to analyse 500,000 Finnish biobank blood samples. Genotype data + medical records + ability to recontact.
<a href="#">UK Biobank to Regeneron group of pharmaceutical companies (2018)</a>	500,000	Exome	\$300	Regeneron group of pharmaceutical companies funding a study to sequence the exomes of 500,000 UK Biobank participants. Exome data + medical information + exclusive access period.
<a href="#">23andMe to GSK for \$300M (2018)</a>	4,000,000	Genotype	\$75	Ownership stake in 23andMe with 4 year exclusive access to genotype + survey data.
<a href="#">Genomic Medicine Ireland to WuXi NextCODE for \$400M (2018)</a>	400,000	Whole genome sequence	\$1000	Company acquisition including whole genome sequence data + medical records + ability to recontact.
<a href="#">UK Biobank to group of pharmaceutical companies for \$200M (2019)</a>	500,000	Whole genome sequence	\$400	4 international pharmaceutical companies funding a study to sequence the whole genomes of 500,000 UK Biobank participants. Whole genome sequence data + medical information + exclusive access period.



We are here  
to support you for  
your patients' benefit

“ 34% of CNS drugs side effects are caused by gene – drug interactions and not by drug – drug interactions. ”



**iDNA PGx CNS Test**

Pharmacogenetics of Central Nervous System Drugs



**iDNA**  
GENOMICS

# The problem

*1/3 of patients with depression don't respond to selected drug treatment*

**Cases of depressive disorder (millions),  
by WHO Region**

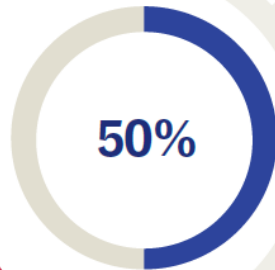


- Depression is no 1 cause of Suicide
- 322 million people suffer from Depression
- > 35% of them don't respond even to the 2<sup>nd</sup> drug treatment
- Doctors until today select an antidepressant by "Trial and Error"
- Besides the social burden, there is a huge economic one for the Health Systems

# The problem in Europe

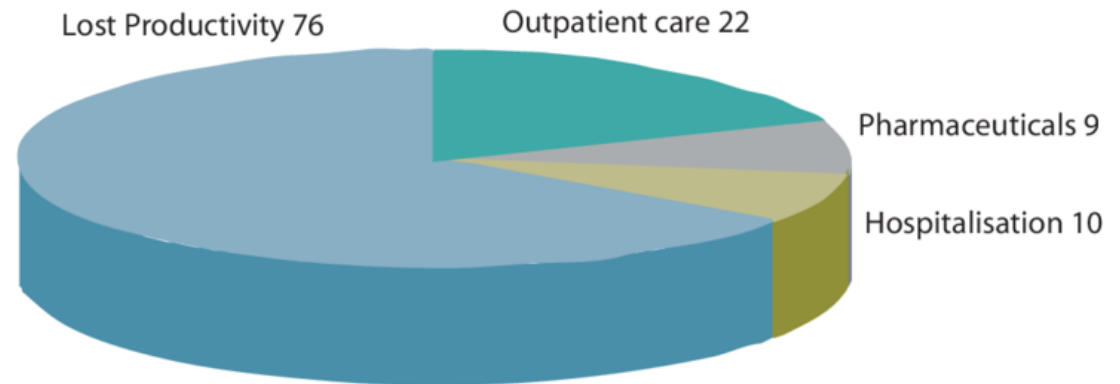
## Depression accounts for up to 50% of chronic sick leaves in the EU.

People with depression are less likely to be employed compared to the general population for all EU countries. Even when at work people with depression may not function to their full abilities, and are estimated to be 6% less productive than usual.



€41 billion direct costs

€77 billion productivity losses



# 120,000

Depression is the primary risk factor associated with suicide and suicidal ideation. An estimated 120,000 people take their own lives every year in the WHO European Region, equivalent to 1.3% of all deaths in 2019

# The solution



7NA PGx CNS is an *in vitro* diagnostic (IVD) medical device bearing the CE mark

Through a simple saliva genetic test, the physician gets the genetic information needed to select **the most appropriate medication for each patient:**

- Faster remission of symptoms
- Less side effects
- Increased compliance
- Higher efficacy



## Strong competitive advantage

- The only in Europe with CE mark *in vitro* diagnostic medical device
- Under reimbursement in Greece
- > 3000 patients already
- Pharmacogenetic analysis for 30 drugs



# Gene-drug interactions

13 genes, 24 SNPs

Gene	SNP
ANKK1, DRD2	rs1800497
CYP2C19	rs12248560
	rs28399504
	rs4244285
	rs4986893
CYP2C9	rs1057910
	rs1799853
CYP2D6	rs1065852
	rs28371725
	rs35742686
	rs3892097
	rs5030655
	rs5030656
DRD2	rs1799978
DRD3	rs963468
EPHX1	rs1051740
	rs2234922
FKBP5	rs4713916
GRIK1	rs2832407
HTR2C	rs1414334
MC4R	rs17782313
	rs489693
SCN1A	rs3812718
UGT2B7	rs7668258

Out of scientifically validated selected genes & SNPs, PGx analysis is provided for 30 CNS drugs



30 common CNS active substances

Antipsychotics
Quetiapine
Risperidone
Olanzapine
Aripiprazole
Paliperidone
Haloperidol
Clozapine
Amisupride
Ziprasidone

Antidepressants
Escitalopram
Citalopram
Venlafaxine
Sertraline
Fluoxetine
Mirtazapine
Paroxetine
Duloxetine
Clomipramine
Fluvoxamine
Amitriptyline
Vortioxetine

Antiepileptics
Lamotrigine
Topiramate
Valproic acid
Carbamazepine
Phenytoin

Other
Diazepam
Clobazam
Donepezil
Galantamine

Pharmacogenetic associations are regularly updated according to the latest scientific literature, pharmacogenetic databases, dosing recommendations, and drug labels

## Αποτελέσματα Φαρμακογονιδιωματικής Ανάλυσης Αντικαταθλιπτικά Φάρμακα

Ελάχιστη αλληλεπίδραση γονιδίου-φαρμάκου	Μέτρια αλληλεπίδραση γονιδίου-φαρμάκου	Σημαντική αλληλεπίδραση γονιδίου-φαρμάκου
citalopram	duloxetine 6,8	amitriptyline 4,9
escitalopram	fluoxetine 1,8	clomipramine 4,9
	fluvoxamine 1,2	
	mirtazapine 1,2,6,8	
	paroxetine 6,8	
	sertraline 1,2,6	
	venlafaxine 1,2,6,8	
	vortioxetine 2	

### Κλινικές Συμβουλές

1. Ξεκινήστε τη θεραπεία με τη συνιστώμενη στο Φύλλο Οδηγιών Χρήσης αρχική δοσολογία και αναπροσαρμόστε.
2. Εξετάστε μείωση της δοσολογίας και σταθμίστε τις ανεπιθύμητες ενέργειες.
3. Εξετάστε μείωση της δοσολογίας συντήρησης κατά 25%.
4. Εξετάστε μείωση της δοσολογίας κατά 50%, ή εναλλακτική θεραπεία.
5. Εξετάστε αύξηση της δοσολογίας και σταθμίστε τις ανεπιθύμητες ενέργειες, ή επιλέξτε εναλλακτική θεραπεία.
6. Αυξημένη πιθανότητα ανεπιθύμητων ενεργειών, ή μειωμένη αποτελεσματικότητα.
7. Αυξημένη πιθανότητα αύξησης βάρους.
8. Συμβουλευτείτε την ερμηνευτική ανάλυση και προσαρμόστε τη δοσολογία.
9. Αποφύγετε τη χρήση αυτής της κατηγορίας φαρμάκων. Εξετάστε εναλλακτικό φάρμακο.

