Belluno, 24 marzo 2018

GLI ORIZZONTI DELLA SCIENZA

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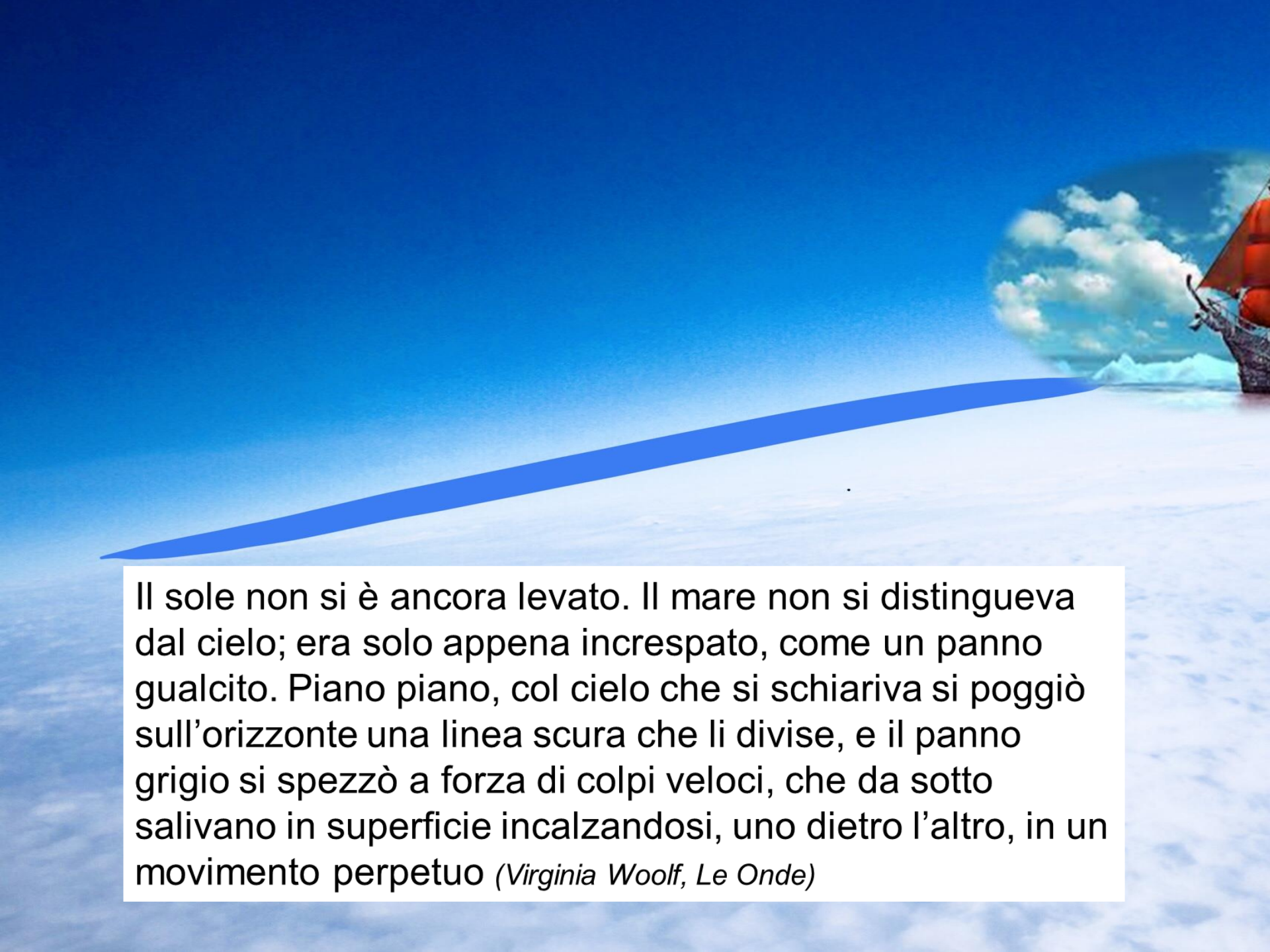


Il sole non si è ancora levato. Il mare non si distingueva dal cielo; era solo appena increspato, come un panno gualcito. Piano piano, col cielo che si schiariva si poggiò sull'orizzonte una linea scura che li divise, e il panno grigio si spezzò a forza di colpi veloci, che da sotto salivano in superficie incalzandosi, uno dietro l'altro, in un movimento perpetuo *(Virginia Woolf, Le Onde)*

L’identità e la rotta

Da ragazzo, Albert Einstein ha trascorso un anno a bighellonare oziosamente. Se non si perde tempo non si arriva da nessuna parte, cosa che i genitori degli adolescenti purtroppo dimenticano spesso. Era a Pavia. Aveva raggiunto la famiglia dopo aver abbandonato gli studi in Germania, dove non sopportava il rigore del liceo. Era l'inizio del secolo e in Italia l'inizio della rivoluzione industriale. Il padre, ingegnere, installava le prime centrali elettriche in pianura padana. Albert leggeva Kant e seguiva a tempo perso lezioni all'Università di Pavia: per divertimento, senza essere iscritto né fare esami. È così che si diventa scienziati sul serio.

Sette brevi lezioni di fisica, Carlo Rovelli

L'emozione di conoscere

"Sebbene negli anni successivi avrei assaporato la gioia di scoperte molto più importanti, la rivelazione di quel giorno lasciò una traccia incancellabile nella mia memoria e segnò non soltanto la fine di un lungo periodo di perplessità, sul significato delle ricerche che perseguivo da tanti anni, ma sigillò un patto di alleanza a vita tra me e il sistema nervoso. Non l'avrei rotto, né me ne sarei pentita" (Rita Levi Montalcini. Elogio dell'imperfezione. Garzanti Editore s.p.a.,1987).

Ognuna di noi dovrebbe forse siglare un'alleanza a vita con l'oggetto della propria passione.

OLTRE LE COLONNE D'ERCOLE

Strumenti di lavoro del Ricercatore

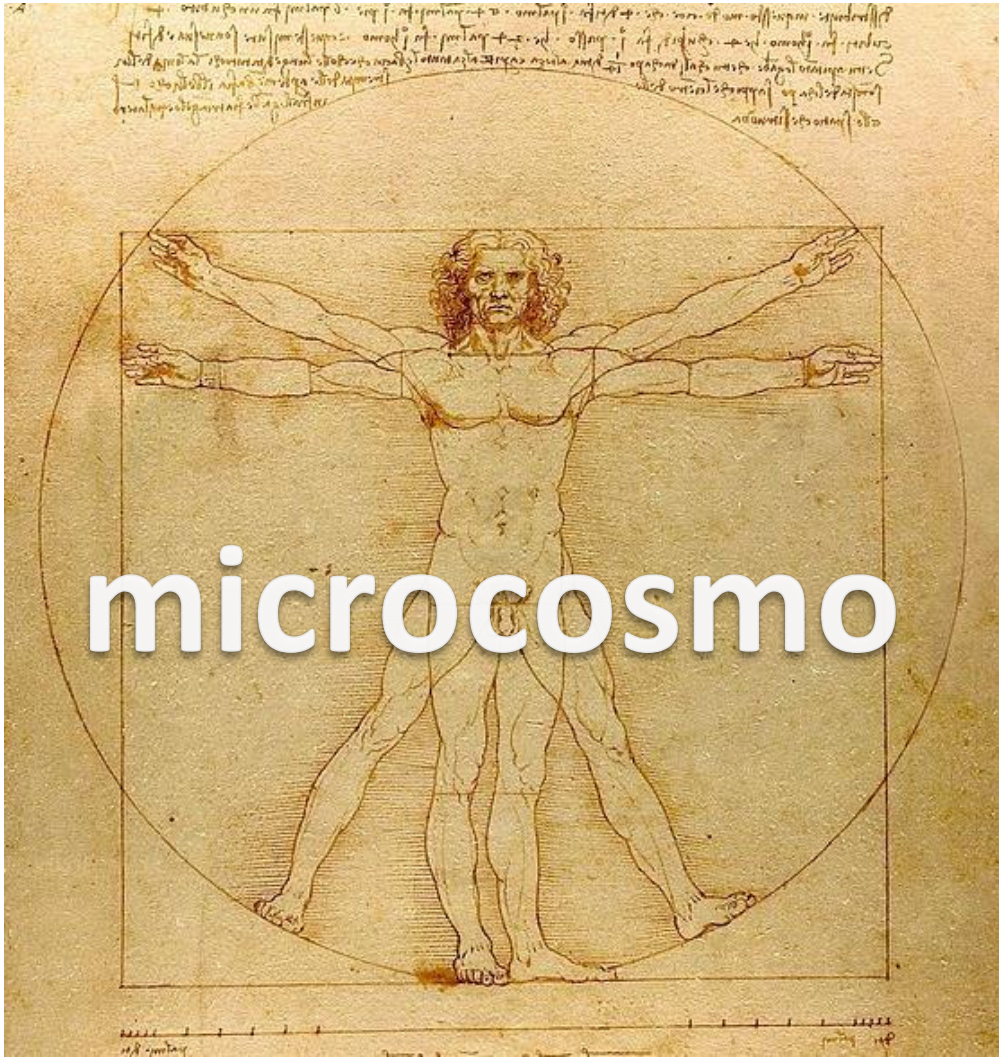
Due sono gli strumenti di lavoro del ricercatore.

1) La logica: come una bussola ti guida nei cunicoli dell'ignoto; ti indica il muro "delle non possibilità", aiutandoti a mantenere la rotta laddove gli occhi non possono vedere
2) La fantasia: veste di ali leggere il pensiero che - facendosi un po' folle- varca cosi ogni confine.

