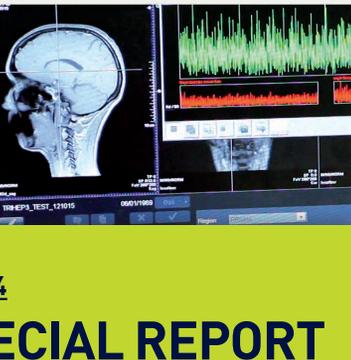


# FOR YOU & WITH YOU

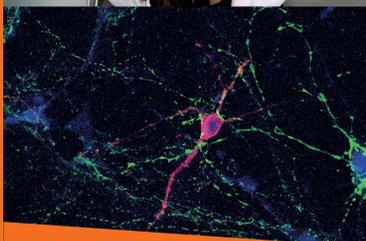
## The brain and spine institute donors journal



「私たちが、尻尾のほうを食べてみて、こいつの糞の発達していない当時でも、それが口か、し、「うなぎはしっぽに限る」というのが食通の無責任な推論に過ぎないが、そういつか臆測ばなしは別として事実を挙げてみよう。私が魚も好んでよく食べた。ところが、いなかで大部分だ。むかしのソバは、二番粉で打れにつけて食べるのがうまいとされていたが、良めるのが一般の嗜好になってしまった。そへをおごろうか」といえば、たいていがソバ



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**SPECIAL REPORT**  
**ON 5 YEARS**  
**OF MAJOR ADVANCES**  
**AT THE ICM**



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Bassem Hassan joins the ICM

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Major advances

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Alzheimer's: the caregiver's battle



**MOVING FORWARD TO PUSH BACK DISEASE**

Almost 12 years ago, when we first imagined creating a top-level institute to treat brain and spinal cord disease, the project seemed to us both ambitious and revolutionary. With the founding members, we had the goal of making possible the creation of a new neuroscience research model. We are thus proud to present to you this journal, which brings together major research advances since the ICM's opening 5 years ago on 24 September 2010.

Though this crucial first five years have had some conceptual and financial difficulties, we have successfully completed this first step, an invaluable basis for the future and for the millions of patients who rely on us. You will see in this special edition of the donor newsletter that the goals we set have been reached, and major scientific discoveries have led to significant advances in three main areas:

- understanding the brain and how it functions;
- diagnosis and prediction of neurological disease, in particular neurodegenerative;
- therapeutic solutions.

This tremendous human and scientific adventure has been made possible thanks to the mobilization of all: the public and private sectors, as well as individuals. All, without exception, because this battle concerns all of us. Before letting you discover in greater detail the various steps that have moved us forward on the high road of neuroscience, I wish to thank all those who stand by our side with the hope, ambitious to be sure, of preventing, curing, and one day repairing brain and spinal cord disease.

**Prof. Gérard Saillant**  
President of the ICM

**BASSEM HASSAN JOINS THE ICM**

Bassem Hassan, internationally renowned neuroscientist, joined the ICM in January 2016, after winning an international call for applicants. His research is concerned with genetic mechanisms that control early development of the nervous system, from cell specification to neural circuit formation, as well as mechanisms involved in neurological disease, using *Drosophila* as a model. Through his work, Bassem Hassan will contribute, alongside 650 researchers, engineers and technicians at the Institute, to the promise of major advances against diseases of the nervous system.



**AIR FRANCE RENEWS ITS COMMITMENT TO THE ICM**

Through its humanitarian philanthropy arm, Air France supports the ICM's medical research programs since 2009 by awarding airline tickets to our researchers.



This partnership allows Institute members to travel and develop collaborations with other researchers, both nationally and internationally. Indeed, this travel is essential for the scientific community, as it facilitates meetings with other research institutes, as well as knowledge-sharing, thus advancing work against diseases of the nervous system. With this valuable support, Air France shares with the ICM's teams the hopes of new medical progress, flowing directly from this collaboration.

**THANKS TO THE DISCOVERERS OF HOPE IN 2015**

In late 2015, three pairs of researchers and clinicians presented their work: Cécile Delarasse and Dr. Stéphane Epelbaum on Alzheimer's disease, Prof. Marc Sanson and Emmanuelle Huillard on brain tumors, and Dr. Fanny Mochel and Prof. Alexandra Durr on Huntington's disease. There are almost 3,900 of you supporting our researchers at the ICM. Thank you all!