## Clinical Application

Before: One-dose-fits-all approach



After: Personalised medicine (from genotype to phenotype)



100 mg



200 mg

100 mg

25 mg

# The evidence

Key findings in >3000 Greek patients



- **Patient satisfaction** (*Gkouvas et al. 2022 and Ntoumou et al. 2022*):
  - 96% of patients responded to their personalized treatment.
  - 83% reported no serious side-effects.
  - 90% reported a change in medication, including dosage adjustments or selection of alternative medication by their doctor.
  - 87% reported fewer visits and communications with their doctor.
- **Cost-effectiveness** (*Chatziandreou & Panagiotou 2022*):
  - PGx-guided therapy was associated with 0.712 Quality-Adjusted Life Years (QALYs), while Treatment as Usual (TAU) was associated with 0.651 QALYs.
  - PGx was found to be highly cost-effective with an Incremental Cost-Effectiveness Ratio (ICER) of 55 €/QALY.
  - Over a 5-year period, suicides to be reduced by approximately 25%.
- **Gene-drug interactions** (*Panagiotou et al. 2023 and Bothos et al. 2021*):
  - PGx guidance towards dosage adjustment benefits 38% and 60% of patients with altered CYP2D6 and CYP2C19 metabolism respectively, as well as 52% of patients with a reduced response phenotype related to FKBP5.
  - PGx guided therapy benefits over 70% of patients, where a moderate or significant gene-drug interaction was discovered.
- **Product Status**
  - CE IVD
  - Under Reimbursement in MDD in Greece

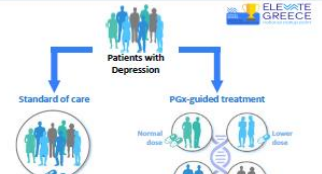
# The scientific publications

## Biomedicine, Bioinformatics & Biotechnology Forum: Fostering Collaboration in Industry & Academia

### idNA Pgx CNS: Pharmacogenetics-Empowered Precision Medicine Improves Treatment Outcomes in Major Depressive Disorder

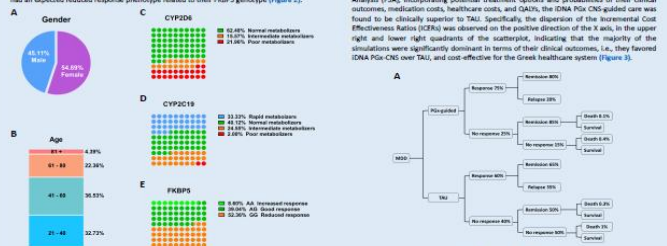
Nikolaos Panagiotou<sup>1</sup>, Eleni Ntounou<sup>1</sup>, Alexis Sagonas<sup>1</sup>, Effie Salata<sup>1</sup>, Athanasios Fotis<sup>1</sup>, Dimitris Roukas<sup>2</sup>, Evi Chatziandreu<sup>1</sup>  
<sup>1</sup>IDNA Genomics, Kifissia, Greece; <sup>2</sup>1417 Veterans Army Hospital NIMTS, Department of Psychiatry, Athens, Greece

**Introduction**  
 Major Depressive Disorder (MDD) is a pervasive mental health disorder with a substantial burden on individuals and healthcare systems globally. The conventional approach to treatment often involves a trial-and-error process to identify the most suitable medication for a patient, resulting in delayed relief, adverse effects, and increased healthcare costs. Significant first antidepressant treatment fails in approximately 50% of patients. The emergence of pharmacogenetics (PGx) testing in mental health has provided a promising avenue enabling personalized treatment for several Central Nervous System (CNS) medications. A plethora of clinical studies and meta-analyses have established the significant benefits of a PGx-guided approach, when compared to Treatment as Usual (TAU) (Figure 1).



**Methods**  
 The idNA Pgx CNS kit was used to collect buccal swab samples from 1,387 patients. DNA was isolated and genotyped with Real-Time PCR, using OpenArray technology. The genotyping data underwent bioinformatic analysis to assign the associated phenotypes, along with gender and age. For the cost-effectiveness analysis, a tree diagram of all possible treatment options, where each path leads to a clinical outcome and indicators such as Quality-Adjusted Life-Years (QALY), was developed. The respective probabilities of occurrence, direct costs of hospitalization, doctor visits, pharmacotherapy, and side effects, as well as patients' quality of life were derived from the literature and according to a panel of psychiatry experts.

**Results**  
 Data were analyzed to study the distribution of CYP2D6 metabolizer status and FKBP5-associated response efficacy in the population. Approximately 38% and 60% of patients had altered CYP2D6 and CYP2C19 metabolism respectively, while approximately 52% of patients had an expected reduced response phenotype related to their FKBP5 genotype (Figure 2).



**Discussion**  
 The beneficial effects of idNA Pgx CNS-guided care in patients with MDD could – because of the scope and scale of the condition and its effects – have important ramifications for patients and the healthcare system. Overall, this study highlights a paradigm shift in depression treatment, establishing the importance of personalized care in achieving better outcomes, while additionally reducing the economic impact of this debilitating condition. The results underline the need for healthcare systems to consider the incorporation of pharmacogenetics testing into standard clinical practice as a cost-effective and patient-centric approach to depression management, to empower Precision Medicine, improve treatment outcomes, and significantly reduce the disease burden in the community. We anticipate that the dissemination of these findings will stimulate discussions among healthcare providers, policymakers, and stakeholders about the broader integration of pharmacogenetics testing in mental health care, ultimately benefiting both patients and healthcare systems.

**References**  
 1. Botros et al. Clinical pharmacogenetics in action: design, assessment and implementation of a novel pharmacogenetic panel supporting drug selection for diseases of the central nervous system. *J Transl Med* 2021; 13(1): 155.  
 2. Roukas et al. A rapid, concise and robust comparison diagnostic test supporting drug selection for diseases of the central nervous system. *European Neuropsychopharmacology* 2022; 52(1): 1039-1040.

### Cost-Effectiveness Analysis of Pharmacogenetic-Guided Treatment in Drug Resistant Depression

Evi Chatziandreu<sup>1</sup>, Nikoleta Panagiotou<sup>1</sup>, Eleni Ntounou<sup>1</sup>  
<sup>1</sup>Theoretical Advanced Biotechnology, Kifissia, Greece  
<sup>2</sup>IDNA Genomics, Kifissia, Greece

**Introduction**  
 Drug side effects and inefficiencies are a source of metabolic significant disability, morbidity, and increase the overall cost of care worldwide. Pharmacogenetics tests aim to detect specific variants in a patient's genome to enable personalized treatment in terms of drug selection and dosage, in order to optimize therapeutic efficacy and reduce treatment-related side effects. This research explores the cost-effectiveness and potential budget impact on the National Organization for Healthcare Services in Greece (OPYF) of an in vitro diagnostic (IVD) pharmacogenetic test, idNA Pgx-CNS, for the treatment of patients with Major Depressive Disorder (MDD) who have had responded to at least 2 antidepressant treatments, i.e., Drug Resistant Depression (DRD). This test explores the precise interaction of drugs administered to patients with MDD with genetic variants, as reflected in the most recent international scientific literature and pharmacogenetic databases, for the optimal selection of the most therapeutically efficacious medication.

**Methods**  
 An economic model was developed for the financial evaluation of idNA Pgx-CNS-guided therapy of MDD. The model was designed to calculate cost-effectiveness analysis (incremental analysis) and probabilistic sensitivity analysis (PSA), specifically employing 5,000 simulations. The study included 2 groups of patients (n=500/500 per group) and compared pharmacogenetic (PGx)-guided therapy versus Treatment-as-Usual (TAU). The time horizon of the study was defined as 12 months, through the perspective of the National Agency for Healthcare Services (OPYF) in Greece. Data inputs to populate the decision tree were derived from the literature, Greek cost data repository, and a panel of psychiatry experts. Following analysis of the results, the cost-utility acceptability curve (CUAC) was derived, with the aim to systematically compare the overall costs and benefits associated with the pharmacogenetic alternative therapeutic intervention in the management of MDD.



Figure 1: Decision tree for Major Depressive Disorder (MDD) therapy following PGx test or Treatment-as-Usual (TAU). The probabilities of the alternative outcomes were determined by a panel of psychiatry experts.

For the PGx-guided arm, use of the idNA Pgx-CNS pharmacogenetic test was explored. This panel examines Single Nucleotide Polymorphism (SNP) variants in 13 genes associated with well-established gene-drug interactions (Table 1), explicitly developed for drugs of the Central Nervous System (CNS) (1,2). To estimate costs, hospitalization data for MDD per year (Table 2) and individual drug compensation costs by the OPFY were used (Table 3). The pharmacogenetic test cost amounted at 120 €, while 80.8 € were assumed related to the OPFY. To estimate the cost of medical visits, the frequency of visits was taken into consideration, as well as the cost of 10 € per visit.

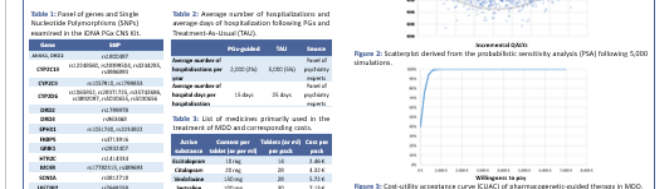


Figure 3: Cost-effectiveness analysis of idNA Pgx CNS-guided treatment for cases of Treatment Resistant Depression in the Greek healthcare system. A: Tree diagram of potential treatment options and probabilities of their clinical outcomes. B: Scatter plot of QALY

**Discussion**  
 In comparison to conventional treatment, pharmacogenetic-guided treatment with idNA Pgx-CNS was found to be a cost-effective intervention with ICER 51 € per QALY, which is almost relevant compared to the conventional average (€ 3,242) and the lower limit (€ 12,222). Furthermore, its impact is rather robust on the OPFY's budget, as seen in the hypothetical scenario of the use of the idNA Pgx-CNS by all patients with DRD, the 5-year cumulative total financial burden does not exceed 1.6 million €. The analysis also showed a significant reduction in suicide, specifically 108 fewer deaths from patient intake in 5 years, in the pharmacogenetic-guided arm. Hence, pharmacogenetic guidance is cost-effective and advances the individualized choice of the most effective, safe, and tolerable medication for each patient.

