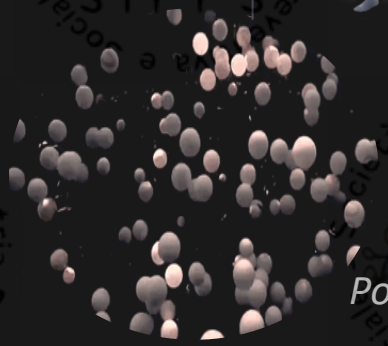
Salve Omnes

VERSO non *DOVE*

MICROCHIMERISMO

MISTERO

Bambino



Popolazione cellulare

Non ci sono misteri…
C’è soltanto l’insufficienza di dati o della mente.
Paul Valéry

L’uomo è l’oggetto più misterioso
e sconcertante scoperto dalla scienza.
Angel Ganivet


MiSteRO
LIFE & DEATH


MISTERO

MISTERO

Si può “uccidere” la morte ?

Il Problema?

Trasferire 7 miliardesimi di DNA

La soluzione:

Attraverso la "riproduzione"

In che modo ?

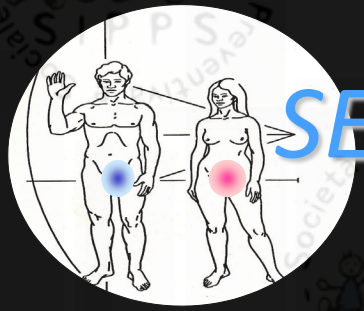
Ammalandosi…

(la "riproduzione" è una malattia sessualmente trasmissibile)

Edward Bellamy

a viaggiare verso l'eternità…

"Che carini! A che servono?".



SESSUALITA'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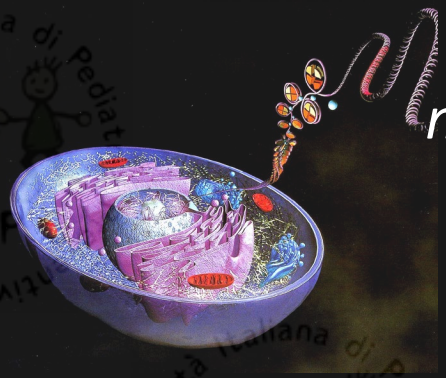
220 cm

7 picogrammi

7 miliardesimi di un milligrammo.

I nostri genitori



nel nostro DNA

sono nelle nostre cellule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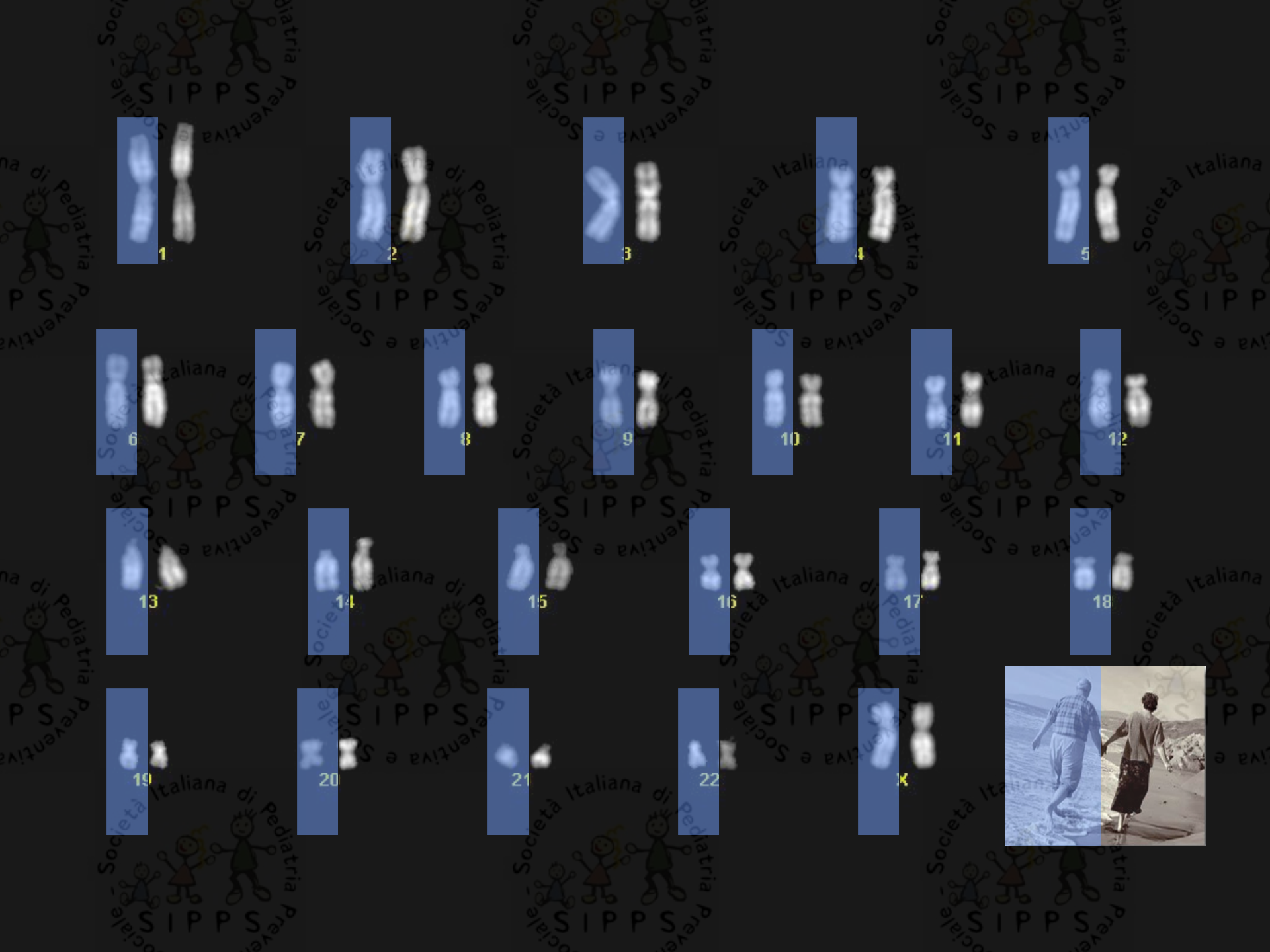
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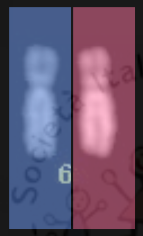
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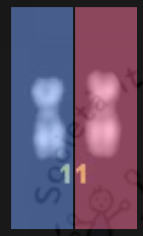
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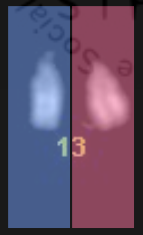
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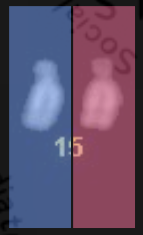
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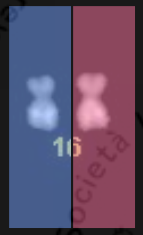
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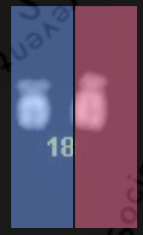
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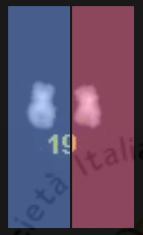
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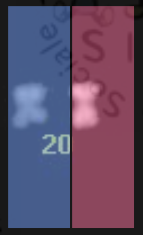
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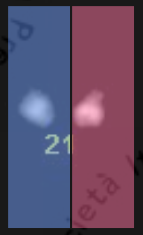
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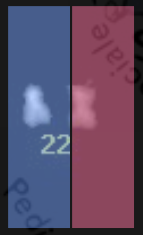
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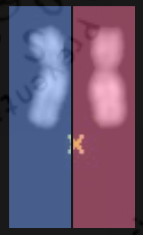
X