Ragione e un pizzico di follia

macrocosmo

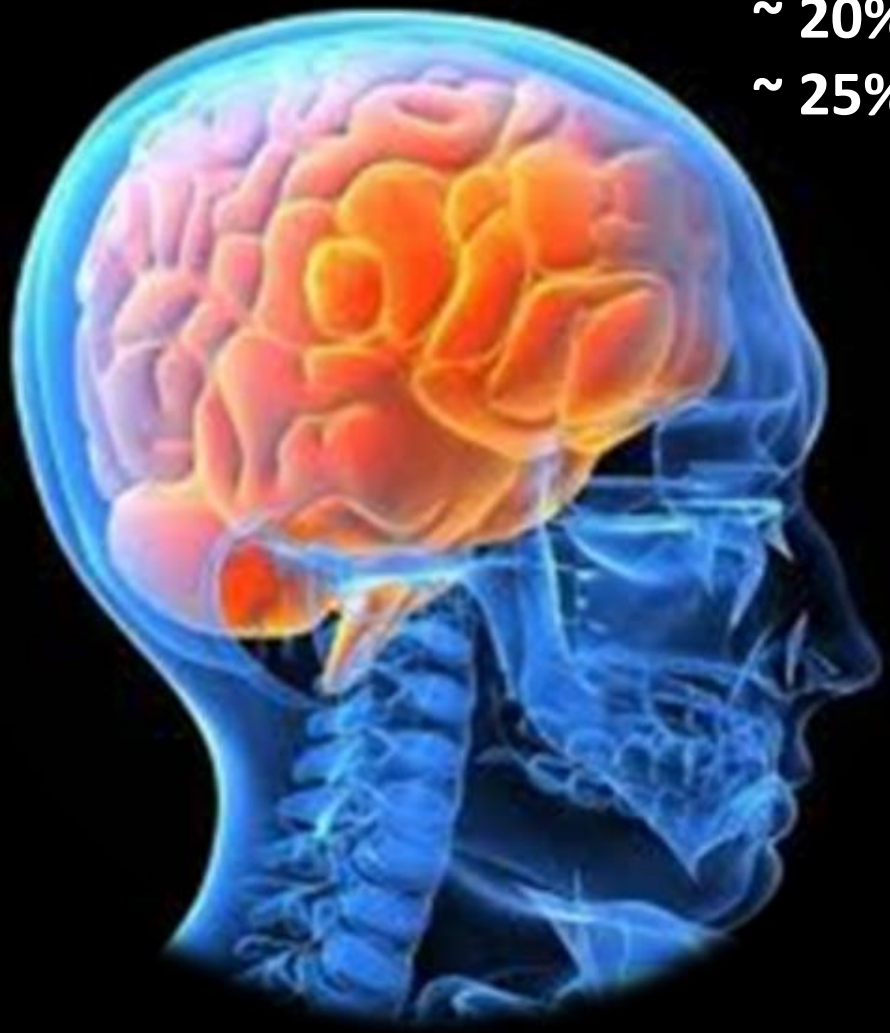
macrocosmo



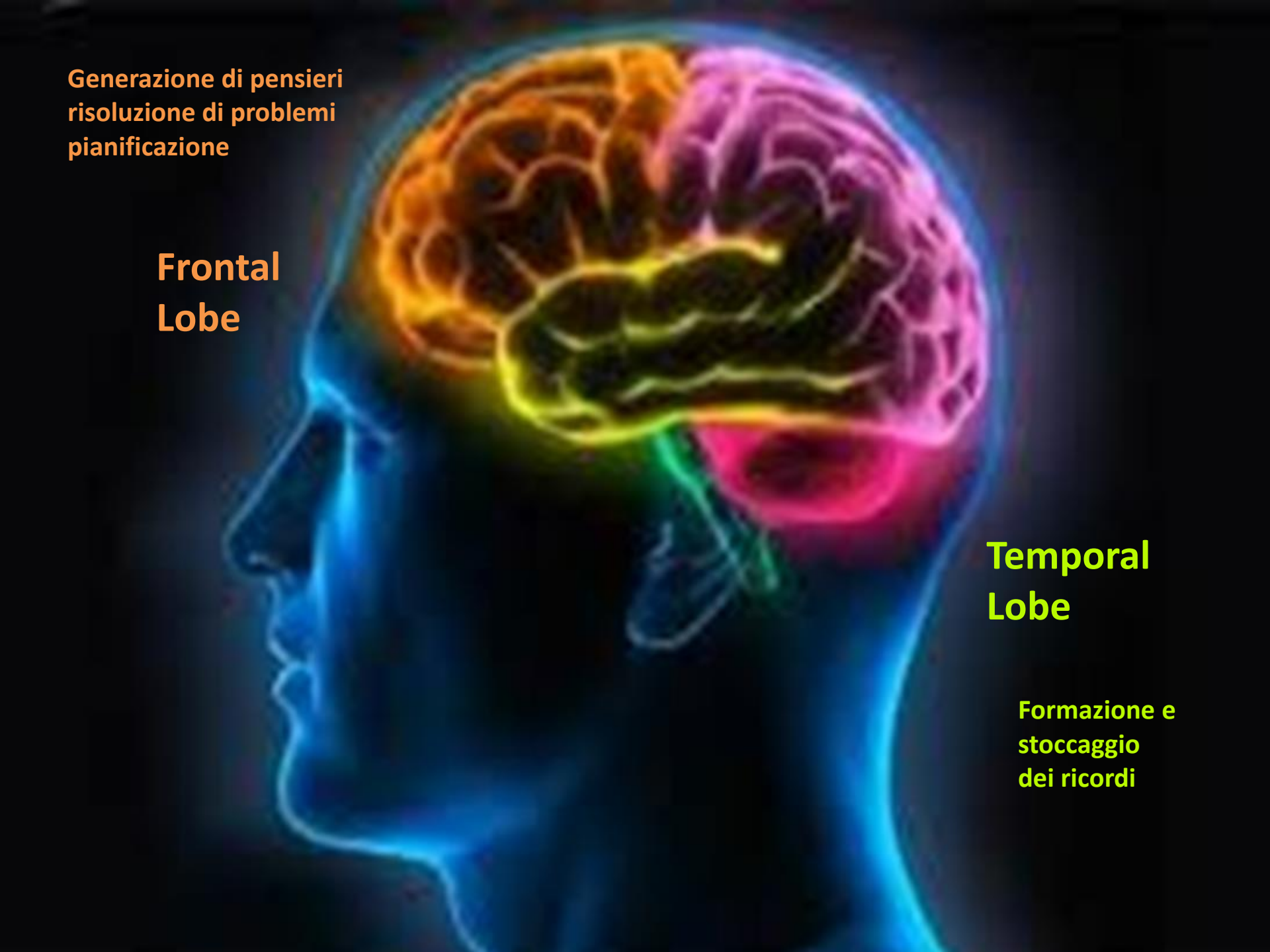
macrocosmo

macrocosmo

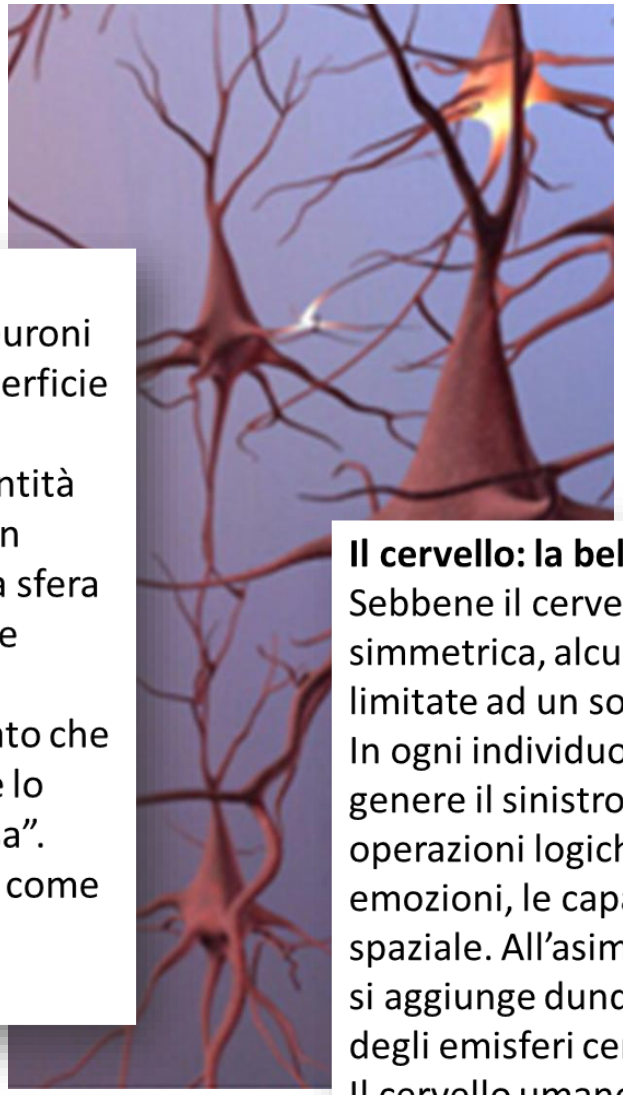
IL CERVELLO



~ 2% del peso corporeo
~ 20% del consumo di ossigeno totale
~ 25% del consumo di glucosio totale


Generazione di pensieri
risoluzione di problemi
pianificazione
Frontal
Lobe
Temporal
Lobe
Formazione e
stoccaggio
dei ricordi

ASIMMETRIE

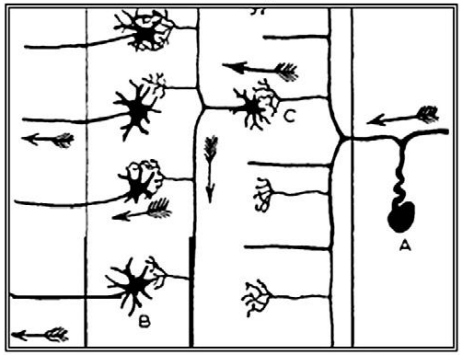


I neuroni: Questione di forma.
Una delle caratteristiche peculiari dei neuroni è la forma o meglio il rapporto tra la superficie ed il volume.
Il rapporto superficie/volume è una quantità che misura quanta superficie possiede un solido rispetto allo spazio che occupa. La sfera è il solido col rapporto superficie/volume minore.
Ma un rapporto superficie/volume elevato che tipo di funzione suggerisce? Certamente lo scambio e della trasmissione di "qualcosa". L'estesa superficie dei neuroni ha quindi come finalità l'ottimizzazione dei processi di comunicazione.