EN EUROPE ET DANS PLUS DE 30 VILLES EN FRANCE  
**Semaine du Cerveau**  
14-20 mars 2016

EXPOSITIONS  
CINÉ-DÉBATS  
SCIENCES  
ATELIERS  
RENCONTRES  
CONFÉRENCES  
ANIMATION SCOLAIRES

MANIFESTATION GRAND PUBLIC GRATUITE  
COORDONNÉE PAR LA SOCIÉTÉ DES NEUROSCIENCES  
Toutes les infos sur [www.semaineducerveau.fr/paris](http://www.semaineducerveau.fr/paris)

Société des Neurosciences

FRC, INRA, CNRS, Inserm, ESPCI, Collège de France, UPMC, etc.

**OUR PARTNERS:  
BRAIN AWARENESS WEEK-17<sup>TH</sup> EDITION**

**Brain Awareness Week is open to all from 14 to 20 March 2016!**

The Society for Neuroscience has more than 2,300 scientists including 500 Ph.D. students. It aims to promote the development of research in all fields of neuroscience. Each year in March, the Society for Neuroscience coordinates Brain Awareness Week in France. This international event is organized simultaneously in over 32 towns, and aims to raise awareness of the importance of brain research. This is an opportunity for many researchers, doctors and student volunteers to meet the public and share progress made in neuroscience research labs, to present what is involved in trying to understand the brain, and the implications for society.

The ICM is participating for the 4<sup>th</sup> consecutive year; this is the chance to meet researchers from the Institute and better understand what neuroscience research and neurological diseases are. Brain Awareness Week begins on 14 March at 6:30 pm, with the opening keynote speech-being held at the ICM itself-given by Jean-Antoine Girault, Chairman of the Society for Neuroscience, on the subject of dopamine.

More information can be found at [icm-institute.org](http://icm-institute.org) and [semaineducerveau.fr](http://semaineducerveau.fr)

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**On the web**

- **Major conference on epilepsy**  
See the "Conferences at the ICM" section
- **The "Invited researchers" series**  
Go to "Videos" in the Research section
- **A special report on translational research**  
Go to the "News" zone of the Research section

[www.icm-institute.org](http://www.icm-institute.org)

**EVENTS**

●●● 14 - 20 March 2016  
- Brain Awareness Week

●●● 20 March 2016\*  
- "A door between two worlds" concert, with profits going to the ICM. Organized by *Le murmure des anges*

●●● 19 April 2016\*  
- Conference on Parkinson's disease

\* For more information:  
[contact@icm-institute.org](mailto:contact@icm-institute.org)

# BIG STEPS FORWARD IN RESEARCH AT THE ICM, FOR YOU & WITH YOU

## 1. UNDERSTANDING THE BRAIN

*How does the brain learn to read? What are the parameters that determine our choices? How to make new neurons? How to trigger movement independently of the brain's control? All fundamental questions for which the ICM's researchers have provided answers.*

The ICM's researchers and clinicians work closely together to:

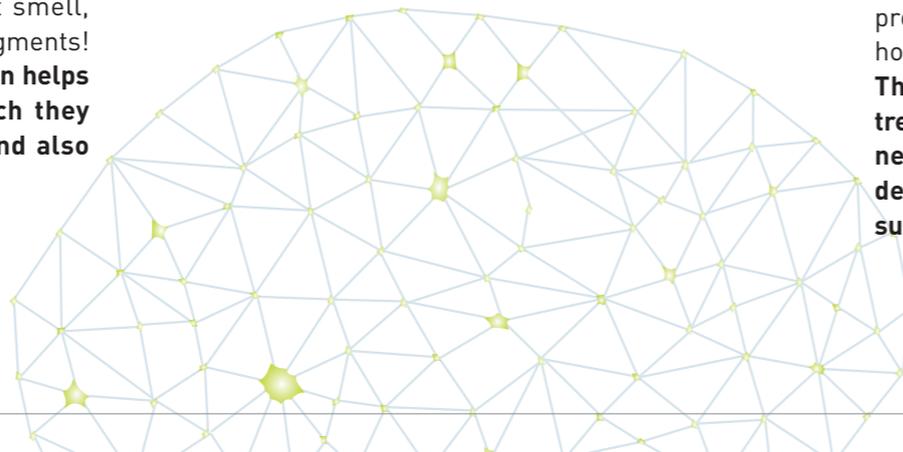
- **IDENTIFY** the mechanisms underlying our behavior, regions involved in language, writing, visual attention, etc.
- **UNDERSTAND** the development of the nervous system, its operation, its plasticity and especially consciousness, creativity, the foundations of motivation, the reasons for our choices, our social interactions, motor control circuits, as well as relationships between different regions of the brain.