Etc…

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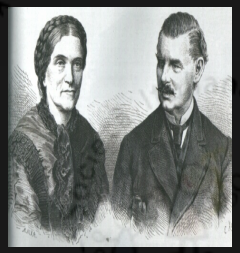

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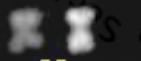

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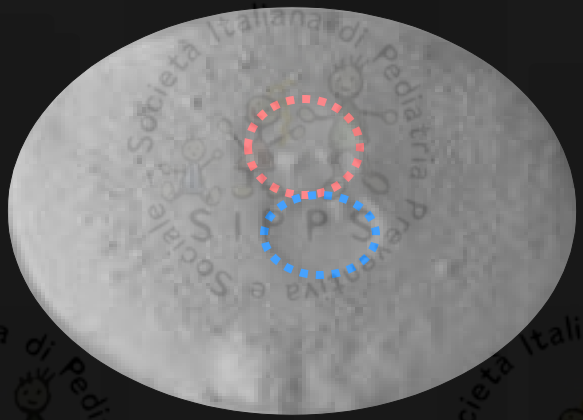
X

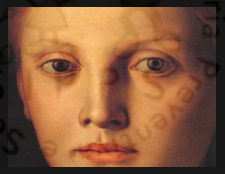
Non c’è niente di più “vecchio”
di una “nuova” vita