Il cervello: la bellezza dell'asimmetria.
Sebbene il cervello abbia una struttura simmetrica, alcune funzioni intellettive sono limitate ad un solo emisfero.
In ogni individuo, l'emisfero dominante (in genere il sinistro) presiede al linguaggio e alle operazioni logiche, mentre l'altro controlla le emozioni, le capacità artistiche e la percezione spaziale. All'asimmetria strutturale del neurone si aggiunge dunque l'asimmetria funzionale degli emisferi cerebrali.
Il cervello umano sembra quindi infrangere uno dei canoni Rinascimentali, ossia la simmetria.

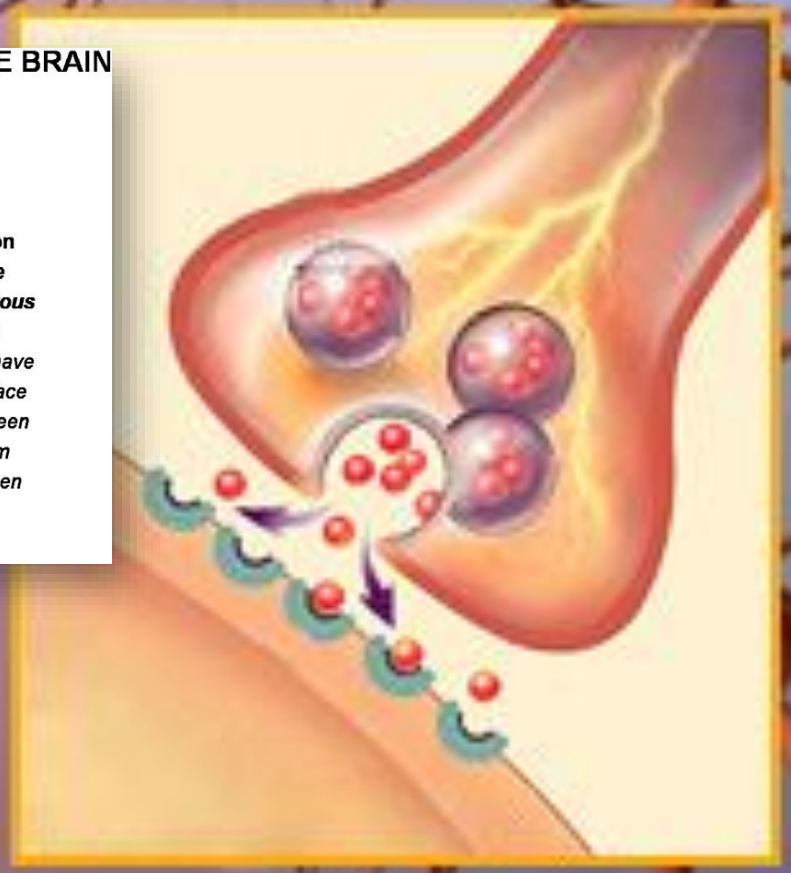
THE 'SYNAPTIC PARADIGM' FOR CELL- CELL COMMUNICATION IN THE BRAIN

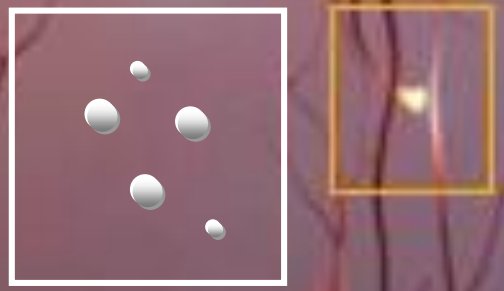
From Cajal (*Nobel Lecture, 1906*):
Nerve elements possess reciprocal relationships ***in contiguity but not in continuity***



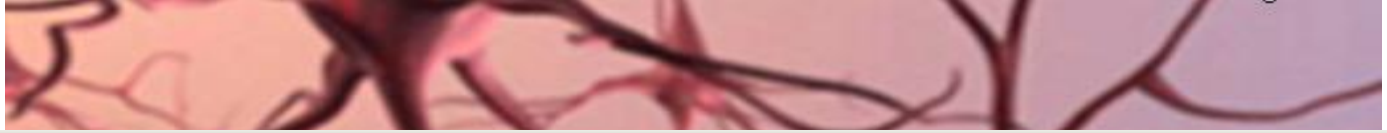
SHERRINGTON CS (1857 - 1952)

From Sherrington (*The Integrative Action of the Nervous System, 1906*):
It is convenient to have a term for the surface of separation between neurons: the term introduced has been ***SYNAPSE***





Neurophysiology, Neuropathology and Neuropsychopharmacology have been mainly based on the **synaptic paradigm**, hence on a deficit or an excess in the release of some neurotransmitters and/or on alterations in their recognition/decoding systems



Feature*	Exosomes	Microvesicles	Ectosomes	Membrane particles	Exosome-like vesicles	Apoptotic vesicles
Size	50–100 nm	100–1,000 nm	50–200 nm	50–80 nm	20–50 nm	50–500 nm
Density in sucrose	1.13–1.19 g/ml	ND	ND	1.04–1.07 g/ml	1.1 g/ml	1.16–1.28 g/ml
Appearance by electron microscopy‡	Cup shape	Irregular shape and electron-dense	Bilamellar round structures	Round	Irregular shape	Heterogeneous
Sedimentation	100,000 g	10,000 g	160,000–200,000 g	100,000–200,000 g	175,000 g	1,200g , 10,000 g or 100,000 g
Lipid composition	Enriched in cholesterol, sphingomyelin and ceramide; contain lipid rafts; expose phosphatidylserine	Expose phosphatidylserine	Enriched in cholesterol and diacylglycerol; expose phosphatidylserine	ND	Do not contain lipid rafts	ND
Main protein markers	Tetraspanins (CD63, CD9), Alix and TSG101	Integrins, selectins and CD40 ligand	CR1 and proteolytic enzymes; no CD63	CD133; no CD63	TNFRI	Histones
Intracellular origin	Internal compartments (endosomes)	Plasma membrane	Plasma membrane	Plasma membrane	Internal compartments?	ND

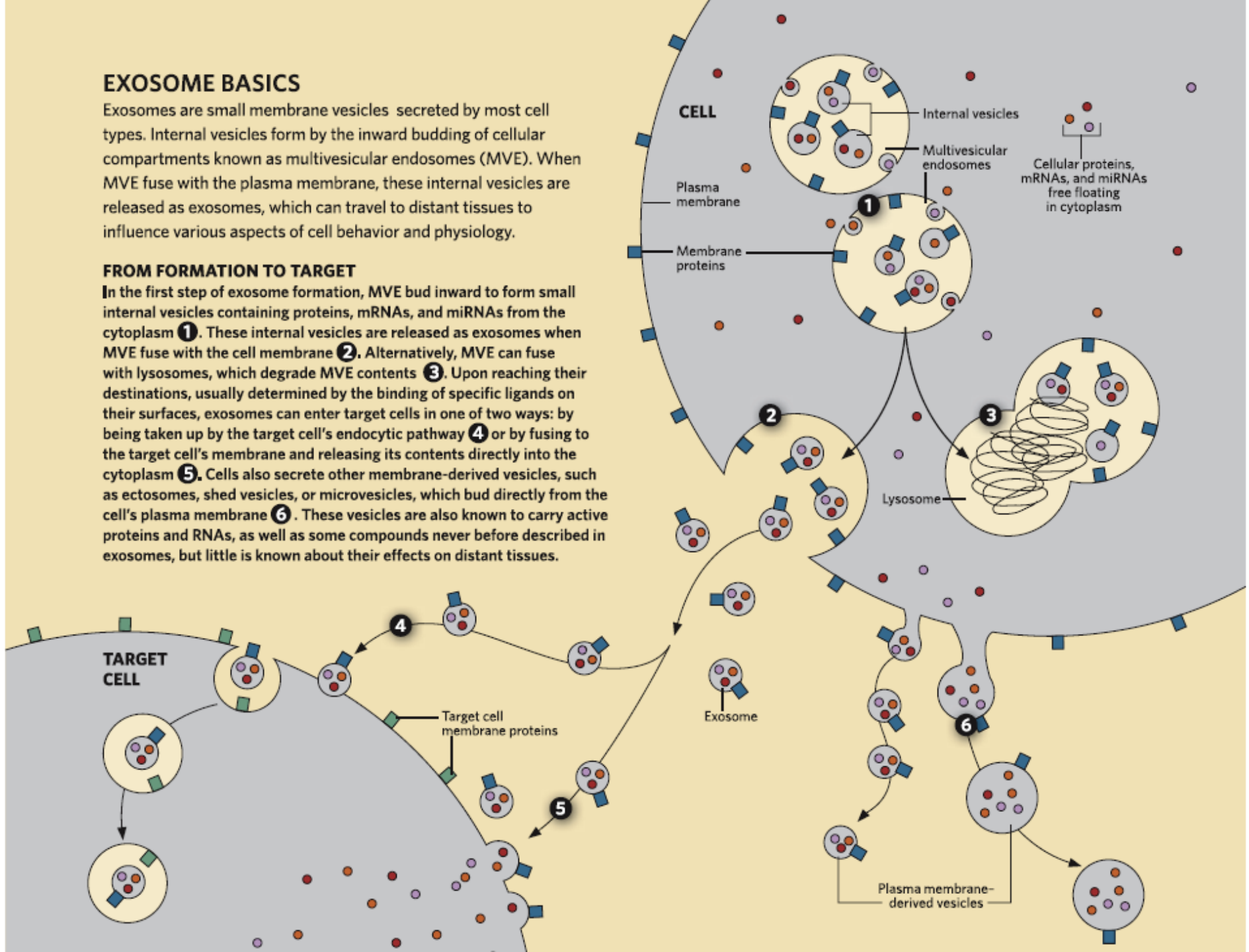
Théry C et al
Nat Rev Immunol 2009

EXOSOME BASICS

Exosomes are small membrane vesicles secreted by most cell types. Internal vesicles form by the inward budding of cellular compartments known as multivesicular endosomes (MVE). When MVE fuse with the plasma membrane, these internal vesicles are released as exosomes, which can travel to distant tissues to influence various aspects of cell behavior and physiology.