## 4 BIG STEPS

### 1. MOTIVATING FACTORS

#### DECIPHERING MECHANISMS

From choosing a restaurant to choosing a partner, the reasons for our behavior often escape us. Why do we do what we do? What are the parameters involved in our choices, and the regions of the brain implicated? One region of the brain, which is also the seat of memory, prevents us from succumbing to the lure of instant gratification and motivates our actions over the long term. Another region is involved in assigning value to things. Interestingly, the activity of this region is influenced by context (music, a pleasant smell, etc.) and by the confidence we have in our judgments! **Understanding the mechanisms of motivation helps us to understand the pathologies in which they are altered: depression, schizophrenia, and also Parkinson's and Alzheimer's disease.**



### 2. LEARNING

#### HOW DOES THE BRAIN LEARN TO READ?

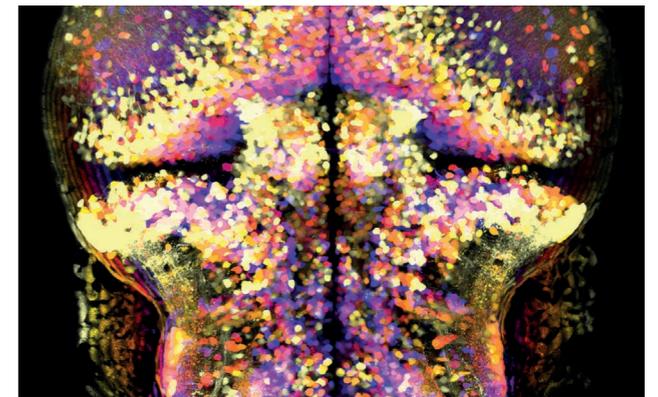
Our brain has adapted to the invention of writing, and thus reading, thanks to a small area that has specialized in letter recognition. But why it? This small area has particularly important connections with language regions that provide understanding of words and speech production. These connections allow us to access, using vision, representations that are normally specific to spoken language. **This learning is possible at any age, which means that reading circuitry is able to develop throughout life.**

たとえば、うなぎの尻尾については、あっさりしている。だから、脂人」たちが、尻尾のほうを食べてみて、コミの発達していない当時でも、そして、「うなぎはしっぽに限る」という私の無責任な推論に過ぎないが、その臆測はなしは別として事実を挙げたが魚も好んでよく食べた。ところが大部分だ。むかしのソバは、一汁につけて食べるのがうまいとされ、食べるのが一般の嗜好になってしまっパをおごろうか」といえば、たいてい、つても、ソバの玉をくれというところ、は、まごうかたなき「時代」による。また、日本から、アメリカへいつ

### 3. MOTOR CONTROL

#### LIGHTING UP ABOUT NEURONS

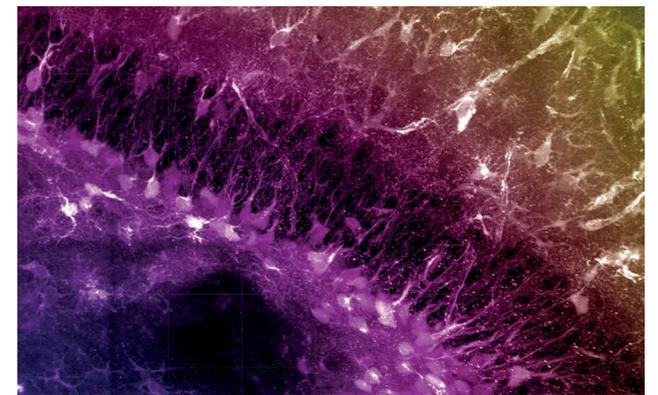
A technique to remotely control neurons has identified neurons whose activation triggers movement independently of the brain in zebrafish. This sensory system, previously unknown, remains intact in those with trauma. **One hope raised by this discovery is to find a way to activate this circuit in humans in order to trigger movement, regardless of brain control.**