Morti riemergono dal passato …

I nostri antenati erano presenti



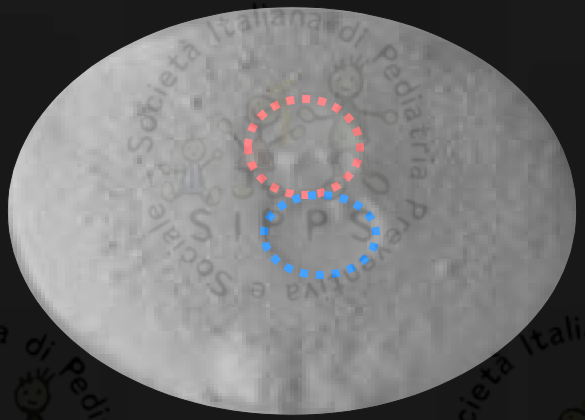
Zigote

I nostri antenati erano presenti

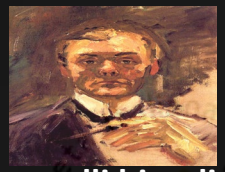
ed ognuno offriva qualcosa di sé…



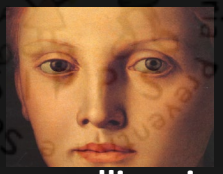


Zigote



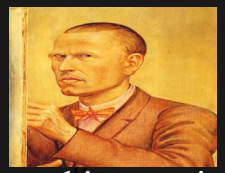



capelli biondi

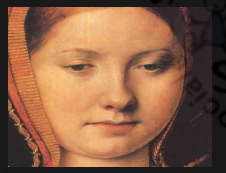


capelli neri

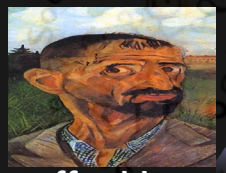
statura



occhi azzurri

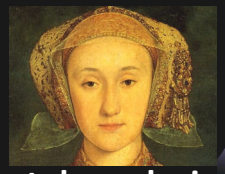


sangue



raffreddore

robustezza



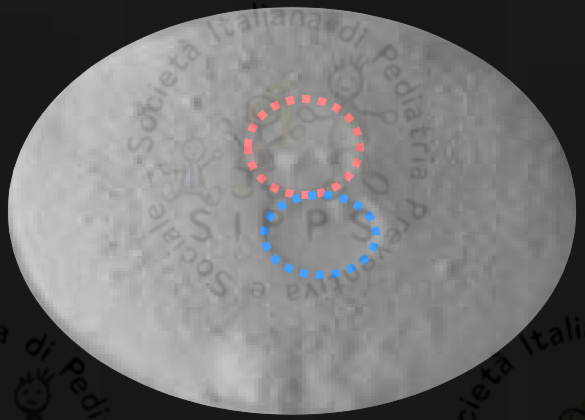
tubercolosi

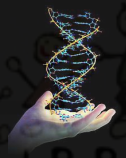
deformità

resistenza

daltonismo

vista acuta





Si definì così non soltanto il nostro corpo

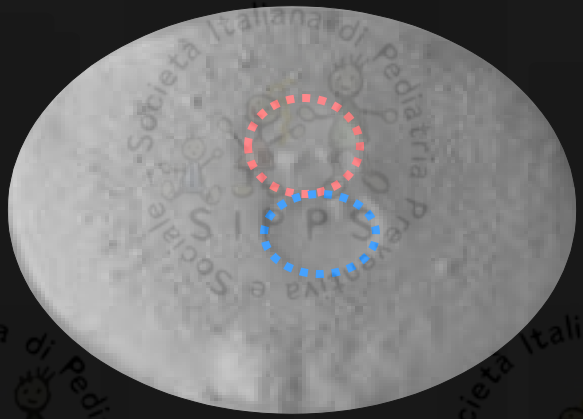
ma anche buona porta del nostro destino…

calma

mansuetudine

iracondia

prepotenza



intelligenza

Avvedutezza commerciale

sentimento

Visione poetica

musica

prodigalità

avarizia

matematica

mansuetudine

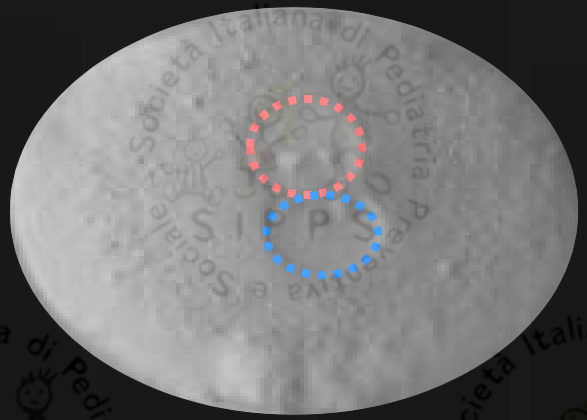
calma

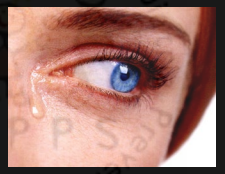
iracondia

prepotenza

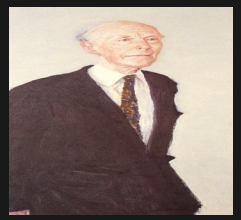
intelligenza

Avvedutezza commerciale



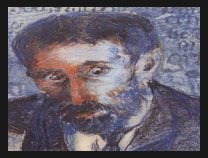


sentimento



Visione poetica

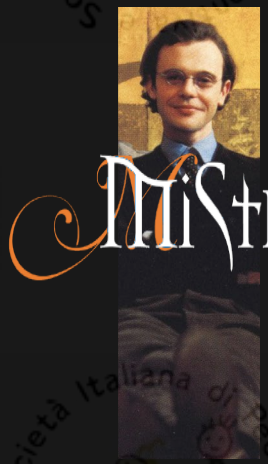
musica

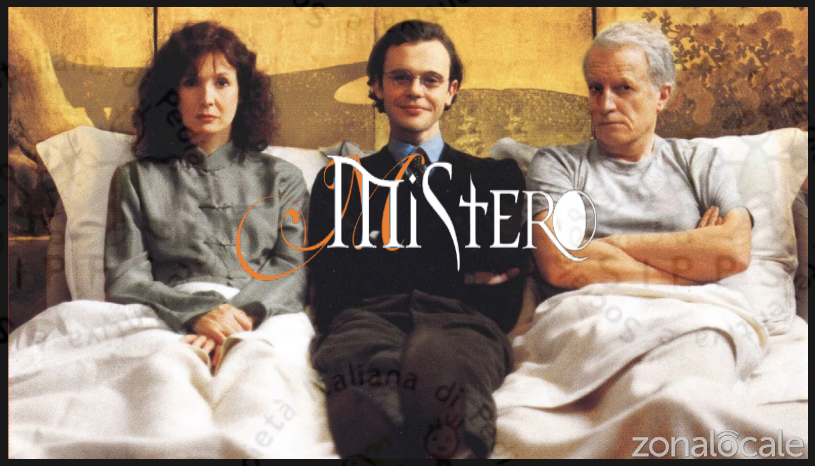


prodigalità

avarizia

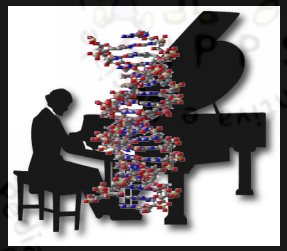
matematica

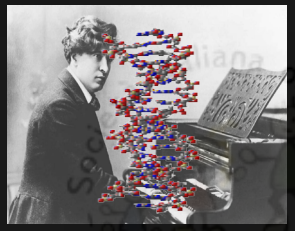

MiSTERO

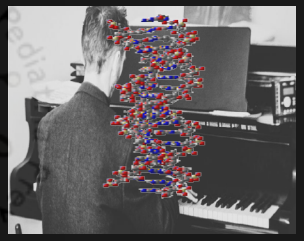


Ma da chi ha preso ?

