The complexity of pathologies and the uniqueness of each individual patient make psychiatric disorders difficult to define.
The importance of defining properly psychiatric illnesses relies on the ability to give a precise diagnosis, as well as being able to provide patients with the most appropriate treatment to their pathology.
The exploration of the genetic component of these disorders using sequencing opens the way to more targeted approaches to prevention, diagnosis and treatment tailored to the specific genetic profile of each patient.

Genetic causes of psychiatric disorders

Psychiatric disorders are highly heritable. Family studies have shown that first-degree relatives of a person with a psychiatric disorder are more likely to arise than in the general population or than first-degree relatives of people with no psychiatric disorder. For second and third degree relatives, the risk is also higher than for the general population. For schizophrenia or bipolar disorders, for example, the risk for first-degree relatives is on average **four times higher**[1].

Genetic investigation of psychiatric disorders is currently based solely on Chromosomal microarray analysis (CMA also known as SNP or CGH-array),which is used to identify chromosomal microdeletions and microduplications. The most common is the 22q11.2 microdeletion, responsible for Di George syndrome, and associated with a 25-30% increased risk of developing schizophrenia in adulthood[2].

However, the diagnostic yield of this approach is limited. The advent of sequencing, such as exome sequencing, has shown its value in many rare diseases, **with a diagnostic yield of around 30%**. The application of this promising technique is in psychiatric diseases.

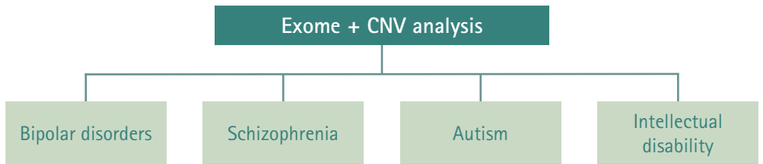
Exome sequencing

Exome analysis is used to search for **point variations in the coding sequence of all the genes identified in the human genome**, as well as **deletions or duplications (CNVs)**, with better resolution than chromosomal microarray analysis (CMA).

This exhaustive analysis makes it possible to:
- eliminate the need for CMA,
- study known and validated genes involved in psychiatric disorders,
- identify new genes.

This strategy offers the possibility of retrospectively **re-analysing the data** without the need for "resequencing". The advancement of knowledge (new genes of interest or pathogenicity of variants), and the updating of databases will allow **existing data to be re-interpreted**.

Indications



Clinical benefits

For the patient:
- confirm or clarify a diagnosis or make a differential diagnosis,
- prevent possible comorbidities,
- implement clinical and drug management adapted to the specific features of the syndrome,
- reduce stigmatisation.

For relatives:
- offer genetic counselling,
- implement early monitoring and management measures.

Benefits of first-tier exome sequencing

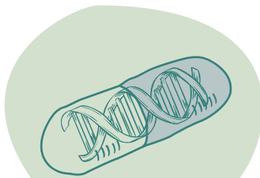
- Identification of microdeletions / microduplications with better resolution than CMA.
- Identification of point variations in known genes.
- Access to pharmacogenetic information.
- Identification of new genes.
- Possibility of re-studying data a posteriori, when new genes are published.

Pharmacogenetics for optimising and personalising drug treatments

Therapeutic choices in psychiatry can be complex, and psychiatrists need to rely on pharmacogenetic information.

Some drugs used in psychiatry are metabolised by enzymes technique activity depends on the presence of genetic variations that explain the patient's response to a particular drug, the dose at which he or she will respond to that drug or the adverse effects.

Exome sequencing makes it possible to define a patient's pharmacogenetic profile on the basis of inter-individual genetic variations.



In practice, this pharmacogenetic profile makes it possible to:

- predict the response to a drug,
- explain an adverse reaction,
- guide the clinician in the choice of drug or dosage.

Passeport pharmacogénétique

John Doe

Date de naissance : 1 janv. 1990

Impact pharmacogénétique sur l'efficacité/risque d'effets indésirables	
BCHE reduced function	mivacurium
CYP2B6 IM	efavirenz
CYP2B6 IM **CYP2C19** IM	sertraline
CYP2C9 IM*3	célécoxib, flurbiprofène, ibuprofène, lornoxicam, méloxicam, piroxicam, siponimod, ténoxicam
CYP2C9 IM*3 **CYP4F2** IM **VKORC1** normal function	warfarine
CYP2C9 IM*3 **HLA-B** normal risk (*15:02-negative)	phénytoïne
CYP2C9 IM*3 **SLCO1B1** normal function	fluvastatine
CYP2C19 IM	carisoprodol, citalopram, clopidogrel, dexlansoprazole, escitalopram oxalate, lansoprazole, oméprazole, pantoprazole, sertraline, voriconazole
CYP2C19 IM **CYP2D6** IM	amitriptyline, clomipramine, doxépine, imipramine, trimipramine
CYP2D6 IM	atomoxétine chlorhydrate, codéine, désipramine, flécaïnide, géfitinib, iloperidone, métoprolol, nortriptyline, paroxétine, perphénazine, pimozide, propafénone, tamoxifène, thioridazine, tramadol, venlafaxine, zuclopenthixol

Pour la liste complète des gènes testés et pour plus d'informations, veuillez consulter le rapport détaillé | Généré le : 27.10.23 09:51

The profile is carried out using the same sample as for exome sequencing.

Results are available within 4 weeks.

Exome sequencing by Eurofins Biomnis

Prescription by means of a dedicated test request form iwhich directly includes a declaration of genetic consultation certificate and informed consent.

Ongoing support, from test implementatiob to results interpretation.

Short turnaround time for results (4 weeks)

In practice

Test	Exome sequencing and CNV analysis in psychiatric disorders
Test code	EXOME
Interpretation level	Detailed report
Turnaround time	**4 weeks** excluding any additional tests
Sample	Whole blood EDTA or extracted DNA
Storage and transport	Room temperature
Price	Contact us
Required document	Test request form B34-INTGB available on **www.eurofins-biomnis.com > Test Guide > Test Code EXOME**
Associated tests	Additional pharmacogenetic profile. Please contact us for further information
Associated documents	«Exome sequencing» leaflet (Ref. DS34-INTGB)

References

1 Geoffroy, Pierre Alexis, Michael Guetta, et Bruno Étain. « La génétique en psychiatrie : aspects fondamentaux », L'information psychiatrique, vol. 92, no. 4, 2016, pp. 305-315.

2 Génétique et épigénétique de la schizophrénie et des psychoses. Boris Chaumette, Oussama Kebir, Marie-Odile Krebs. - Biologie Aujourd'hui 211 (1) 69-82 (2017). DOI: 10.1051/jbio/2017015

For more information

Eurofins Biomnis Ireland
Unit 3, Sandyford Business Centre, Sandyford Business Park, D18 E528
E-mail: sales@ctie.eurofinseu.com
Phone: 1800 303 349
www.eurofins-biomnis.ie

eurofins | Biomnis

Eurofins Biomnis International
17/19 avenue Tony Garnier
BP 7322 - 69357 LYON Cedex 07 - FRANCE

DS114-INTGB - March 2024 - © 123RF

eurofins | Biomnis

Exome sequencing in psychiatric disorders

For accurate diagnosis and optimised therapies