FROM FORMATION TO TARGET

In the first step of exosome formation, MVE bud inward to form small internal vesicles containing proteins, mRNAs, and miRNAs from the cytoplasm ❶. These internal vesicles are released as exosomes when MVE fuse with the cell membrane ❷. Alternatively, MVE can fuse with lysosomes, which degrade MVE contents ❸. Upon reaching their destinations, usually determined by the binding of specific ligands on their surfaces, exosomes can enter target cells in one of two ways: by being taken up by the target cell's endocytic pathway ❹ or by fusing to the target cell's membrane and releasing its contents directly into the cytoplasm ❺. Cells also secrete other membrane-derived vesicles, such as ectosomes, shed vesicles, or microvesicles, which bud directly from the cell's plasma membrane ❻. These vesicles are also known to carry active proteins and RNAs, as well as some compounds never before described in exosomes, but little is known about their effects on distant tissues.



IL LINGUAGGIO MOLECOLARE

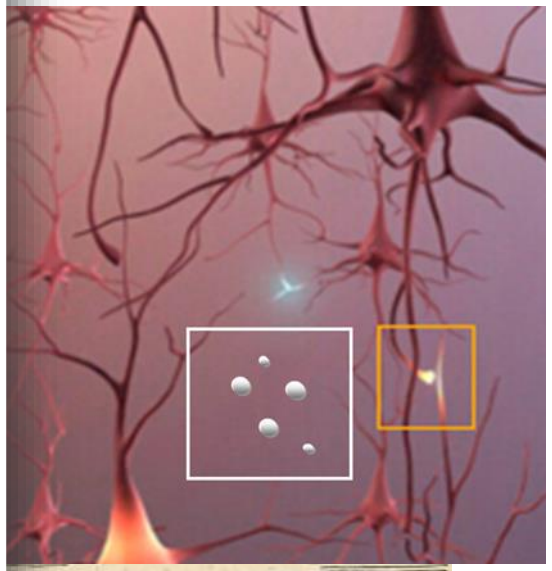
I neuroni parlano una seconda lingua

L'inizio del nuovo millennio ci ha regalato una nuova importante scoperta. I neuroni comunicano non solo grazie allo scambio di neurotrasmettitori a livello delle sinapsi, ma anche grazie allo scambio di vere e proprie "bisacce" (vescicole extracellulari((Faurè J Mol Cell Neurosci. 2006, 31(4):642-8.).

Le cellule nervose quindi parlano anche una seconda lingua che permette loro

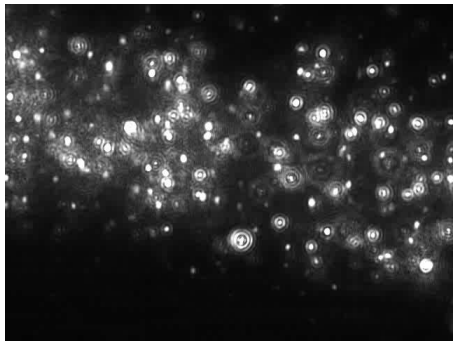
1) di dialogare con interlocutori lontani
2) di spedire messaggi in un microambiente protetto
3) di spedire messaggi di vario genere: DNA, RNA, proteine.

Tali messaggi possono essere più o meno graditi per l'interlocutore *(Ghidoni et al MBA 2011; Benussi et al. NBA 2016)*



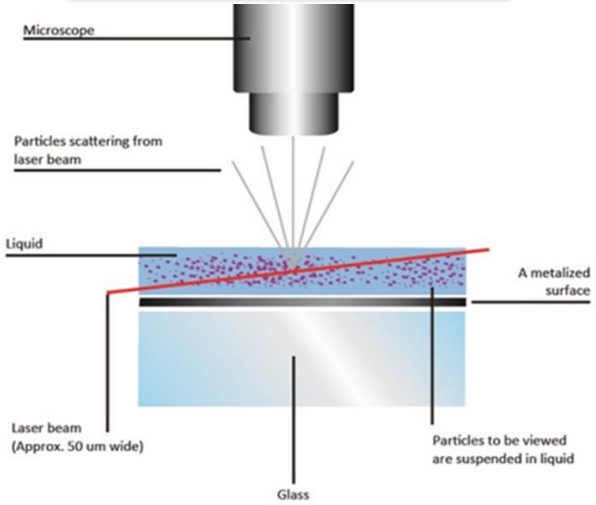
Nanoparticle Tracking Analysis

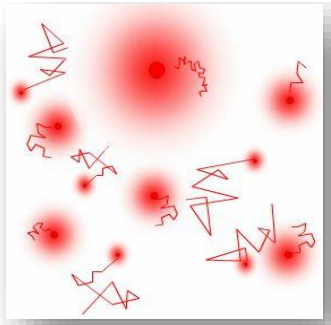
Nanoparticles



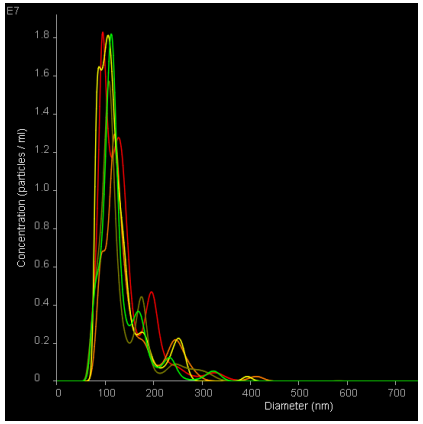
Particles in the liquid sample which pass through the beam path are seen as small points of light