Ma da chi ha preso ?







Ma da chi ha preso ?

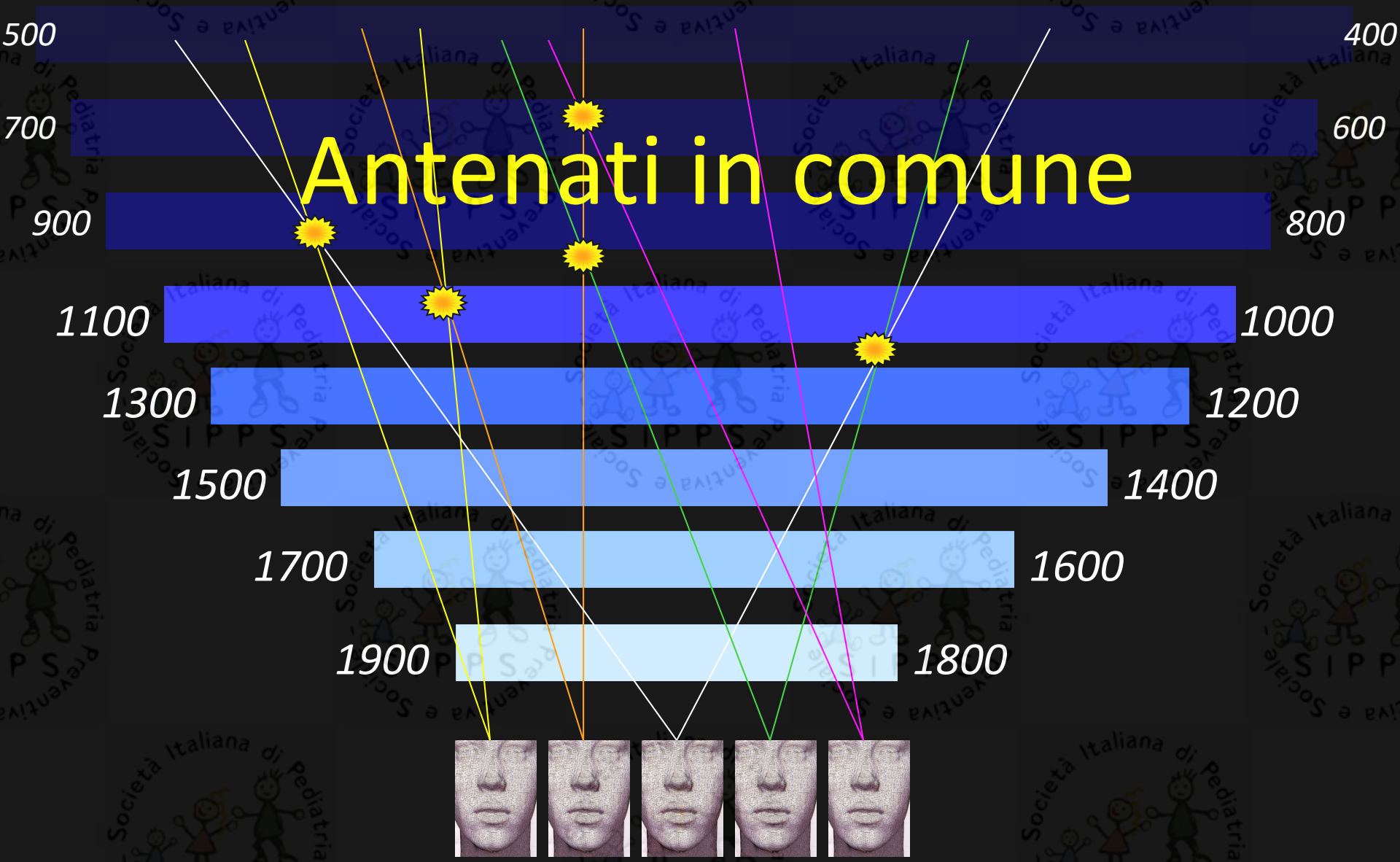
2000 anni fa…

576.460.752.303.423.488 MISTERO

OGGI

8 MILIARDI

Antenati in comune

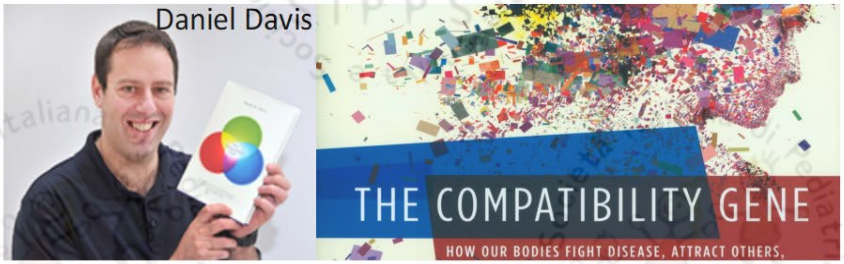


Inizia la ricerca

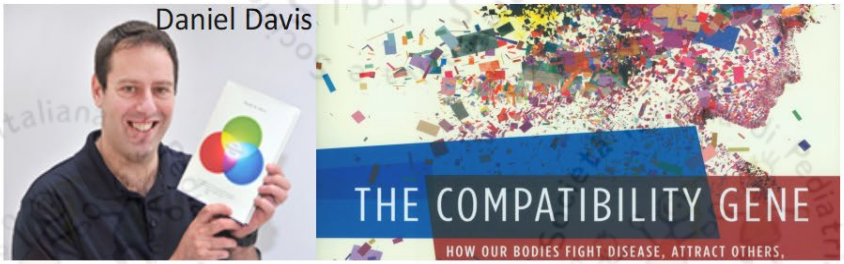
dei nostri "fratelli biologici"

del "donatore compatibile"


Daniel Davis
THE COMPATIBILITY GENE
HOW OUR BODIES FIGHT DISEASE, ATTRACT OTHERS,