### 4. AGEING

#### MAKING NEW NEURONS

The identification of a growth factor essential to the production of new neurons, VEGF-C, is an incredible hope in the fight against neurodegenerative disease. **This work could lead to the development of new treatments: VEGF-C is a good candidate for activating neuron production and compensating for cognitive decline in people with neurodegenerative diseases such as Alzheimer's.**



## 2. DIAGNOSIS AND PREDICTION

*Six new risk factors for Parkinson's disease, an early and reliable diagnostic method for Alzheimer's, a new gene involved in epilepsy, a revolutionary new tool for determining the state of consciousness and predicting the evolution of patients in vegetative states: these are some of the results of five years of intensive research by scientists and clinicians at the ICM.*

Researchers and clinicians at the ICM work closely together to:

- **IDENTIFY** genes responsible for disease, risk factors, diagnostic and prognostic factors, and biological markers to detect and monitor disease
- **CREATE** relevant diagnostic tools
- **PREDICT** the evolution of a pathology
- **DIAGNOSE** so as to treat patients as well and as early as possible
- **DEVELOP** personalized or targeted treatment

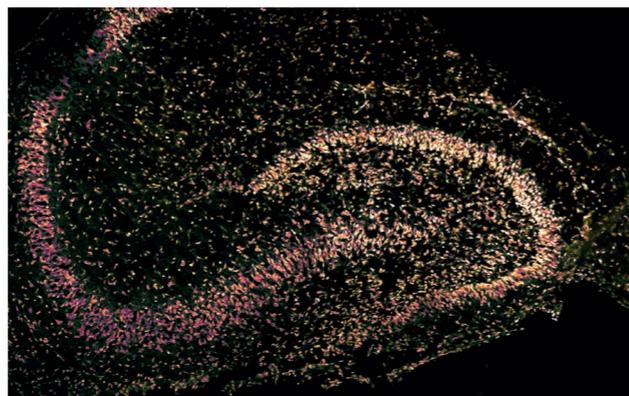
## 4 BIG STEPS

### 1. ALZHEIMER'S DISEASE

#### ACCURATE AND EARLY DIAGNOSIS

More reliable, faster, more accurate and more specific: the diagnostic criteria for Alzheimer's disease have been redefined by a group of international experts.

**Identifying the disease as early as possible, with new markers, is a major challenge for clinicians who want to better treat patients, especially in the case of younger patients or atypical cases in which diagnosis is difficult.**



### 2. PARKINSON'S DISEASE

#### SIX NEW RISK FACTORS

Six new and until now unsuspected genetic risk factors involved in Parkinson's disease have been discovered. This big step in Parkinson's research will help identify those at risk and better understand the causes of the disease. This discovery will enable the development of diagnostic tools to identify people who are at higher risk of developing the disease. In addition, **understanding its causes opens the door to developing targeted therapies.**



### 3. EPILEPSY

#### ONE GENE, DIFFERENT DISEASES

The discovery of a gene DEPDC5, potentially implicated in several different types of inherited epilepsy, opens new avenues for diagnosis and treatment, for this disease known for its difficulty to treat.

**With this discovery, a diagnosis based on DEPDC5 can be offered to families to enable better therapeutic choices. This discovery also opens new treatment possibilities for focal epilepsy, also difficult to treat.**

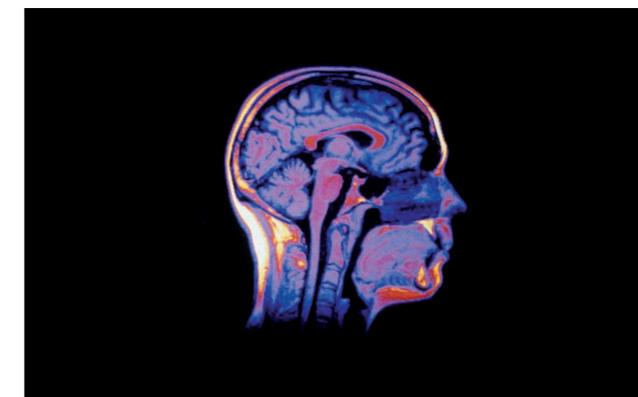


### 4. NON-COMMUNICATIVE PATIENTS

#### DETERMINING THE LEVEL OF CONSCIOUSNESS

Characterizing the state of consciousness of non-communicative patients and predicting their evolution is now possible thanks to the calculation of almost a hundred measurements of the brain using an electroencephalogram.