Tracking



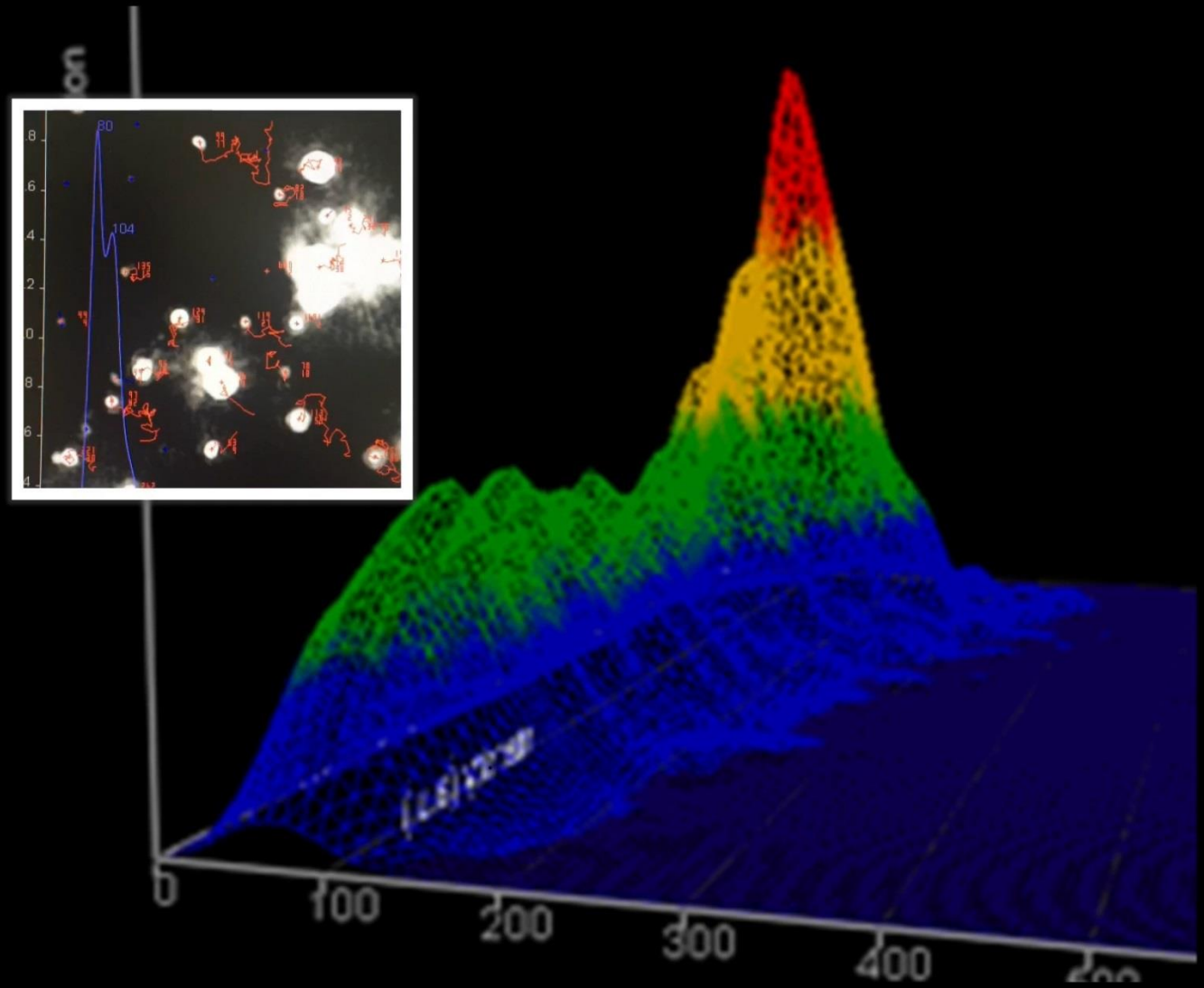


Analysis

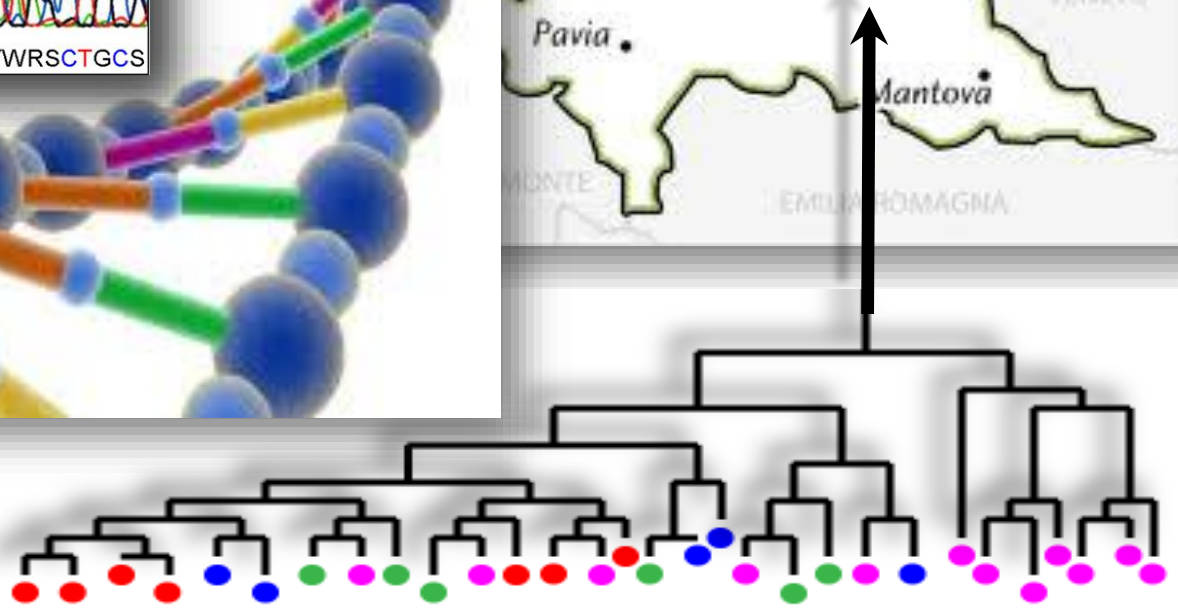


Estimation of particle concentration and particle size distribution

La tecnica NTA utilizza le proprietà della luce diffusa (light scattering) e del movimento browniano per ottenere la distribuzione dimensionale e la concentrazione dei campioni in sospensione liquida.


80
104
0
100
200
300
400

Demenza Frontotemporale



IL LINGUAGGIO MOLECOLARE

Il silenzio diventa messaggio

I maestri di retorica dell'antichità hanno sempre sostenuto che un bravo oratore non solo deve saper parlare in modo eloquente, ma anche tacere efficacemente.

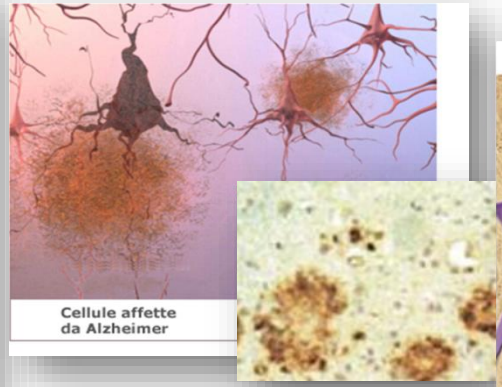
In taluni casi, l'assenza parziale di una singola proteina è in grado di accendere la neurodegenerazione (Ghidoni R et al. Neurology. 2008,71(16):1235-9).

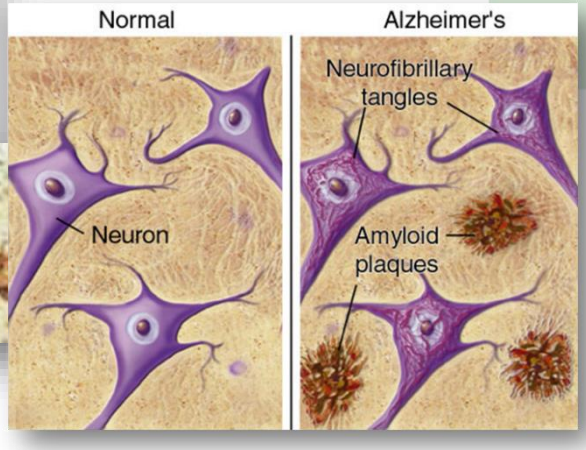
Il silenzio diviene messaggio.

La scelta di "non trasmettere" è un atto linguistico anche nel microcosmo neuronale.

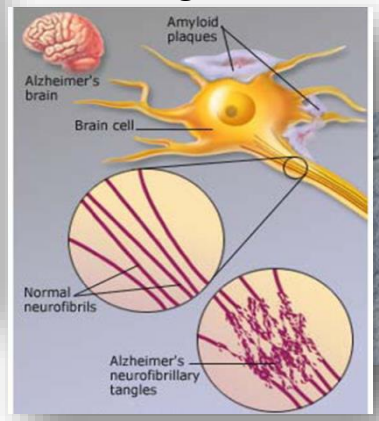
Demenza di Alzheimer

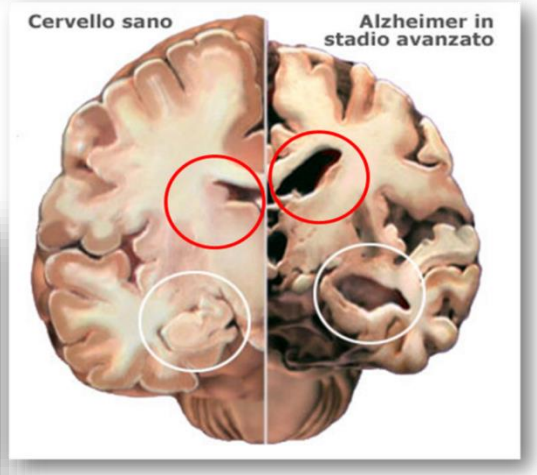
Placche



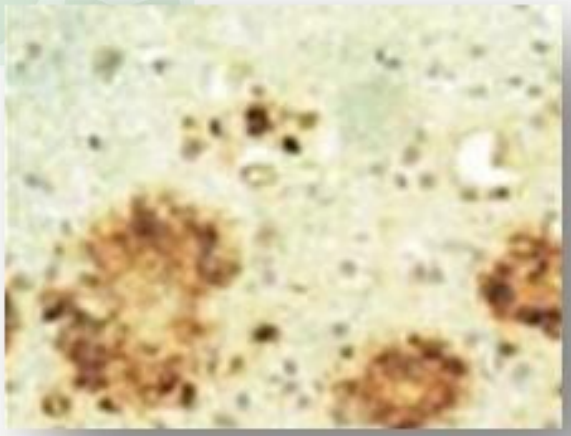


Grovigli neurofibrillari

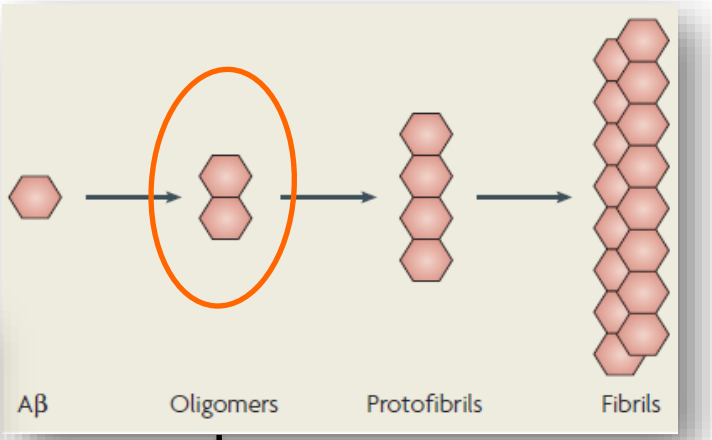




TECNOLOGIE AVANZATE E RICERCA TRASLAZIONALE



Le forme aggregate di abeta



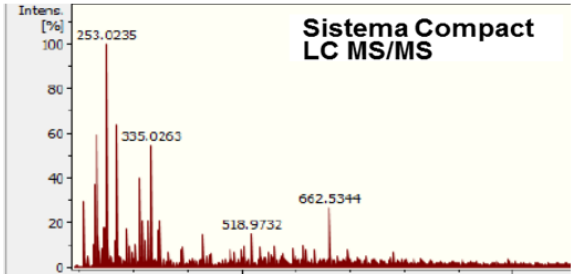
Disfunzioni sinaptiche

Numerose Isoforme di abeta

Table 1. Summary of Aβ peptides in human CSF

Aβ	MW expected (Da)	MW observed (Da)
1–17 [11, 13–15]	2068.5	2069.5
1–18 [11, 13, 15]	2166.4	2169.3
1–19 [13–15]	2314.1	2317.1
11–40 [17, 20]	3151.5	3153.1
10–40 [17]	3314.7	3315.5
11–42 [8, 9, 17, 20, 21]	3335.9	3337.1
1–33 [11–17]	3674.0	3675.5
1–34 [11–17]	3787.1	3788.5
1–35 [16]	3915.6	3918.0
1–36 [22]	4017.4	4019.2
1–37 [11–17]	4074.5	4075.9
1–38 [11–17]	4131.6	4132.9
1–39 [11–17]	4230.7	4232.4
1–40 [10–17, 20, 21]	4329.3	4331.2
1–42 [8, 9, 11–14,16, 17, 20, 21]	4514.1	4515.7