**References**  
 1. Botros et al. Clinical pharmacogenetics in action: design, assessment and implementation of a novel pharmacogenetic panel supporting drug selection for diseases of the central nervous system. *J Transl Med* 2021; 13(1): 155.  
 2. Roukas et al. A rapid, concise and robust comparison diagnostic test supporting drug selection for diseases of the central nervous system. *European Neuropsychopharmacology* 2022; 52(1): 1039-1040.  
 3. Botros et al. An economic model of the cost-utility of a pharmacogenetic test to support personalized therapy in drug-resistant depression. *Pharmacogenomics* 2020; 19(6): 805-814.

### A novel pharmacogenetic test supports drug selection for diseases of the Central Nervous System

E. Ntounou<sup>1</sup>, N. Panagiotou<sup>1</sup>, E. Botros<sup>1</sup>, D. Roukas<sup>1</sup>, N. Drakoulis<sup>1</sup>, M. Papanicolaou<sup>1</sup>, F. A. Karakostas<sup>1</sup>, P. Mousoulis<sup>1</sup>, K. Karakostas<sup>1</sup>  
<sup>1</sup>IDNA Genomics, Evros 25, Kifissia, 145 64, Greece; <sup>2</sup>Genolytika G.P., Greece; <sup>3</sup>Institute of Informatics and Computer Systems, National Technical University of Athens, Greece; <sup>4</sup>Department of Psychiatry, 417 Veterans Army Hospital (NIMTS), 115 21 Athens, Greece; <sup>5</sup>Research Group of Clinical Pharmacology and Pharmacogenetics, Faculty of Pharmacy, School of Health Sciences, National and Kapodistrian University of Athens, Panepistimiou, 157 01 Zografos, Athens; <sup>6</sup>Department of Human Evolution and Paleoneurology, Department of Geology, University of Tübingen, Tübingen, Germany; <sup>7</sup>Institute for Functional Genomics, Department of Biotechnology, Biomedical Research Foundation, 14 Heraklion, 265 02, Iraklion, Greece

**Background**  
 Pharmacogenetics (PGx) study the interaction between drugs and gene variation with the aim to improve and personalize clinical management of health disorders. Here, we present a novel pharmacogenetic panel (idNA Pgx-CNS) that provides clinically useful information to Psychiatrists for optimizing the selection of the most appropriate medication for neurological disorders such as Major Depressive Disorder (MDD) and Schizophrenia. Moreover, we evaluated the utility of idNA Pgx-CNS in the support of clinical decisions related to drug selection.

**Methods**  
 For the development of the pharmacogenetic panel, 24 SNPs on 13 genes were selected and analyzed, employing a bioinformatic platform which contains an in-house PGx-CNS database, to provide individualized pharmacogenetic information about metabolism, response, efficacy and adverse events related to 31 drugs. This platform was used for the analysis of 2075 patient-derived samples from a southeastern European population. Subsequently, a sub-group of 132 patients, who received a diagnosis of MDD, were questioned for their response to received medication, if there were any severe side effects, changes in their previous medication and reduced number of visits & communications with the physician after idNA Pgx-CNS test use.

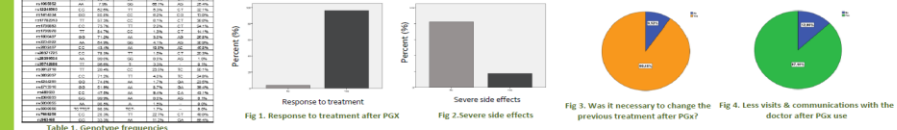


Figure 1. Response to treatment after PGx. Figure 2. Severe side effects. Figure 3. Was it necessary to change the previous treatment after PGx? Figure 4. Less visits & communications with the doctor after PGx use.

**References:**  
 Botros et al. *J Transl Med*, 2021, 13(1), 155.  
 Roukas et al. *European Neuropsychopharmacology*, 53, 5159-5160.



Figure 5: Scatter plot derived from the probabilistic sensitivity analysis (PSA) following 5,000 simulations.

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# iDNA Cardio Health Prevention



Genetic Predisposition to Cardiovascular Diseases –  
Polygenic Risk Score (PRS)



PRS is associated with the prospect of intervention, including prioritization of preventive measures and presymptomatic testing, initiation and frequency of testing, as well as lifestyle modification and clinical decision-making.



# The problem

*No early detection of the risk*



Cardiovascular  
diseases are the

No.

1

cause of death  
**GLOBALLY**

*Source: 2023 World Heart Report, World Heart Federation*

# The problem

Risk  
underestimation



Healthy  
diet



Regular  
exercise



No smoking



Normal  
weight



Maintaining  
normal blood  
pressure



Regular  
monitoring  
of cholesterol  
levels



Regular  
monitoring  
of blood  
glucose levels



Sufficient  
sleep

iDNA  
GENOMICS

## Ερωτηματολόγιο: Φαινοτυπικά χαρακτηριστικά

Ημερομηνία γέννησης:	1961-12-09
Φύλο:	Ανδρας
Φυλετική καταγωγή:	Λευκή ή Καυκάσια
Καρδιακές συνήθειες:	Έκοπα το κάπνασμα περισσότερο από 12 μήνες πριν
Ύψος (cm):	190
Βάρος (kg):	82
ΜΟ εβδομαδιαίας σωματικής άσκησης:	Μέτρια Άσκηση: 210 λεπτά Έντονη Άσκηση: 0 λεπτά
ΜΟ ημερήσιας κατανάλωσης φρούτων & λαχανικών:	Λιγότερα από 4,5 φλιτζάνια
ΜΟ ημερήσιας κατανάλωσης μερίδων (30γρ.) από τρόφιμα ολικής άλεσης:	Λιγότερες από 3 μερίδες
ΜΟ εβδομαδιαίας κατανάλωσης αναψυκτικών (350ml):	Λιγότερα από 3
ΜΟ εβδομαδιαίας κατανάλωσης μερίδων (100γρ.) ψάρι:	2 ή περισσότερες μερίδες
Ημερήσια κατανάλωση αλατιού:	Καταναλώνω περισσότερο από 1/3 κουταλάκι του γλυκού αλάτι ημερησίως
Συστολική (μεγάλη) αρτηριακή πίεση (mm/Hg):	130
Διαστολική (μικρή) αρτηριακή πίεση (mm/Hg):	85
Φαρμακευτική αγωγή για τη μείωση της αρτηριακής πίεσης:	Ναι
Ολική χοληστερόλη (mg/dL):	190
Φαρμακευτική αγωγή για τη μείωση της χοληστερόλης:	Ναι
Σάκχαρο / γλυκόζη αίματος νηστείας (mm/dL):	70
Φαρμακευτική αγωγή για τη μείωση του σακάρου:	Όχι