**In the near future, simplified versions of these analyses will be available to all clinical departments with standard EEG equipment, a widely used medical tool which is inexpensive, non-invasive and reusable at will.**



Today the ICM is:

**26** research teams

**650** researchers, engineers, technicians, Ph.D. students and post-docs

**22,000 sqm** of laboratories

**1,200 sqm** for clinical research

**More than 1,000** scientific publications since 2012

**1,000 sqm** for incubating startups

**24** cutting-edge technical platforms

**1 goal:**

**Search, find, cure. For you & with you.**

### 3 . FINDING NEW THERAPIES

*New treatments for multiple sclerosis and Huntington’s disease have proven effective, and a surprising discovery has made it possible to prevent the death of neurons in Parkinson’s disease. Furthermore, deep brain stimulation suppresses the symptoms of obsessive compulsive disorder in most patients.*

Researchers and clinicians at the ICM work closely together to:

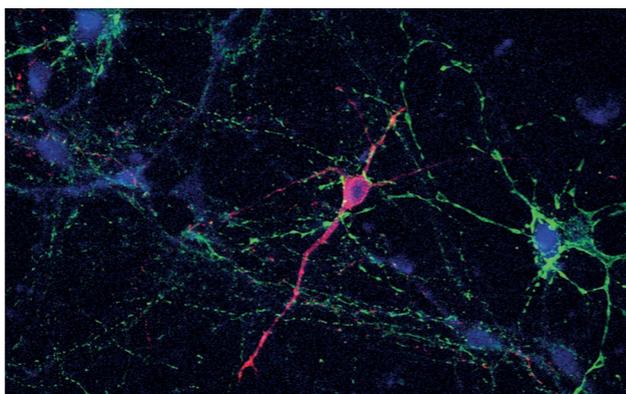
- **REPAIR** damage
- **SLOW** disease progression
- **IDENTIFY** new therapeutic targets
- **TREAT** disease

### 4 BIG STEPS

#### 1. PARKINSON’S DISEASE

##### PROTECTING NEURONS

An astonishing discovery has been made: a protein from a certain virus is capable of protecting neurons involved in Parkinson’s disease. **This very encouraging result opens the way to new therapies for Parkinson’s, and also other neurodegenerative diseases.**



#### 2. HUNTINGTON’S DISEASE

##### MEDICINAL OILS

The therapeutic potential of a synthetic oil, triheptanoin, has been demonstrated in patients with Huntington’s disease. By improving energy processes in the brain, this drug could slow the progression of the disease. **Based on these results, a clinical trial, TRIHEP3, has begun in France and the Netherlands, for a period of one year involving one hundred patients, with evaluation criteria including clinical data and imaging results.**



#### 3. OCD (OBSESSIVE COMPULSIVE DISORDER)

##### TREATMENT USING BRAIN STIMULATION

In the majority of patients with OCD who are resistant to conventional treatments, deep brain stimulation of a particular region, the subthalamic nucleus, **suppresses the symptoms and improves quality of life.**



#### 4. MULTIPLE SCLEROSIS

##### TOWARDS A NEW TREATMENT

For the first time, a drug, MD1003, slows disease progression and improves the health status of patients with progressive multiple sclerosis. **This drug should quickly be on the market, which is extremely encouraging for both clinicians and patients.**



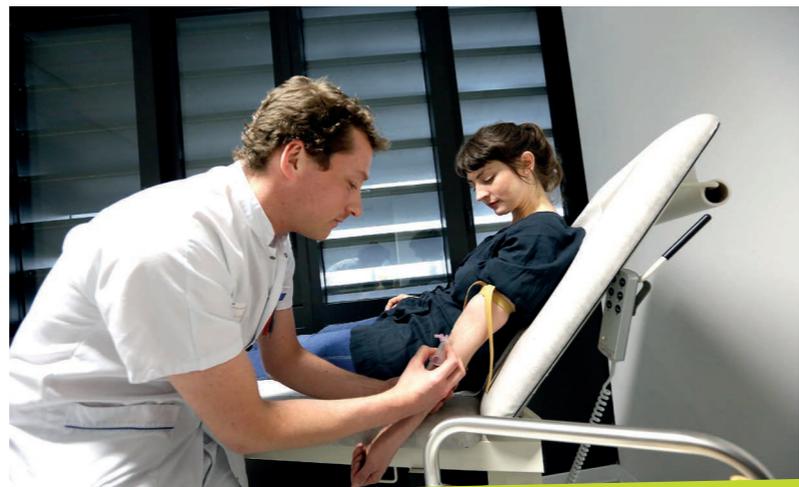
Today, medicine provides relief.  
 Tomorrow, we want to prevent, heal and repair.  
 These 12 steps forward have been chosen because they stood out in the research conducted on diseases of the brain and spinal cord at the ICM. But these are far from all; many more discoveries have been made since 2010, and can all be found in full on the Institute’s website