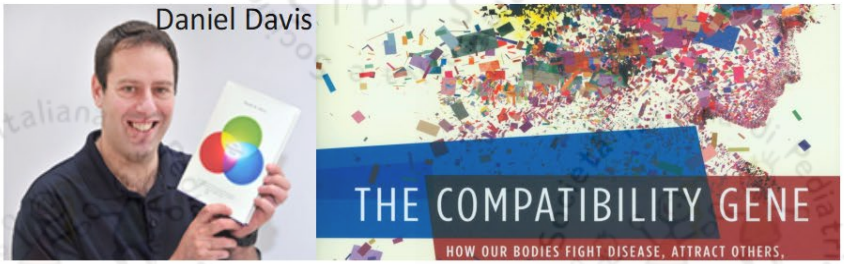


Antipatico a "pelle"



Antipatico a "pelle"

COMPATIBILITA' MASSIMA



Antipatico a "pelle"

COMPATIBILITA' MASSIMA

antipatico *ricevitore*

ANTIPATIA come ANTIDOTO ad un “incesto immunologico”

William Hazlitt

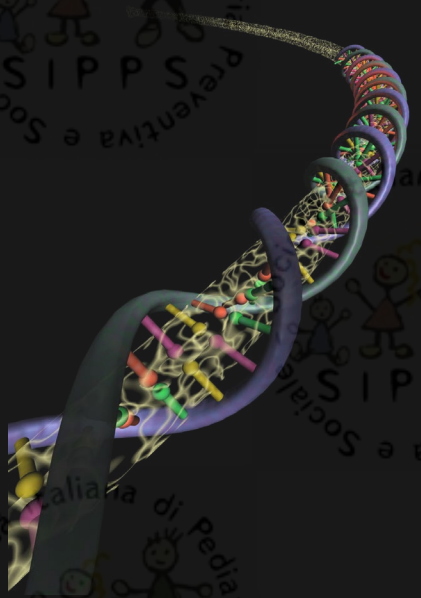
Le antipatie violente
sono sempre sospette,

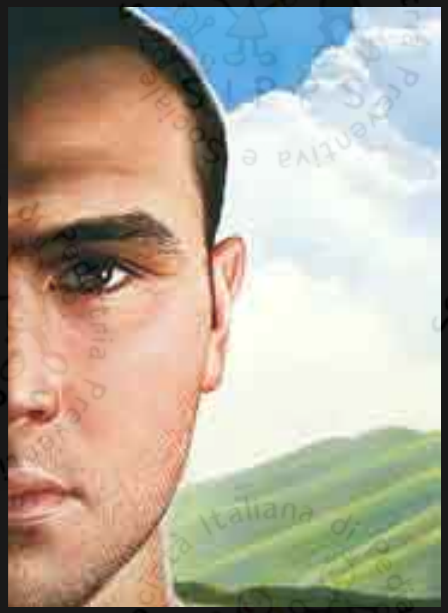
tradiscono una segreta affinità.

DNA

La storia dell'UMANITA'