Source: American Heart Association

<https://www.heart.org/en/healthy-living/healthy-lifestyle/lifes-essential-8>

iDNA  
GENOMICS

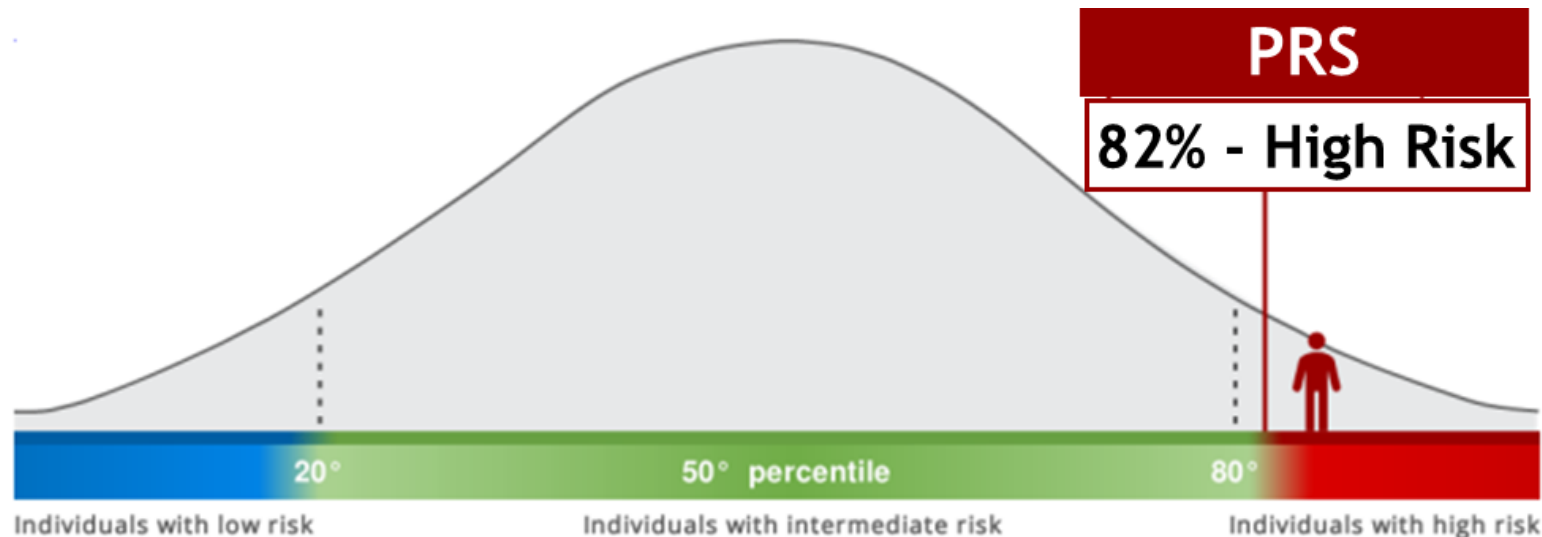
# The solution

*(Lots of genes)*

# Polygenic Risk Score

Stroke :  
What is your Genetic  
Predisposition?

PRS: 82% relative to the population

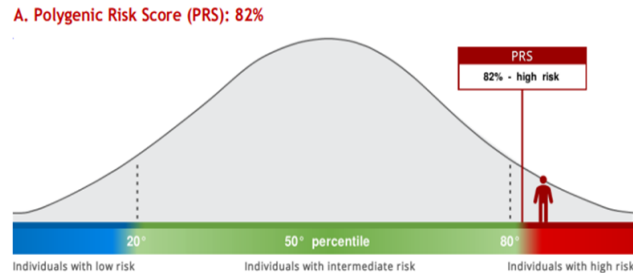


# The solution

The report provides PRS and PRS adjusted for 6 cardiovascular diseases. Next to PRS, PRS adjusted reflects the lifestyle impact on disease occurrence

1. Coronary Artery Disease
2. Cardiomyopathy – Dilated
3. Cardiomyopathy – Hypertrophic
4. Heart Failure
5. Arrhythmia - Atrial fibrillation
6. Ischemic stroke

Phenotype + Polygenic Risk Score (PRS) = PRS adjusted



DELAY/AVOID  
Cardio disease

- The only *in vitro* diagnostic (IVD) medical device with CE mark
- The only one that combines the phenotypic with the genetic profile and comes up with the Adjusted PRS





# The solution

## 5. Ισχαιμικό εγκεφαλικό επεισόδιο

### A. Βαθμολογία πολυγονιδιακού ρίσκου (PRS): 93%

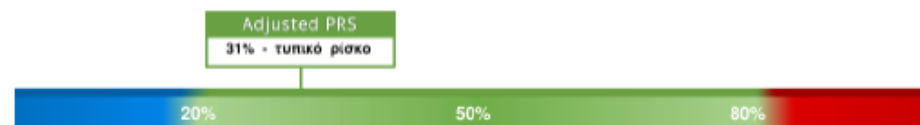


Η Βαθμολογία PRS είναι 93% επί του πληθυσμού. Αυτό σημαίνει ότι σε κάθε 100 άτομα, το εκτιμώμενο δικό σου PRS είναι υψηλότερο από 93 άτομα και ίδιο ή χαμηλότερο από τα υπόλοιπα 7 άτομα. Επομένως, το γενετικό σου υπόβαθρο σε θέτει σε αυξημένο ρίσκο εμφάνισης της πάθησης.

### B. Προσαρμοσμένη Βαθμολογία πολυγονιδιακού ρίσκου (Adjusted PRS): 31%

Για τον υπολογισμό του Προσαρμοσμένου PRS (Adjusted PRS), συνεκτιμάται:

1. Βαθμολογία PRS: 93%
2. Βαθμολογία εκτίμησης τρέχουσας κατάστασης καρδιαγγειακής υγείας: **Βέλτιστη**



Το Προσαρμοσμένο PRS (Adjusted PRS) εκτιμάται ότι είναι 31%, δηλαδή μειωμένο σε σχέση με την Βαθμολογία PRS και βρίσκεται σε τυπικά επίπεδα ρίσκου σε σχέση με το γενικό πληθυσμό. Η τήρηση υγιεινών συνηθειών και η συμμόρφωση με τις οδηγίες του γιατρού σου, μπορεί να συμβάλουν στη βέλτιστη καρδιαγγειακή υγεία και στην πρόληψη καρδιαγγειακών παθήσεων.

Ένα επεισόδιο συμβαίνει όταν διακόπτεται ή μειώνεται η παροχή αίματος σε μέρος του εγκεφάλου, εμποδίζοντας με αυτό τον τρόπο τον εγκεφαλικό ιστό να πάρει οξυγόνο και θρεπτικά συστατικά. Αποτελεί μια επείγουσα ιατρική κατάσταση της οποίας έγκαιρη αντιμετώπιση είναι ζωτικής σημασίας.

(Πηγή: <https://www.mayoclinic.org/diseases-conditions/stroke/symptoms-causes/syc-20350113>)

# Our scientific publications

## Adjusted Polygenic Risk Score Enables Personalized Cardiovascular Disease Prevention and Clinical Management

Nikolaos Panagiotou<sup>1</sup>, Fragiskos Berdimirzaev<sup>1</sup>, Thanos Fotis<sup>1</sup>, Efthi Ntoumou<sup>1</sup>, Effie Salata<sup>1</sup>, Evi Chatziandreu<sup>1</sup>

<sup>1</sup>IDNA Genomics, Kifissia, Greece  
<sup>2</sup>University of Pavia, Department of Statistics and Insurance Science, Greece  
<sup>3</sup>Sciencena, Kifissia, Greece  
<sup>4</sup>Thessaloniki Advanced Biotechnology, Kifissia, Greece

EE77

### Introduction

Assessing the risk of cardiovascular disease is central to early detection, prevention, and clinical decision-making. To date, clinical risk prediction relies on demographic characteristics, lifestyle, health parameters and family history. Routine genetic testing, however, is absent from this list. Yet, genetics are the earliest measurable contributor to common adult-onset disease risk. Novel genetic profiling methods have been developed to estimate the probabilistic susceptibility (i.e., predisposition) of an individual to disease based on their Polygenic Risk Score (PRS). This is a weighted sum of the number of risk alleles carried by an individual, where the risk alleles and their weights are defined by their measured effects as detected by Genome Wide Association Studies (GWAS). The aim of this study was to develop a PRS and an adjusted PRS, which estimates a combined risk by incorporating lifestyle and phenotypic characteristics, for use in medical practice to personalize and enhance cardiovascular disease prevention.

### Methods

We developed a novel PRS to estimate comprehensive risk for six common cardiovascular conditions, comprising coronary artery disease, dilated cardiomyopathy, hypertrophic cardiomyopathy, atrial fibrillation, ischemic stroke, and heart failure. Specifically, we designed three unique algorithms to i) search for statistically significant Single Nucleotide Polymorphisms (SNPs) associated with disease predisposition in major databases with published GWAS, ii) detect the appropriate SNPs by assessing allele, beta coefficient, odds ratio, and linkage disequilibrium metrics, and iii) calculate PRS for each cardiovascular condition under investigation. We then examined risk categorization on a population level (n=1447). Finally, we employed the American Heart Association's Life's Simple 7 (LS7) lifestyle and phenotypic characteristics scoring system to assess an individual's cardiovascular health status. Using LS7 categorization, we were capable to generate an adjusted PRS that can dynamically fine-tune risk prediction based on current health status and age.

### Results

We developed and employed a PRS methodology, termed IDNA Cardio Health, that allowed us to estimate and stratify genetic risk for a series of cardiovascular diseases, following genotyping of DNA that was isolated from buccal swab samples. Based on published disease prevalence data (LS2), the PRS was then divided in three categories: i) low risk (PRS < 20%), ii) intermediate risk (PRS 20-50%), and iii) high risk (PRS > 50%) (Figure 1).