MASS SPECTROMETRY

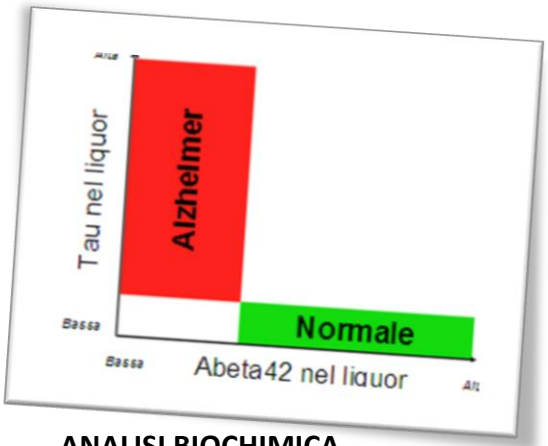


CSF

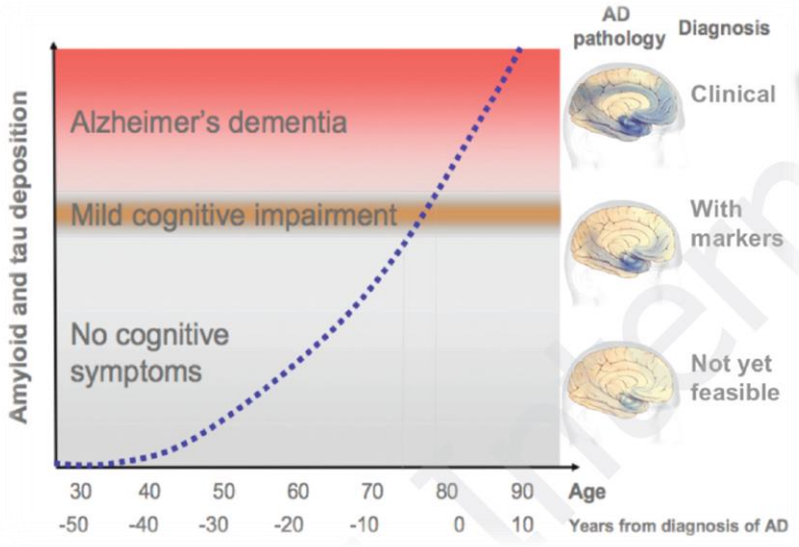
abeta

BRAIN

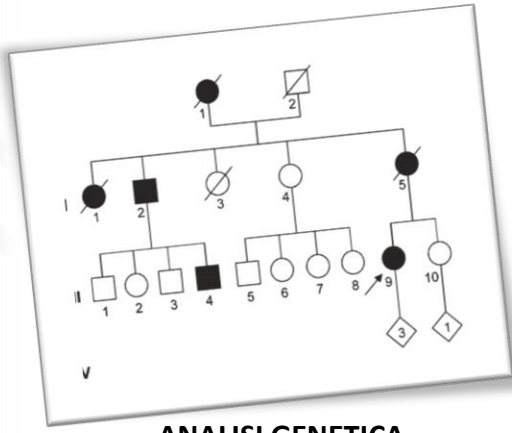
DIAGNOSI PRECOCE



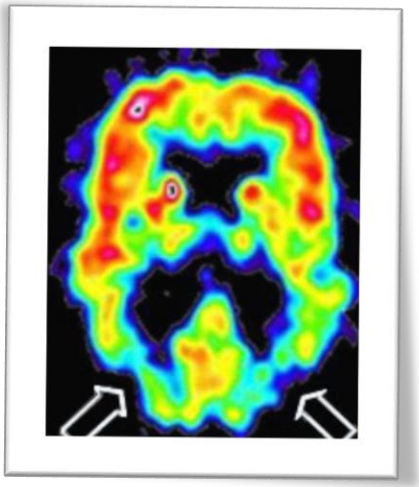
ANALISI BIOCHIMICA
LIQUIDO CEREBROSPINALE



Functional Neurology 2013; 28(3): 175-190



ANALISI GENETICA
IN CASI DI DEMENZA EREDITARIA



TOMOGRAFIA AD EMISSIONE DI POSITRONI

RISONANZA MAGNETICA
AD ALTA DEFINIZIONE

Assenza di memoria

secondo Virgilio

Omnia fert aetas, animum quoque:
saepe ego longos cantando puerum
memini me condere soles: nunc oblita
mihi tot carmina; vox quoque Moerim
iam fugit ipsa.

Tutto porta via il tempo, anche
la memoria: ricordo che spesso
da ragazzo trascorrevo cantando
lunghe giornate; ora ho scorda-
to tante canzoni, anche la stessa
voce fugge ormai Meri.

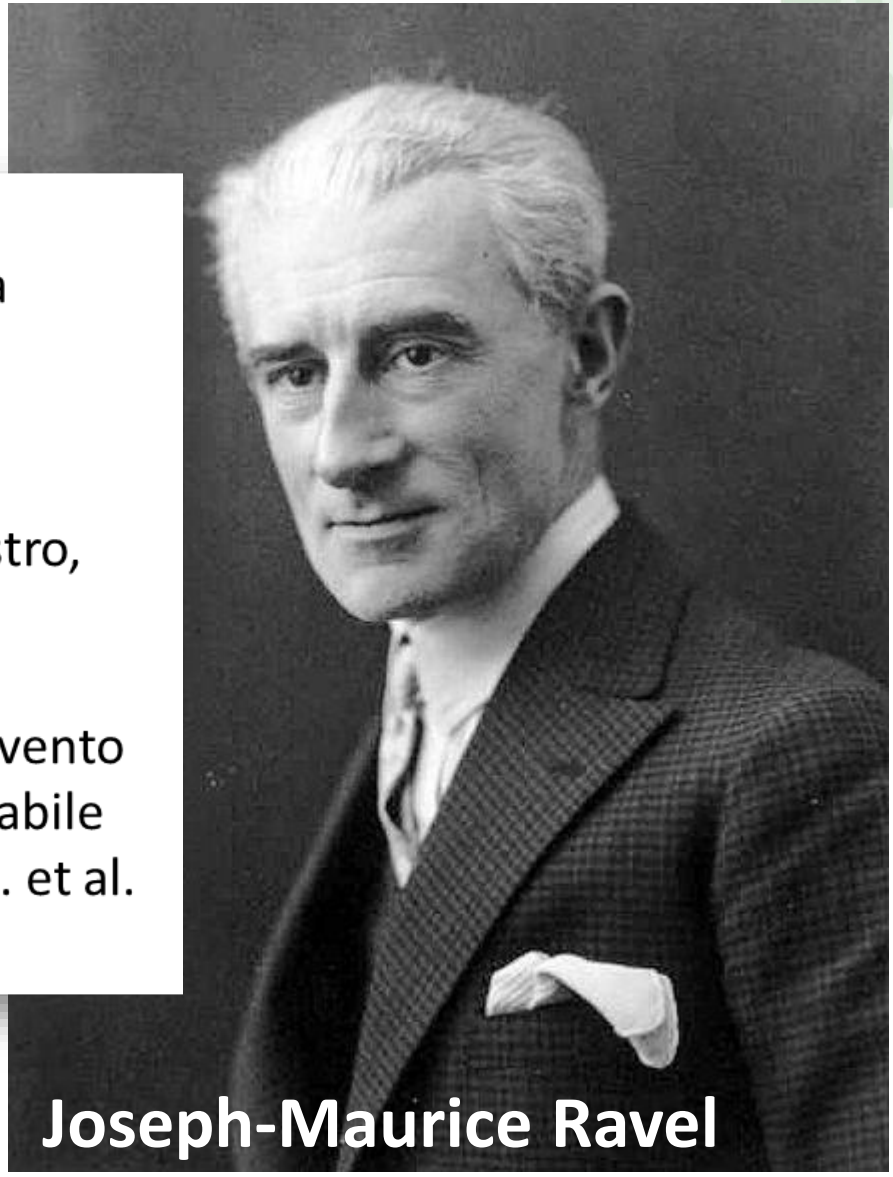
Virgilio, Egloga iX, vv 51-54

Cervello e creatività.

Tra i personaggi celebri affetti da malattia neurodegenerativa bisogna annoverare il compositore francese Maurice Ravel.

Nel corso della malattia, che colpì eminentemente l'emisfero cerebrale sinistro, Ravel perse l'uso della parola.

L'analisi delle sue ultime opere musicali (tra cui il Bolero) sembra suggerire l'intervento di una forma di creatività musicale imputabile all'emisfero cerebrale destro (Amaducci L. et al. Eur J Neurol. 2002 Jan;9(1):75-82).



Joseph-Maurice Ravel

La Scienza e la Società

European Commission

History of Horizon 2020

Article | Newsroom

In 2011 the EU Heads of State and Government called on the European Commission to bring together all of the previous EU's research and innovation funding under a single common strategic framework. The Commission launched a wide-ranging consultation involving all key stakeholders which has led to Horizon 2020.

The European Commission has compiled all the feedback from stakeholders, and has taken into account recommendations from the European Parliament, as well as lessons learned from previous programmes. The message was clear – make Horizon 2020 simpler for users – and it is!

Curiosità

Il nome "Horizon 2020" è il vincitore della competizione on-line lanciata dalla Commissione europea "You Name it" per dare un nome al futuro programma per la ricerca e l'innovazione.

Le vincitrici sono 2 donne: Marcela Endlova, un'insegnante della Repubblica Ceca e Beata Zyngier, insegnante anche lei ma polacca. Il premio? Un viaggio a Bruxelles per partecipare alla "European Innovation Convention" che si è svolta a dicembre 2011.