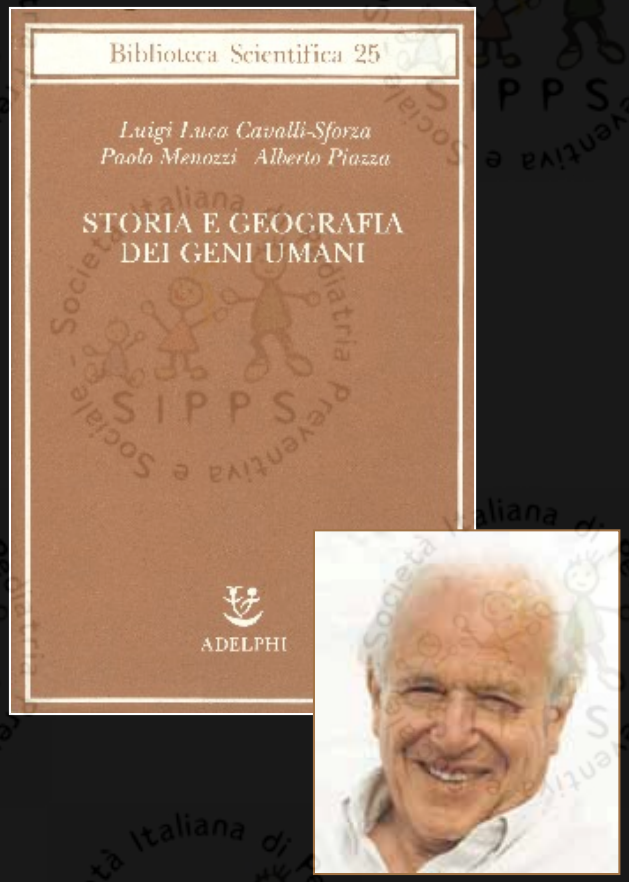
Il DNA non ci dice solo da dove veniamo





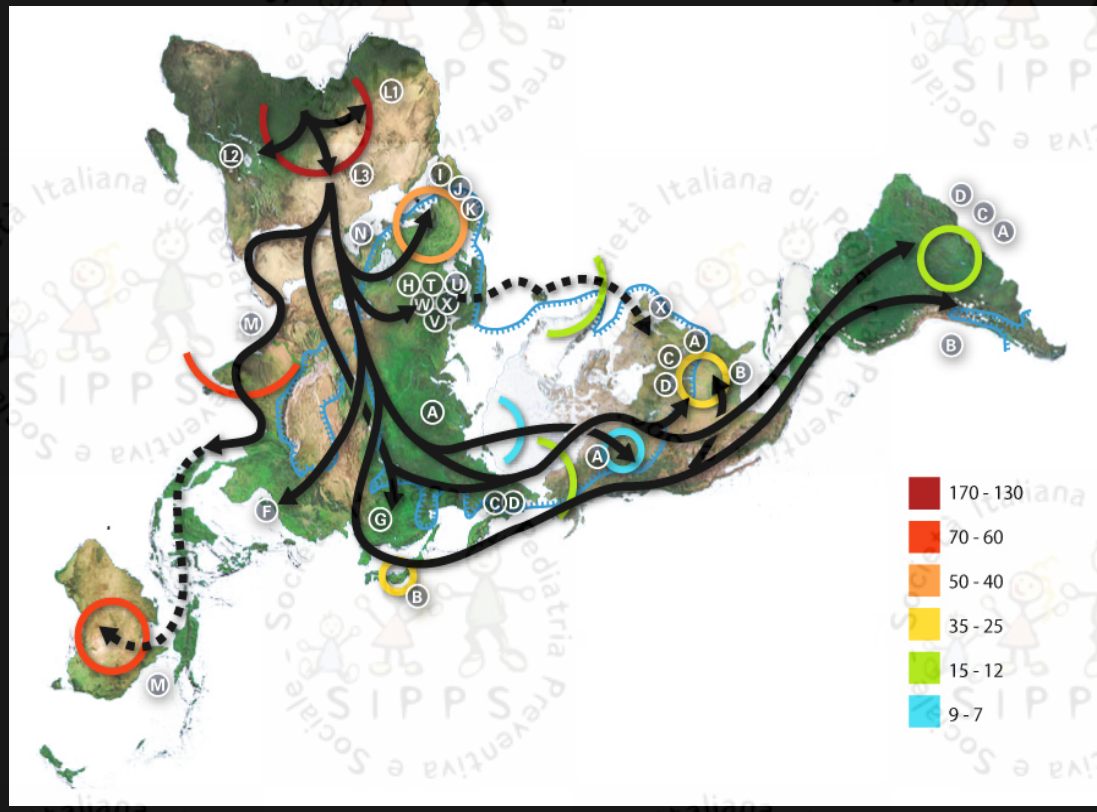
Il DNA non ci dice solo da dove veniamo

Ma anche chi erano, da dove venivano
e come vivevano i nostri antenati


Biblioteca Scientifica 25
Luigi Luca Cavalli-Sforza
Paolo Menozzi Alberto Piazza
STORIA E GEOGRAFIA
DEI GENI UMANI
ADELPHI