Our PRS stratification data suggest that we can identify a percentage of the population that is at high risk and could thus benefit from lifestyle changes and a preventive medicine approach [3]. Nevertheless, to further improve risk prediction with the use of PRS, we aimed to incorporate commonly examined cardiovascular disease clinical risk factors. Specifically, we employed the Life's Simple 7 (LS7) [4] questionnaire and scoring system to produce a PRS that combines lifestyle and phenotypic parameters [4], termed adjusted PRS.

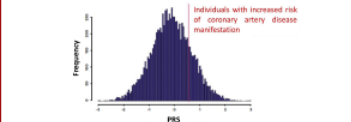


Figure 1: Example of Polygenic Risk Score (PRS) distribution in a population and high-risk categorization (PRS > 50%) for coronary artery disease.



Figure 2: American Heart Association's (AHA) Life's Simple 7 (LS7). Using the best available evidence, the AHA developed the LS7, which comprises the seven most important predictors of heart health to define and highlight a pathway for achieving ideal cardiovascular health. It includes four modifiable behaviors (not smoking, healthy weight, eating healthy and being physically active) and three biometric measures (blood pressure, total cholesterol and blood sugar / glucose).

The PRS data that were calculated for a Greek population (n=1447), were further analyzed, and risk stratification was specifically examined for a series of cardiovascular diseases, including coronary artery disease, dilated cardiomyopathy, hypertrophic cardiomyopathy, atrial fibrillation, ischemic stroke, and heart failure (Figure 2).

Employing the LS7 methodology, individuals can also be categorized in three distinct categories of cardiovascular health status: i) poor, ii) intermediate, and iii) ideal. Hence, following LS7 classification, PRS data can be dynamically adjusted, also depending on chronological age, to depict a combined score of genetic, lifestyle, and phenotypic parameters. Therefore, current cardiovascular health can significantly impact upon the existing genetic risk estimates with a PRS and affect the adjusted PRS (Figure 4).

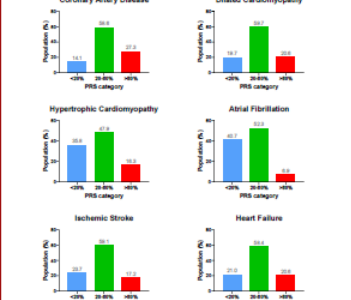


Figure 3: Tornado diagram for Deterministic Sensitivity Analysis.

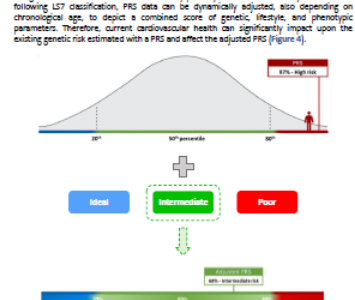


Figure 4: Example of adjusted PRS estimation by combination of a high risk PRS (87%) with an intermediate status of current cardiovascular health assessed following LS7 categorization criteria, for a 30-year-old individual.

### Discussion

PRS estimation can significantly improve upon the current use of cardiovascular disease risk underestimation, enhance compliance and intervention efficiency, and identify high-risk individuals who are expected to experience higher benefits following primary prevention, such as statin therapy [1-3]. Moreover, as others have recently indicated [5], PRS implementation can reduce the average healthcare costs, improve Quality-Adjusted Life Years (QALYs), and prevent future cardiovascular events, with significant benefits in young individuals with borderline/intermediate risk. Finally, our novel adjusted PRS methodology, that at its core encompasses genetic risk, can then be combined with traditional clinical risk prediction metrics to revolutionize cardiovascular risk detection, monitoring, and disease prevention, thus enabling a personalized medicine approach.

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1. Robinson et al. The personal and clinical utility of polygenic risk scores. *Nature Reviews Genetics*, 2018, 19(9), p. 585-596.
2. Hirsch et al. Personalized polygenic scores for common diseases identify individuals with risk equivalent to monogenic mutations. *Nature Genetics*, 2018, 50(9), p. 1219-1224.
3. Cristofari et al. Polygenic risk scores for cardiovascular disease: A Scientific Statement from the American Heart Association. *Circulation*, 2021, 144(11), p. 1048-1058.
4. Lifescore of Polygenic Risk Score for Coronary Artery Disease as a Risk-Enhancing Factor in the Revised Cohort Equation: A Cost-Effectiveness Analysis Study. *Journal of the American Heart Association*, 2021, 11(12), p. e021246.
5. Mujuru et al. Integrating a PRS for CAD as a Risk-Enhancing Factor in the PCE: A Cost-Effectiveness Analysis Study. *Journal of the American Heart Association*, 2022, 11(12), p. e025236.

## Cost-Effectiveness Analysis of an Adjusted Polygenic Risk Score in Cardiovascular Disease Prevention in Greece

EE159

Evi Chatziandreu<sup>1</sup>, Nikolaos Panagiotou<sup>1</sup>, Panagiotis Rigopoulos<sup>2</sup>, Isidoros Kougioumtzoglou<sup>3</sup>, Efthi Ntoumou<sup>1</sup>, Effie Salata<sup>1</sup>, Alexis Sagonas<sup>1</sup>, Athanasios Fotis<sup>1</sup>, Fotini Maragkou<sup>1</sup>

<sup>1</sup>IDNA Laboratories, Greece | <sup>2</sup>Vianex S.A, Greece | <sup>3</sup>Laboratory of Hygiene & Epidemiology, School of Public Health, University of West Attica



### Introduction

**Background:** Cardiovascular diseases (CVDs) remain the leading cause of morbidity and mortality globally. Vital for reducing the CVD burden is early identification of individuals at high and very high risk and effective preventive interventions. The predictive accuracy of existing risk predictors varies for a variety of reasons and may underestimate CVD risk. Recent advancements in genomics have led to the development of Polygenic Risk Score (PRS) as a promising tool for assessing genetic susceptibility to CVD. Combined with traditional clinical risk prediction metrics, adjusted PRS could revolutionize CVD prevention through screening, monitoring, and clinical management.

**Aim:** This study aimed to address the limitations of traditional clinical metrics known to underestimate CVD risk for certain individuals with higher genetic susceptibility, by developing a novel dynamic genetic tool, the Adjusted Polygenic Risk Score (Adj-PRS), designed to non-invasively and routinely measure CVD risk in the population, incorporating genetic, lifestyle, and phenotypic characteristics<sup>1-3</sup>. Furthermore, we aimed to evaluate the economic value of PRS examination through a cost-utility analysis and provide an initial estimate of its potential benefit as a screening tool.

### Results

CVD risk stratification was examined in a randomly selected non-symptomatic Greek population (n=291), employing the Adj-PRS methodology to dynamically fine-tune risk prediction based on Single Nucleotide Polymorphisms identified as risk alleles, in combination with age and current cardiovascular health status. Both for Coronary Artery Disease (CAD) and Ischemic Stroke (IS) (Figure 2), Adj-PRS was significantly increased in hypertensive individuals, in overweight and obese individuals, when salt consumption was high (>1,500 mg/day), when exercise level was recorded as moderate (<150 mins/week) or poor (0 mins/week), and in smokers. Interestingly, those who quit smoking within the last year had improved their Adj-PRS, reaching levels of significance in IS. Hence, Adj-PRS can reclassify underestimated individuals from a marginal intermediate clinical risk to high risk, when in the presence of underlying genetic predisposition (i.e., high PRS).

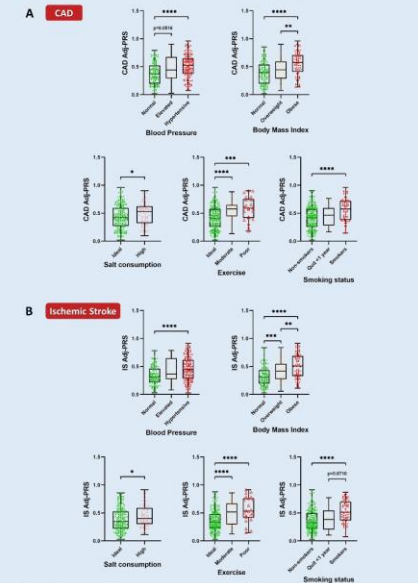


Figure 2: Adj-PRS for A. Coronary Artery Disease and B. Ischemic Stroke, with blood pressure, body mass index, salt consumption, level of exercise, and smoking status. n=291, \*p<0.05, \*\*p<0.01, \*\*\*p<0.001, \*\*\*\*p<0.0001.

### References

1. Panagiotou et al. Polygenic Risk Scores and their Phenotypic Adjustment: Novel Biomarkers in Cardiovascular Disease Prevention. *Journal of Hypertension*, 2023, 41(3), e149-e150.
2. Panagiotou et al. Adjusted Polygenic Score: Translation of a New Concept for Cardiovascular Disease Prevention and Management. *Genetics in Medicine Open*, 2023, 1(1), 100010.
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4. Luengo-Fernandez et al. Economic Burden of Cardiovascular Diseases in the European Union: A Population-Based Cost Study. *European Heart Journal*, 2023, ehhc035.
5. Mujuru et al. Integrating a PRS for CAD as a Risk-Enhancing Factor in the PCE: A Cost-Effectiveness Analysis Study. *Journal of the American Heart Association*, 2022, 11(12), e025236.