[icm-institute.org](http://icm-institute.org)

**DISCOVER THE CLINICAL INVESTIGATION CENTER**

The Clinical Investigation Center (CIC) is a unique bridge between research and care which saves valuable time when fighting disease, and offers the hope of more rapid delivery of innovative treatments for the millions of patients suffering from diseases of the brain and spinal cord.

Unlike usual laboratories, research at CIC is performed in both healthy and sick individuals with two goals: understanding disease mechanisms and evaluating the effectiveness of new drugs in early stages of development. Such research can only be done with the cooperation of patients and healthy volunteers who agree to participate in the various trials. In this way, CIC has been at the origin of several scientific advances in improving the understanding and therapeutic management of various nervous system disorders (Parkinson's disease, multiple sclerosis, cerebellar ataxia, Alzheimer's, etc.).



**NATIONAL STRATEGY FOR NEURODEGENERATIVE DISEASE: 7 CENTERS SELECTED**



Under the new National Strategy for Neurodegenerative Disease (2014-2019), seven regional centers of excellence in this field were selected from twelve submitted projects.

These centers will bring together their individual strengths to enable better diagnosis and improved treatment of neurodegenerative disease. The centers will also take on the mission of accelerating knowledge and technology transfer by relying on local and regional business incubators, and centers of clinical and therapeutic investigation for clinical trials. They will be involved in teaching and also have the task of attracting students from other disciplines to this research field, so as to foster multidisciplinary approaches. These centers will be identified in the same way as the French centers of excellence within the Europe-Canada network. Seven regional centers of excellence have been chosen: **Aix-Marseille, Bordeaux, Grenoble, Lille, Montpellier, Paris et Toulouse.**

**ALZHEIMER'S: THE CAREGIVER'S BATTLE**

*"The experience proves that a favorable environment allows the patient to continue a peaceful existence, experience happiness, and give back to those around them."*

*Maricotte, 92, suffers from Alzheimer's disease.*

*Patricia, her daughter, shares a story full of love and hope.*



**What do you feel when faced with this disease?**

The diagnosis of the disease in a loved one generally has a devastating effect on those around them, who now worry about the coming years both for the patient and themselves. For most, the disease changes the perception they had of the person "before". For some, it's not worth going to see them or talk to them since they are no longer recognized. For others, it makes them think about what may happen to them one day, and they prefer to cut off all contact so as to "only remember the best things."

However, experience proves that a favorable environment allows the patient to continue a peaceful existence, experience happiness, and give back to those around them. Alzheimer's disease does not only have negative effects. It does not cause physical suffering unlike other diseases affecting the elderly, it erases bad memories, and quickly banishes sorrow, frustration and worry. Unlike their peers who are still "with it", they are not aware of the stigmas of age and the prospect of approaching death. Nevertheless, emotional suffering, profound but fortunately fleeting, may be caused by the awareness of intellectual decline or the feeling of not counting for anything anymore. In my mother, who did not have a great memory anyway, this happened quite gradually, and thus did not particularly distress her.

These days, her face - usually so affable - drops when visitors talk to each other without including her in the conversation. "Nobody looks at me, I am nothing", she said to me one day. She is happy when neighbors come near her wheelchair to say hello, though this doesn't happen all the time, even if they have known her for years.

**And how is it for you?**

It is the job of those around her to adapt. You have to enter the patient's world, respect their slower pace, and interpret their requests as well as possible. Balance is difficult between maintaining a "normal" life for yourself, and adapting to the fact that your loved one's field of possibilities has shrunk. Rather than imposing on them what would please everyone, like eating out or going on holiday, it is good to organize activities they have always appreciated, such as an invitation to a glass of champagne at home or getting a haircut, and finding new activities that are compatible with their condition, like sorting ribbons, folding papers, etc.

**Why did you choose to talk with us?**

I tell this story hoping to give courage to those who are facing up to Alzheimer's disease in a loved one, sharing their hope that this disease can soon be treated and cured through the efforts of researchers.