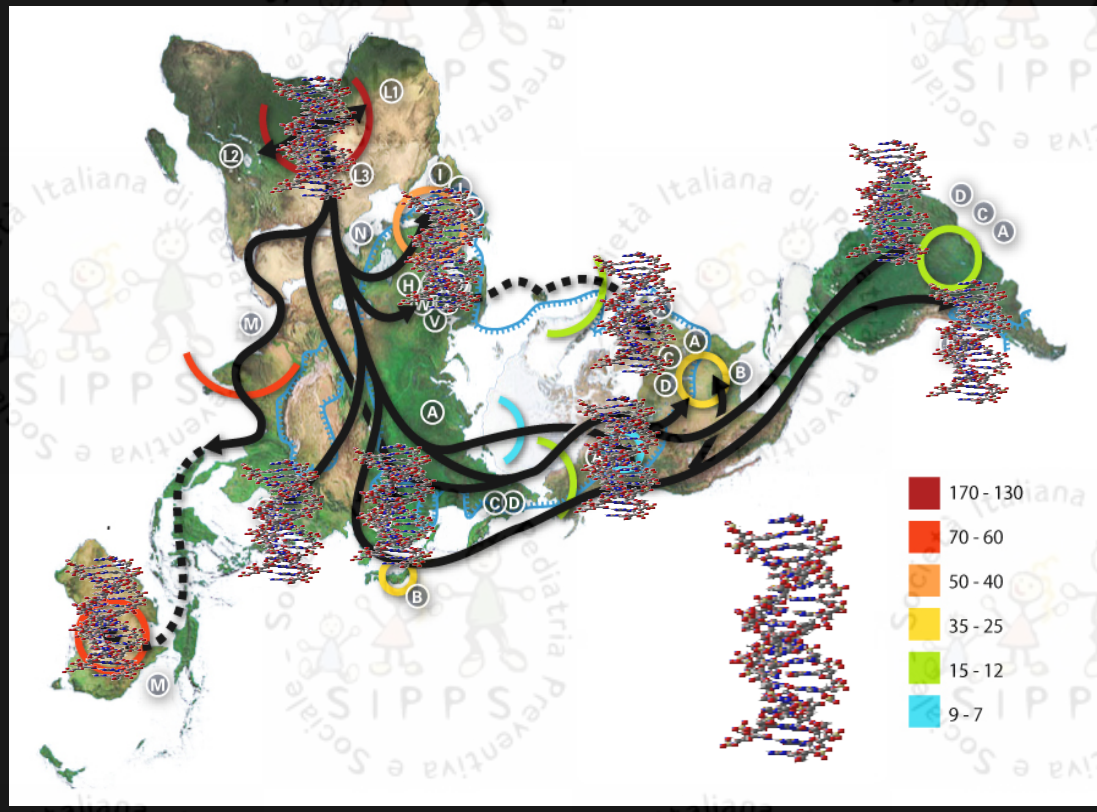
Le grandi migrazioni

Dal Caucaso a Mergellina



Le grandi migrazioni

Dal Caucaso a Mergellina



La più alta concentrazione genetica di Longobardi ?

In alcuni paesini del Beneventano

Le più belle donne normanne ?

Le ragazze di Palermo

Genoma afro-americano

Genoma afro-americano

COLONIALISMO

SCHIAVISMO

RAZZISMO

Genoma italo-americano

THE ITALIAN AMERICANS

Genoma italo-americano

DISPERAZIONE

DISCRIMINAZIONE

PREGIUDIZI

Siamo tutti emigranti…
da 2 milioni di anni

MITOSI

MITOSI

Il sogno di una cellula che si realizza

Jacques Monod

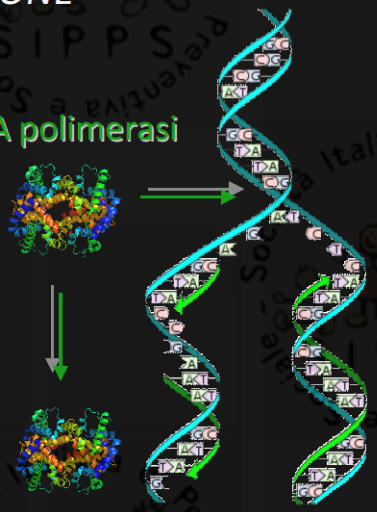
MITOSI

MITOSI

Le 3 prerogative di un gene

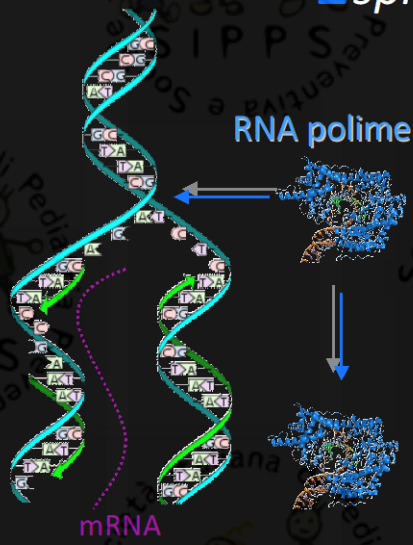
Replicazione

DNA polimerasi



Espressione

RNA polimerasi



That was just a dream
Just a dream
Just a dream, dream
Losing My Religion

Muta

Metonimie pericolose:

Ce l'abbiamo nel DNA !

La ***RNA polimerasi*** per la gestione del quotidiano ?

La ***DNA polimerasi*** per la corenza della dignità ?

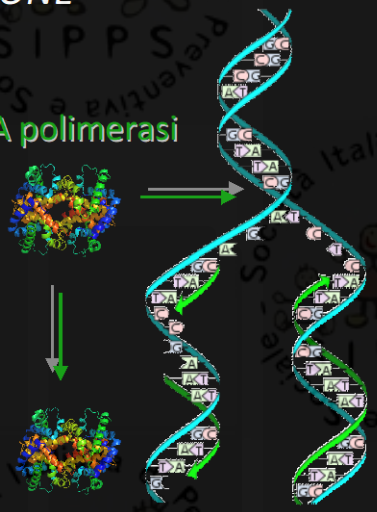
Quante ***Mutazioni*** hai collezionato nella tua vita ?