### Methods

A novel genetic panel, IDNA Cardio Health, was developed to estimate PRS for CVDs. Buccal swab samples were collected from 291 non-diagnosed individuals and the DNA genotyped for PRS assessment. The Life's Simple 7 (LS7) lifestyle and phenotypic characteristics scoring tool was employed to calculate the Adj-PRS. The Adj-PRS was then cross compared between individuals categorized by blood pressure, body mass index, amount of salt consumption, exercise level, and smoking status. Furthermore, to evaluate the economic value of integrating the Cardio Health genetic test, compared to current clinical practice alone, a cost-effectiveness analysis was designed from a payer perspective. A Markov model was used to project health care costs, health outcomes, and Quality-Adjusted Life-Years (QALYs) in a cohort of 45-year-old individuals in Greece without a previous CVD diagnosis. We assumed an annual cycle length with 4 health states (Figure 2) and a 20-year horizon. Clinical data, including baseline patient characteristics, outcomes, and healthcare resource utilization, were collected through a targeted literature review. Direct medical costs were obtained from official national sources and Greek-specific publications, inflated to 2023 prices. Finally, a one-way sensitivity analysis was performed to ensure the robustness of the model.

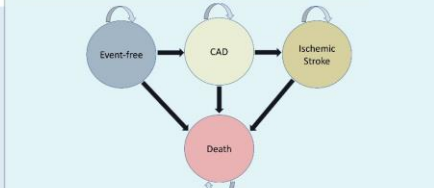


Figure 1: Markov model health states.

From the Greek health care system perspective, application of the Cardio genetic test demonstrated improved patient outcomes and was associated with a higher overall cost compared to standard care. Over the 20-year horizon, the Cardio Health genetic test resulted in an incremental gain of 0.26 QALYs per patient at a cost of 2,105€. The incremental cost-effectiveness ratio (ICER) was estimated at 8,079€ per QALY gained, indicating the cost-effectiveness of the integration of Cardio Health over standard practice alone. Sensitivity analysis confirmed the robustness of the results, with the ICER remaining cost-effective in the majority of scenarios (Figure 3). The above results, if translated in a population level, could significantly contribute to the overall improvement of population health and reduced spending. In a 5-year horizon, an estimated 40,000 new CVD events (Coronary Artery Disease and Ischemic Stroke) could potentially be avoided (Table 1), leading also to 17% fewer deaths. The cost of those events correspond to more than 150 million € that could also be avoided, indicating the need to consider and evaluate a targeted national screening program.



Figure 3: Tornado diagram for Deterministic Sensitivity Analysis.

Table 1: Total costs, QALYs, ICER, and 5-year CVD events avoided with and without implementation of Cardio Health in standard of care.

Total Cost	Total Cost	QALYs without Cardio Health	QALYs with Cardio Health	Incremental QALYs Gained	ICER (€ per QALY)	5-year CVD events avoided	5-year CVD events avoided
32,771 €	34,876 €	11,29	11,55	0,26	8,079 €	20,178	15,274

### Discussion

It is accepted that current clinical tools for CVD risk estimation may misclassify the risk, while the Adj-PRS can be employed to optimally reclassify individuals with marginal intermediate risk to a high-risk category. Our novel methodology has the potential to revolutionize CVD prevention, through Precision screening, monitoring, and downstream clinical management, and enable personalized medicine approaches to prevent CVDs and significantly improve the human healthspan. Furthermore, our analysis dictates a further study to carefully examine the costs and benefits of a targeted national screening program.



## Article Contents

### Abstract

Introduction

Methods

Results


Discussion

Conclusions

Acknowledgements

### JOURNAL ARTICLE

## Integration of a polygenic score into guideline-recommended prediction of cardiovascular disease

Ling Li, Shichao Pang, Fabian Starnecker, Bertram Mueller-Myhsok, Heribert Schunkert  [Author Notes](#)

*European Heart Journal*, ehae048,  
<https://doi.org/10.1093/eurheartj/ehae048>

**Published:** 29 March 2024 **Article history** ▼

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We are all different!  
And this should apply to what we eat!

# iDNA NutriGenetix

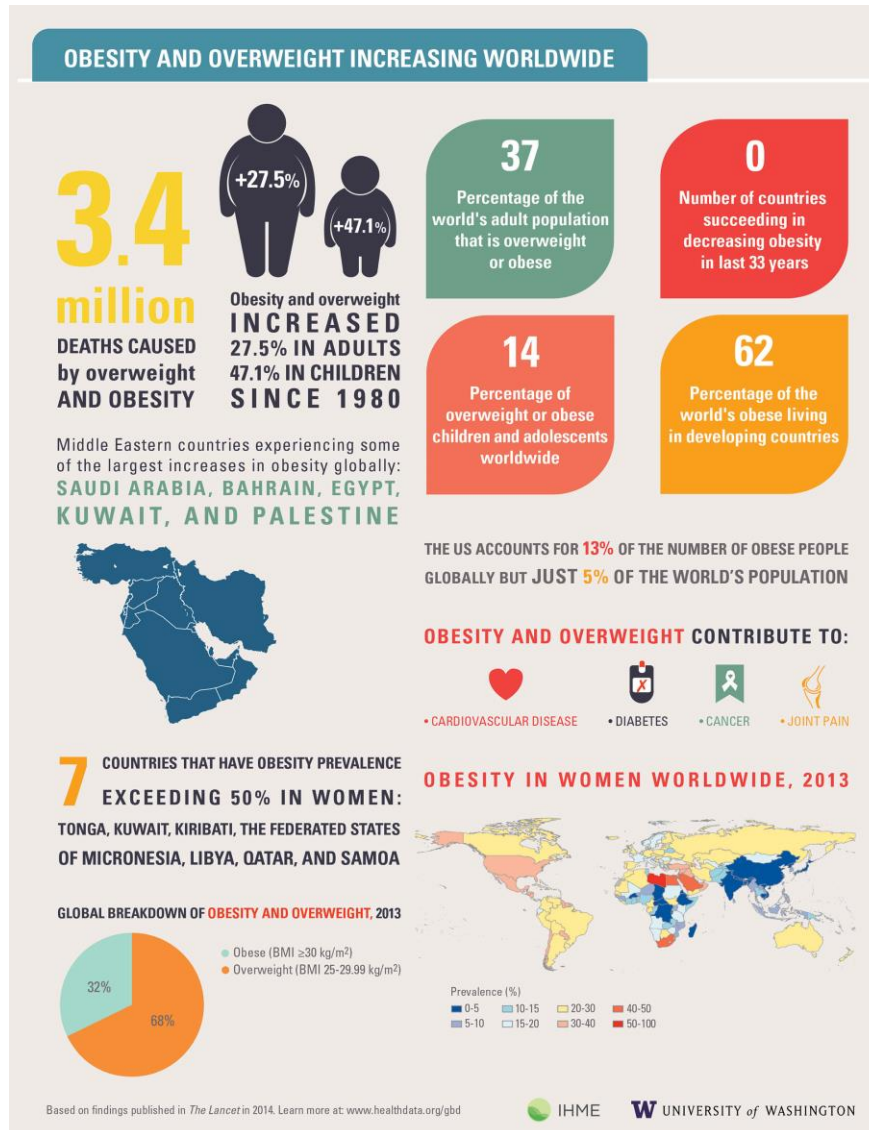
Personalized Nutrigenetic Analysis

CE IVD



# The problem

*No real tailor-made nutritional plan*




- 1.9 billion people (37% of global population) are overweight
- 1 out of 5 children 5-19 y.o. are overweight
- 650 million people are obese
- Obesity is related to serious health problems i.e., Diabetes, Cardiovascular diseases, musculoskeletal problems
- >50% of obesity risk is genetic
- Current nutritional plans & diets are not based on genetic profile but rather only on phenotype & lifestyle characteristics



# The solution

*The report provides personalized advises and dietary plan combining both phenotype and genetics*

	Sensitivity profile	Nutritional status assessment	Association between nutritional habits and genetic dietary recommendations
Macronutrient Category	Nutrigenetic analysis	Nutritional status	Nutrigenetic analysis-nutritional status
Carbohydrates	Typical	✗	●
Proteins	High	✓	●
Total fats	Increased	✓	●
Saturated fats	Typical	✓	●
Omega 6 / Omega 3 fatty acids	High	✗	●
Trans fats	Increased	✓	●