European Commission

Horizon 2020

Bridging Society and Science

European Commission

Horizon 2020 è lo strumento di finanziamento alla ricerca scientifica e all'innovazione della Commissione europea che ha un budget stanziato tra i più alti del mondo: quasi 80 miliardi di euro, per 7 anni (2014 al 2020)

European Commission

KEY FEATURES OF HORIZON 2020

- An EU Research and Innovation Framework Programme that is unique in the world in terms of
  - > budget (about EUR 80 billion, the largest Framework Programme budget ever),
  - > duration (seven years),
  - > budgetary framework stability,
  - > and scope (research plus innovation; grants as well as loans, equity, and procurement; broad top-down thematic coverage as well as bottom-up blue-sky research; cross-border, transnational, in-ter-disciplinary collaboration, mobility, coordination);
- Pursuing an ambitious general objective of 'building a society and economy based on knowledge and innovation';

società ed economia basate sulla conoscenza

European Commission

Goals of Horizon2020

Five objectives:

employment, research and innovation, climate change and energy, education, fighting poverty

European Commission

Change is about Growth

Smart Growth

developing an economy based on knowledge and innovation

INNOVATION
Flagship initiative
«Innovation Union»

EDUCATION
Flagship initiative
«Youth on the move»

DICIGTAL SOCIETY
Flagship initiative
«A digital agenda for Europe»

Sustainable Growth

promoting a more resource efficient, greener and more competitive economy

CLIMATE, ENERGY, MOBILITY
Flagship initiative
«Resource efficient Europe»

COMPETITIVENESS
Flagship initiative
«An industrial policy for the globalisation era»

Inclusive Growth

fostering a high-employment economy delivering social and territorial cohesion

EMPLOYMENT AND SKILLS
Flagship initiative
«An agenda for new skills and jobs»

FIGHTING POVERTY
Flagship initiative
«European platform against poverty»

Excellence Science

- **European Research Council**
  Frontier research by the best individual teams (ERA)
- **Future and Emerging Technologies**
  Collaborative research to open new fields of innovation
- **Marie Sklodowska Curie Actions**
  Opportunities for training and carrer development
- **Research Infrastructures (Including e-infrastructure)**
  Ensuring access to world-class facilities

Industrial Leadership

Leadership in enabling and industrial technologies

- **ICT**
- **Nanotechnologies materials, biotechnologies, manifacturing**
- **Space**

- **Access to risk finance**
  Leveraging private finance and venture capital for research and innovation
- **Innovation in SMEs**
  Fostering all forms of innovationin all types of SMEs

Societal Challange

- **Health, demographic change and wellbeing**
- **Food security, sustainable agriculture, marine and maritime research, and the bio-economy**
- **Secure, clean and efficient energy**
- **Smart, green and integrated transport**
- **Climate action, resource efficiency and raw materials**
- **Europe in a changing world – inclusive, innovative, reflective societies**
- **Secure Societies**

Nuovo

European Innovation Council (EIC)

European Institute of Innovation and Technologies (EIT)

Spreading Excellence and Widening Participation

Science with and for society

Joint Research Center (JRC)

Euratom

European Commission

HORIZON 2020 AT WORK - SHOWCASES

Horizon 2020's quick reaction to the outbreaks of Ebola and Zika

The outbreak of Ebola in West Africa was one of the international health emergencies of the past few years. EUR 24.4 million from Horizon 2020 were urgently mobilised. In parallel, the IMI-Ebola+ public-private partnership call was launched in record time. This Horizon 2020 research response, very significant in scale, with a total of EUR 140 million, in turn, leveraged a further EUR 101 million from the pharmaceutical industry.

These efforts are already delivering, with trials on the ground in West Africa underway and with the first indication of results. Europe has also taken the lead in establishing the Global Research Collaboration for Infectious Disease Preparedness (GLOPID-r) that links together research funders, the scientific community, industry, patient groups and public health actors. Its goal is to mount an effective research response within 48 hours of an outbreak. It was tested with the Zika outbreak in Latin America in 2015, when the Horizon 2020 Work Programme was updated to include in emergency a call on Zika research.

European Commission

HORIZON 2020 AT WORK - SHOWCASES

Going further with nanopharmaceuticals

Nanotechnology applied to medicine (nanomedicine) promises more effective and better targeted drugs, with reduced side effects for patients, but these nanopharmaceuticals are still at a very early stage of development. The aim of the NanoPilot project is to establish a flexible and adaptable pilot plant for nanopharmaceuticals. It will provide specific tools and services to SMEs and researchers to validate their technologies and to be able to produce nanopharmaceuticals of sufficient quantity and quality to enter clinical testing.

Three different applications show the flexibility of the planned facility: the treatment of dry eye syndrome, a HIV nanovaccine and a drug for the treatment of painful bladder syndrome. The pilot line will be validated in the project and will continue its certified services after the project, for further drugs and diseases. The consortium includes the operator of the pilot line, an SME, two university institutes which develop the nanopharmaceuticals, and a specialist institute on nanosafety.

European Commission

HORIZON 2020 AT WORK - SHOWCASES

Greening European aeronautics

For almost ten years Clean Sky is the largest European research programme developing innovative, cutting-edge technology aimed at reducing CO_2, gas emissions and noise levels produced by aircraft. Equally funded by the EU research and innovation framework programmes (FP7 and then Horizon 2020) and industry, Clean Sky contributes to strengthening European aero-industry collaboration, global leadership and competitiveness. In 2017 the first Clean Sky programme is being finalised: some 20 large Demonstrators have been completed by 600 participants in 24 EU countries, bringing together thousands of experts from leading companies, universities, SMEs and research centres. Thousands of components used in current aircraft and helicopters have been reviewed to identify the areas that can be significantly improved in order to reduce CO_2 emissions and noise by 2020. Clean Sky 2 is larger in scope than the first Clean Sky Programme with a total budget of nearly EUR 4 billion.

European Commission

HORIZON 2020 AT WORK - SHOWCASES

Reducing cyclist and pedestrian casualties

Even though road safety has improved in recent years, accidents remain a serious problem on European roads, where, on average, 75 people lose their lives every day and 750 are seriously injured. Vulnerable road users such as pedestrians, cyclists, motorbike and moped riders represent a particularly serious safety concern, since they account for a disproportionately high percentage of the total number of road fatalities and serious injuries. The PROSPECT project aims to develop, test and demonstrate innovative in-vehicle active safety systems that better protect vulnerable road users in Europe, such as pedestrians and cyclists.

NEWS | 13 March 2018 | Brussels, Belgium | Research and Innovation

First set of top-class innovators selected for funding under the European Innovation Council pilot to scale-up their businesses

A total of 57 small and medium-sized companies have been selected

Examples of the projects selected include a 3D printer for food; an innovative treatment for breast cancer; a virtual reality and augmented reality headset capable of human eye resolution; a multi-active cardboard packaging that extends the shelf life of vegetables by 40% and a new type of biodegradable bioplastic.

" With the European Innovation Council pilot, we set out to support high-flying entrepreneurs with breakthrough ideas and a clear ability to create new markets. This very first group of innovators certainly has that potential. "

European Innovation Council (EIC) pilot

The EIC pilot supports top-class innovators, entrepreneurs, small companies and scientists with bright ideas and the ambition to scale up internationally. It brings together the parts of Horizon 2020 that provide funding, advice and networking opportunities for those at cutting edge of innovation.

Success stories

Powerful graphene batteries

An Estonian start-up has patented and commercialised ultracapacitors

Affordable solar power

Developing solar collectors cheaper than the current silicium-based panels

Feeling without touching

A unique technology enables users to receive tactile feedback touching anything

Stand up and walk

A Spanish small company and a consortium of partners are developing an exoskeleton: support for the legs (hips, knees and ankles) that will enable wheelchair-bound people to stand and walk again. The user will be able to command movements by thinking – the exoskeleton will pick up the brainwaves. GOGOA Mobility Robots will be the first EU company to enter this market.

ALL SUCCESS STORIES ›

NEWS | 8 March 2018 | Brussels, Belgium | Research and Innovation

Twelve outstanding finalists are in the running for the 2018 EU Prize for Women Innovators

Twelve successful women entrepreneurs who have brought their breakthrough ideas to th
Prize for Women Innova
research and innovation

- **Gabriella COLUCCI (IT)**, who founded the company Arterra in Naples, which discovers and produces active compounds for industrial applications, in particular cosmetics and agriculture.

Carlos Moedas, Commissioner for Research, Science and Innovation, announced t
meeting of th
and Gender

- **Anna FISCALE (IT)**, who co-founded the QUID Project in Avesa, which produces clothing and accessories from waste and leftovers, and which employs disadvantaged people.

> *" On this day, the world shouts about the importance of gender equality. For me, the battle must be won on many fronts. And two of our strongest tools to empower women are science and innovation. This is the true spirit of the EU Prize for Women Innovators. "*

AgriResearch Conference - Innovating for the future of farming and rural communities

AgriResearch Conference - Innovating for the future of farming and rural communities

From 02/05/2018 - 02:00 to 03/05/2018 - 02:00

The EU AgriResearch Conference is dedicated to scientists, farmers, rural communities, industry, advisors, policy-makers, citizens and NGO representatives who wish to learn about EU agriculture and rural R&I activities and achievements and to have their say on how to shape the future of agriculture R&I after 2020. The conference will also be a great occasion to network with around 500 peers.

Register

What is the conference about?

The conference is about **EU agriculture and rural research and innovation activities now and in the future.**

European Commission

Interim Evaluation of HORIZON 2020

Commission staff working document

Research and Innovation

European Commission

Key findings from the HORIZON 2020 interim evaluation

Research and Innovation

European Commission

TOWARDS SCIENTIFIC IMPACT

EARLY SIGNS OF PROGRESS

INVOLVING AND TRAINING THE BEST

- Attracting and involving the **EU's and world's best** research institutions and researchers
- **~340,000** researchers supported overall
- Marie Skłodowska-Curie Actions supported the international mobility of **27,000** researchers

PRODUCING KNOWLEDGE AND GENERATING SCIENTIFIC BREAKTHROUGHS

- **4,043** peer-reviewed publications, 2/3 in Open Access, **cited more than twice the world average**
- So far **17** Nobel Prize winners supported before or after their award
- **71%** of European Research Council projects so far made scientific breakthroughs
- Contribution to **key discoveries** like exoplanets, the Higgs boson and gravitational waves