Phenotype & lifestyle + Nutrigenetics = Precision Nutrition

- Age, sex, BMI
- Medical history
- Weight goal
- Dietary habits

+

Genetic analysis for specific genetic polymorphisms in 27 nutritional categories

=

- Tailor made dietary plan
- Actionable interventions
- Long term monitoring & dietary adjustments

- The only *in vitro* diagnostic (IVD) nutrigenetic with CE mark
- The only one that combines the phenotypic with the genetic profile and comes up with tailor made nutritional plan

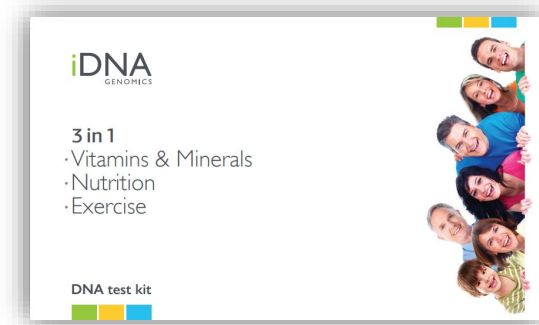




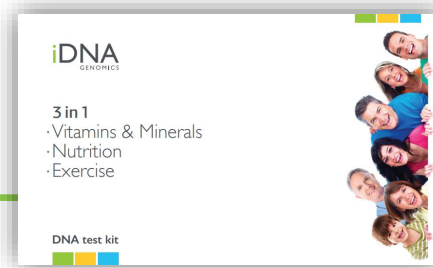
Which diet suits us best,  
how our body absorbs vitamins,  
in which sport we are predisposed  
towards high performance

# iDNA 3 in 1

Personalized Nutrition, Vitamins & Exercise  
Genetic Analysis



# The solution



The 'one-size-fits-all' approach in nutrition and exercise does not suit everyone.

The iDNA 3 in 1 DNA Test includes the genetic information needed to **personalize our dietary and sports choices**. This offers a deeper understanding of the individual nutrition, vitamins, minerals and exercise needs to achieve **optimal health and athletic performance**.

The iDNA 3 in 1 DNA test offers personalized genetic analysis in 37 categories related to **Nutrition, Exercise, Vitamins & Minerals**.

## The categories



Nutrition



### Weight Management

Our genes dictate the optimal diet for weight loss and long-term weight management.



### Cardiovascular Health

Cardiovascular health is highly dependent on both our genetic makeup and environmental factors, such as nutrition.



### Food sensitivity

Food sensitivity refers mainly to the reduced ability to process or digest certain food components. We will learn if we can process compounds such as caffeine, lactose and gluten, satisfactorily.



Vitamins & Minerals



### Detoxification Capacity & Antioxidant Needs

The detoxification process, which is carried out by the liver and kidneys, may be reduced due to our genes.



### Vitamin absorption

Through personalized genetic analysis we will find out what is the recommended vitamin intake for us.



### Mineral metabolism

Our genes influence the way we absorb minerals. By receiving this information, we will be able to prevent potential deficiencies.



Sports



### Athletic Profile

We will be informed in which sports we are genetically predisposed and in which we can achieve maximum performance.



### Injury predisposition

Knowing our genetic predisposition will help us choose the right training regimen to avoid injuries.

- iDNA to launch the Whole portfolio of innovative genetic tests
  - Lab analysis
  - Sales promotion & demand generation
- Agreement signed
- Prosigna, for Breast Ca, will be the first launch in 2024
- Reimbursement file under adaptation for Greece to be submitted in April 2024



## Breast Cancer

Using prognostic information to inform next steps in patient care

[LEARN MORE >](#)



## ILD

Improving ILD diagnosis and confidence in treatment decisions

[LEARN MORE >](#)



## Bladder Cancer

Revealing cancer molecular subtype to inform treatment decisions

[LEARN MORE >](#)



## Lung Cancer

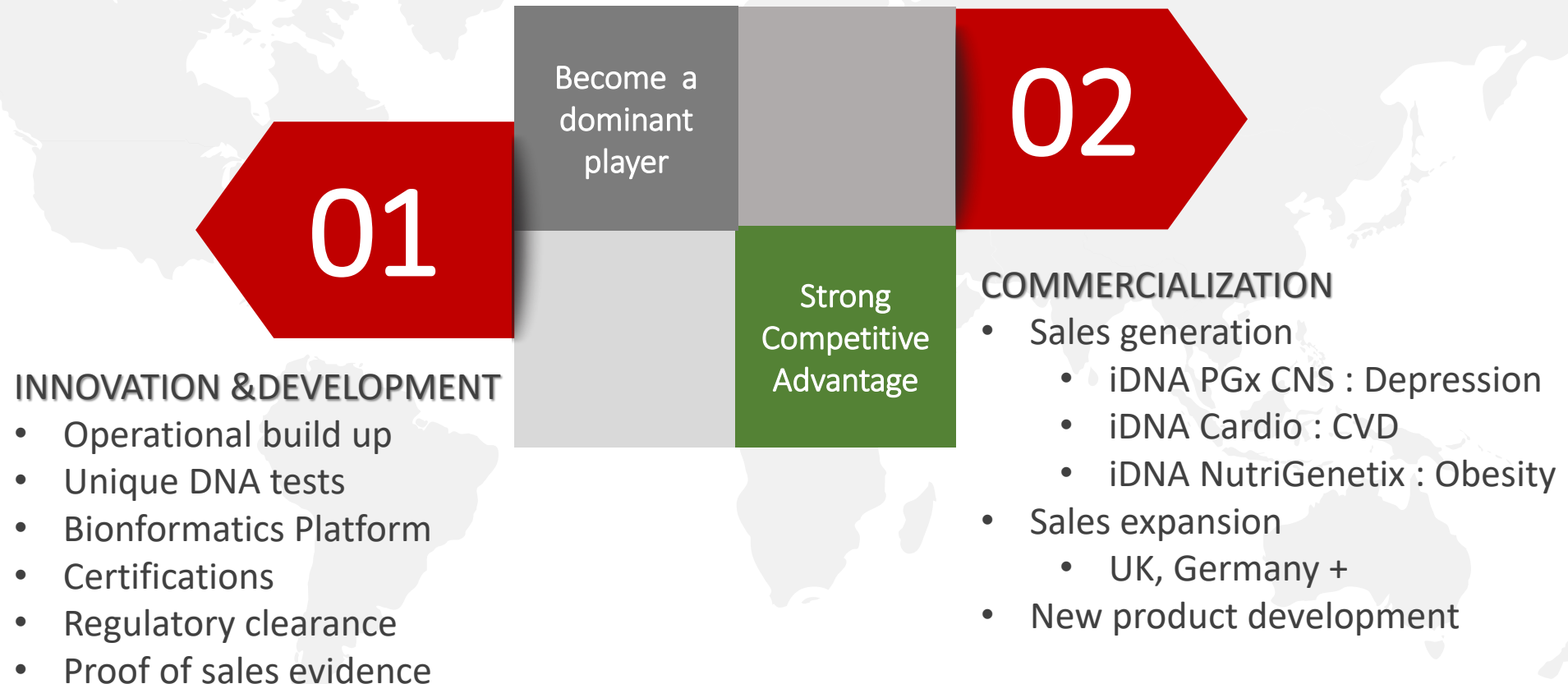
Providing answers at every step of the patient journey

[LEARN MORE >](#)



# What is the pathway

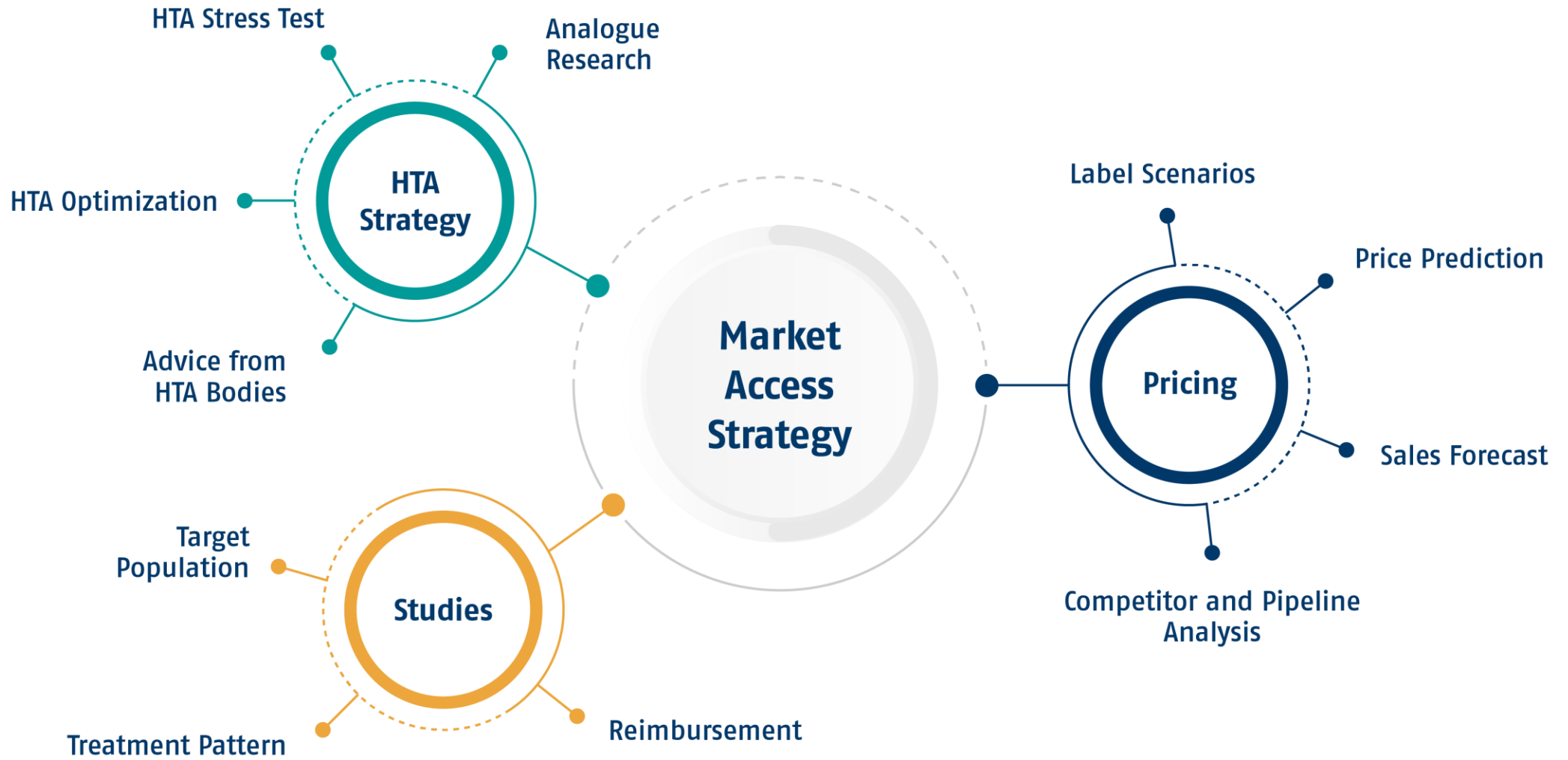
*Two phases of operational excellence*



# BIANEΞ

- Ελληνική Εταιρεία
- 100 χρόνια επιχειρηματικότητας
- Εργοστάσια : 4
- Τζίρος : > 500 εκατ. Ευρώ
- Προσωπικό : >1.600 άτομα
- Προϊόντα :
  - Generics
  - Original πολυεθνικών εταιρειών
  - Food supplements φαρμακείου
- Επέκταση το εξωτερικό
- Επενδύσεις σε νέες αγορές
- Επενδύσεις σε νέα, πρωτότυπα προϊόντα στην Υγεία







70 Sales Reps will call 10.000 physicians



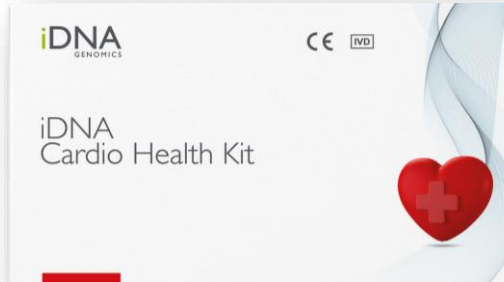


# The Opportunity in Greece

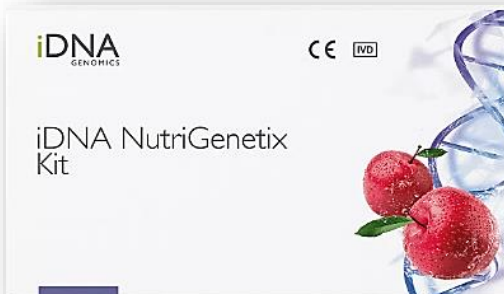
## Medical Genomics



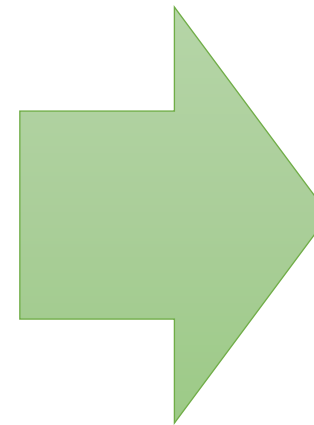
- 187.000.000 €



- 159.000.000 €



- 270.000.000 €



**> 600.000.000 €**

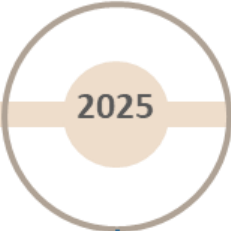
# Next Steps

Developing in Greece & Preparing for international



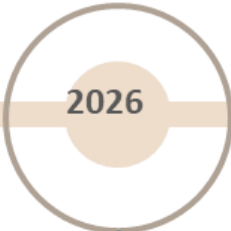
- Launch of CVD Predisposition test & Nutritional guide as CE IVD Certified Tests
- PGx CNS Reimbursed

First international Launches



- Sales growth in Greece
- Secure country entrance and strategy with the respective partners
  - UK, Germany, MEA
- Research & Preparation for US entry
  - Nasdaq Stock exchange

Growth & development



- Sales growth
- Secure country entrance and strategy with the respective partners
  - Rest of EU
  - USA
- Preparation for
  - New brands
  - New markets



<b>Development and Manufacturing Costs</b>	<b>Low end (US Dolars)</b>	<b>High end (US Dolars)</b>
Technology acquisition and protection	0.6	4
QSR and FDA compliance	1	3
GMP manufacturing	0.5	5
Platform development (buy in or make)	3	20
R&D (based on 1-3 years of FTEs at 200k/yr loaded spend)	3	8
Clinical utility trials retrospective versus prospective	1	10
Admin and financing	3	5
Subtotal costs to launch	12.1	55
<b>Sales and Marketing Costs (US market only)</b>		
Direct sales team (assuming required for 3 years)	3	12
Health technology assessment and payer negotiations	1	4
Clinical education (guidelines – KOL endorsement multi-stakeholder education)	2	25
Marketing (launch meetings, representative detail aids, online marketing)	2	10
Subtotal costs to drive adoption	8	51
<b>Total costs to commercialize</b>	<b>20.1 M</b>	<b>106.0 M</b>



[The cost to bring an IVD into the market  
zimmerpeacocktech.com](http://zimmerpeacocktech.com)

# iDNA : Financials

	2020	2021	2022
TOTAL NTS	160.989	1.410.856	1.523.352
COGS	21.101	333.783	477.386
OTHER COSTS	11.430	17.674	46.252
<b>TOTAL COGS</b>	<b>32.531</b>	<b>351.457</b>	<b>523.638</b>
<b>% COGS</b>	<b>20,2%</b>	<b>24,9%</b>	<b>34,4%</b>
<b>TOTAL GP</b>	<b>128.457</b>	<b>1.059.399</b>	<b>999.714</b>
<b>% GP</b>	<b>79,8%</b>	<b>75,1%</b>	<b>65,6%</b>
TOTAL OVERHEAD	339.638	860.972	530.634
A&P	371.652	312.968	85.435
OPERATIONAL EXPENSES	543.924	322.942	288.387
IT SUPPORT SERVICES		268.044	229.790
R&D			
<b>TOTAL OPEX</b>	<b>1.255.214</b>	<b>1.764.925</b>	<b>1.134.246</b>
<b>% OPEX</b>	<b>779,7%</b>	<b>125,1%</b>	<b>74,5%</b>
<b>OPERATIONAL PROFIT</b>	<b>-1.126.757</b>	<b>-705.527</b>	<b>-134.532</b>
<b>% OP</b>	<b>-699,9%</b>	<b>-50,0%</b>	<b>-8,8%</b>
FINANCIAL EXPENSES	7.915	56.660	48.243
DEPRECIATION			
<b>EBITA</b>	<b>-1.134.672</b>	<b>-762.186</b>	<b>-182.774</b>
<b>% EBITA</b>	<b>-704,8%</b>	<b>-54,0%</b>	<b>-12,0%</b>



**Thank you**

iDNA Genomics  
27 Evrota St., 145 64, Kifissia, Attica  
Tel.: 211 1021821, 210 6256177  
[www.idnagenomics.com](http://www.idnagenomics.com)