CREATING SCIENTIFIC COLLABORATION NETWORKS

European Commission

TOWARDS SOCIETAL IMPACTS

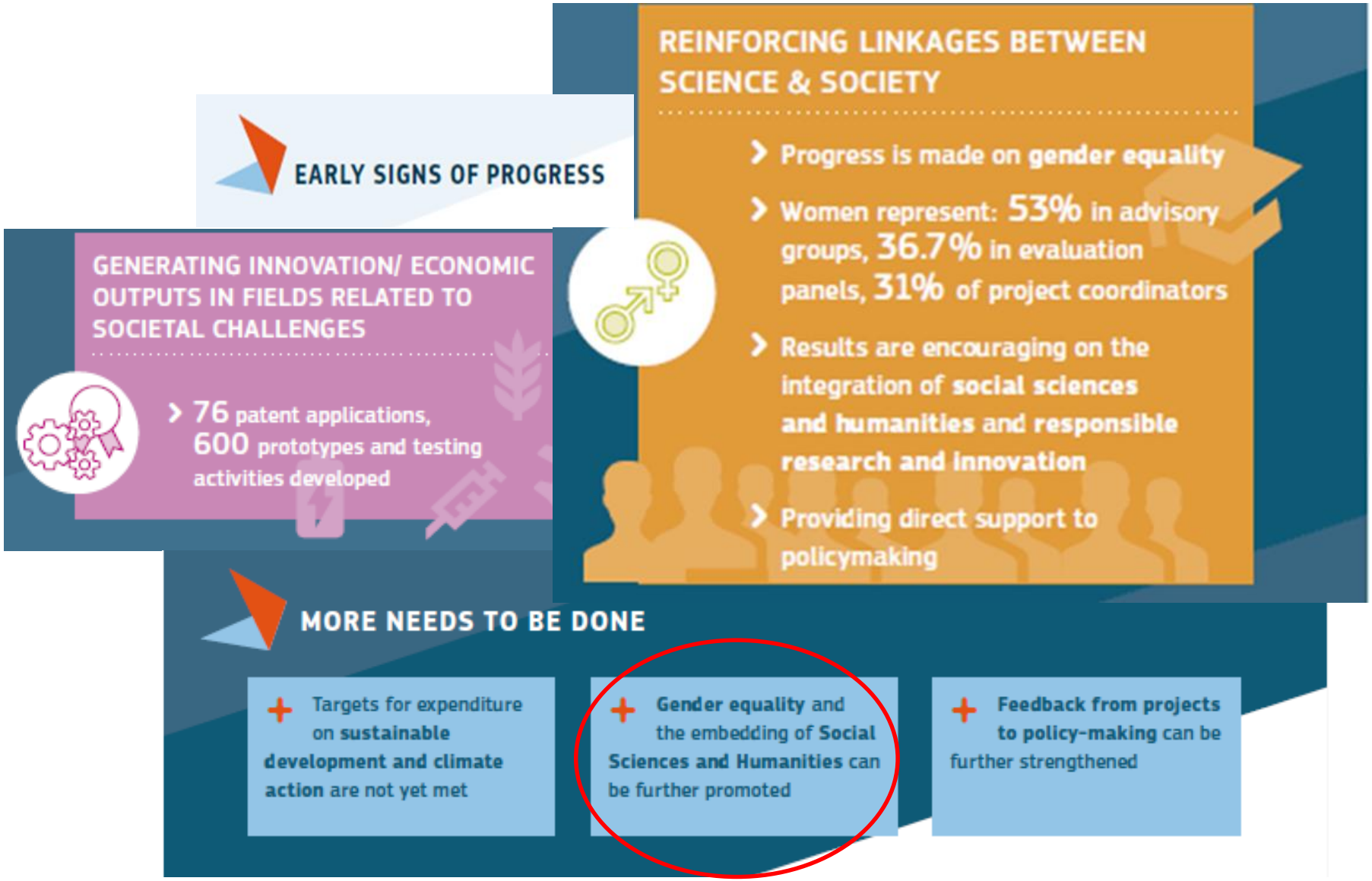
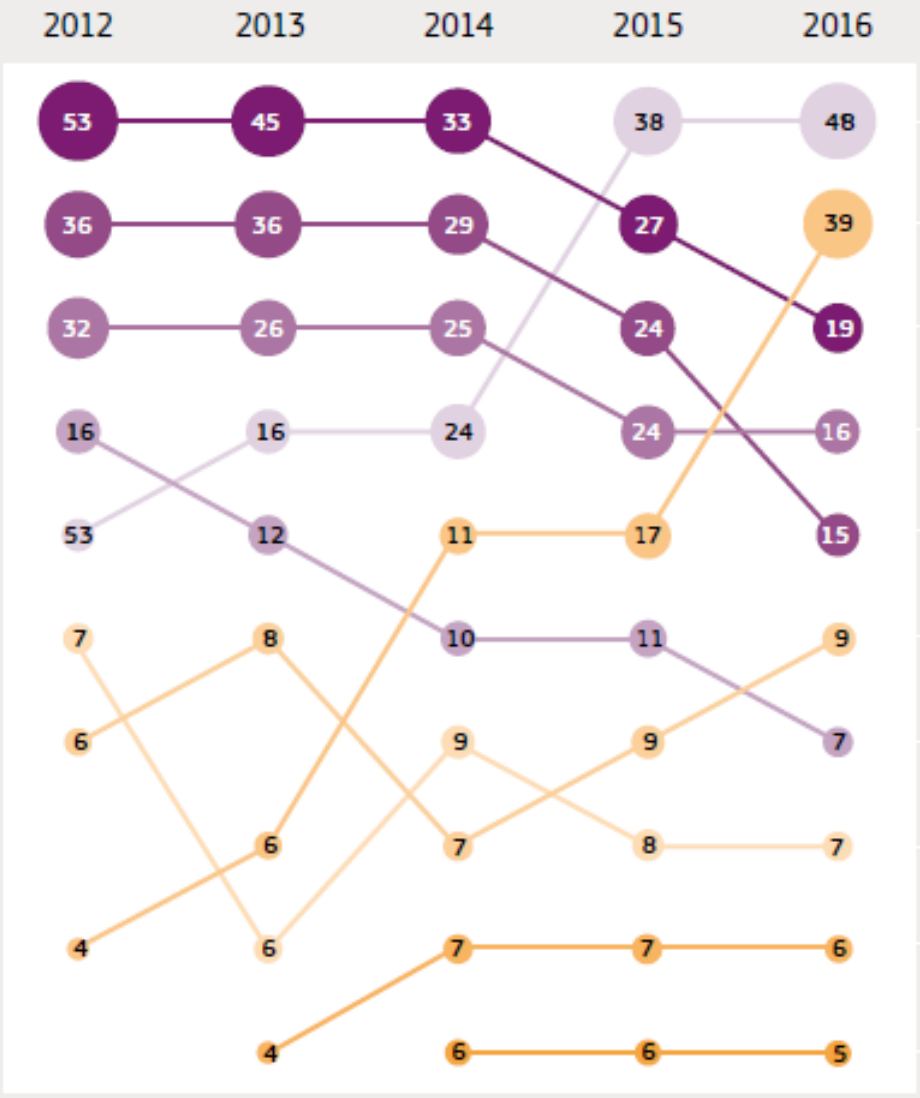
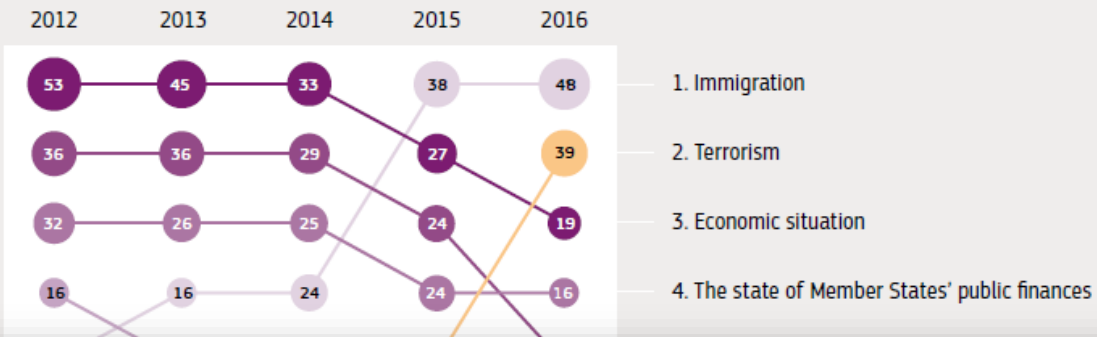


FIGURE 18: What issues are Europeans most concerned about?



1. Immigration
2. Terrorism
3. Economic situation
4. The state of Member States' public finances
5. Unemployment
6. Crime
7. Rising prices/inflation/cost of living
8. EU's influence in the world
9. Climate change
10. The environment

FIGURE 18: What issues are Europeans most concerned about?



Whereas in 2016 high (youth) unemployment remains the biggest socio-economic concern and challenge in many Member States associated with slow economic growth, **the EU has to respond to new emerging challenges, such as armed conflicts, rising migration flows or global health emergencies and terrorism** (see Figure 18)[66]. More specifically,

Horizon 2020 has built-in flexibility[67] to tackle new and unexpected challenges and thus allows for a more flexible approach to respond to the new emerging challenges compared to FP7[68]. The

FIGURE 20: Word cloud of frequency of keywords from Horizon 2020 projects

Source: Horizon 2020 Corda, date: 01/01/2017. The size of the word depends on its frequency in project keywords

Mission-oriented policy for the next research and innovation framework programme

Background, expert reports and studies outlining a mission-oriented policy approach for framework programme to succeed Horizon 2020

PAGE CONTENTS

What is a mission-oriented approach?

This is an approach to policy-making which means setting defined goals, with specific targets and working to achieve them in a set time

Why do we need a mission-oriented approach?

The interim evaluation of Horizon 2020 and the high level group chaired by Pascal Lamy found that the next framework programme for research and innovation would need to

- make it easier for citizens to understand the value of investments in research and innovation
- maximise the impact of investments by setting clearer targets and expected impact when addressing global challenges

One way this could be done is by following a mission-oriented approach.

European Commission

European Commission > News >

NEWS | 22 February 2018 | Brussels, Belgium | Research and Innovation

Bold science to meet big challenges: independent report calls for mission-oriented EU research and innovation

A plastic-free ocean, 100 carbon neutral cities by 2030 or decreasing the burden of dementia, these are examples of bold but concrete goals. Setting EU-level research and innovation missions with such ambitious goals can inspire European citizens, push the frontier for research and innovation, drive economic growth, and help solve some of our society's biggest challenges.