*R*EPLICAZIONE

Le 3 prerogative di un gene

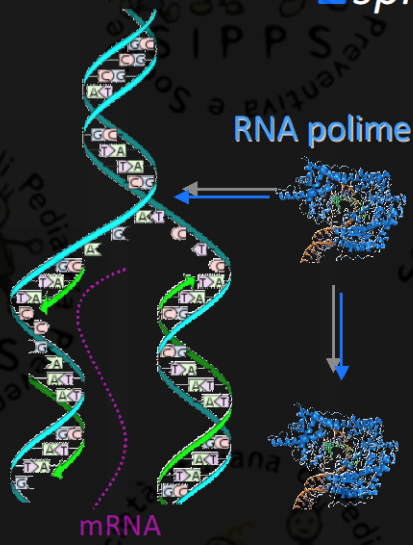
*E*spressione

DNA polimerasi

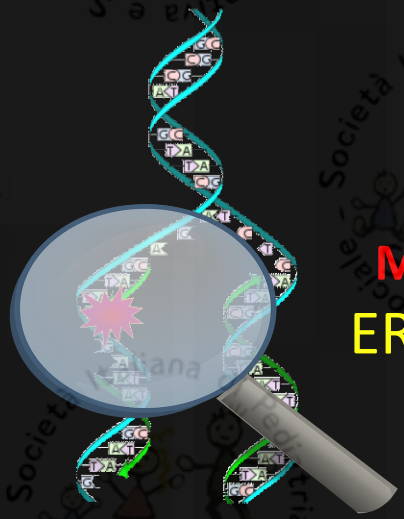


That was just a dream
Just a dream
Just a dream, dream
Losing My Religion

RNA polimerasi



*M*uta



Modificazione EPIGENETICA

Modificazione chimica covalente

EREDITABILE ma REVERSIBILE

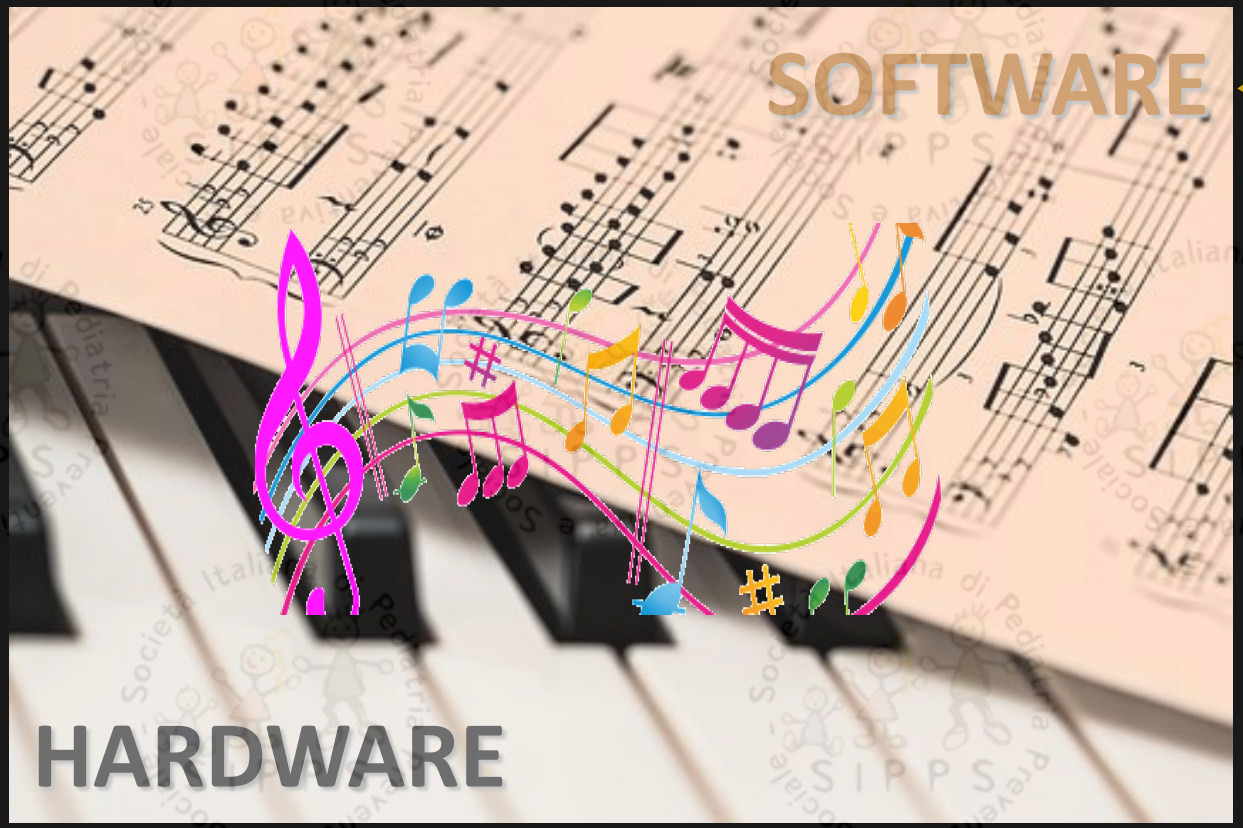
GENOMA

GENOMA EPIGENOMA

HARDWARE

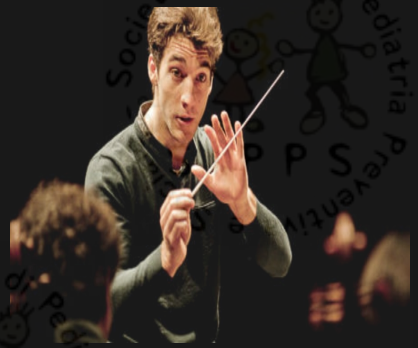
DNA

STILE DI VITA

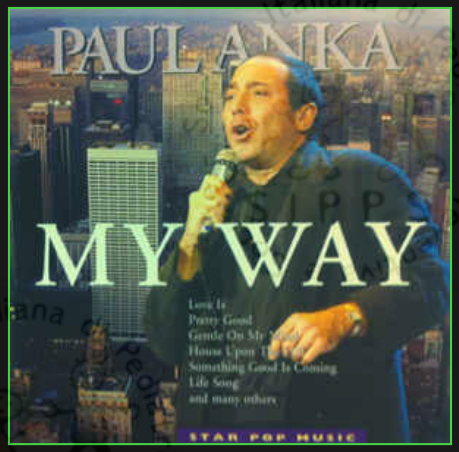


DNA

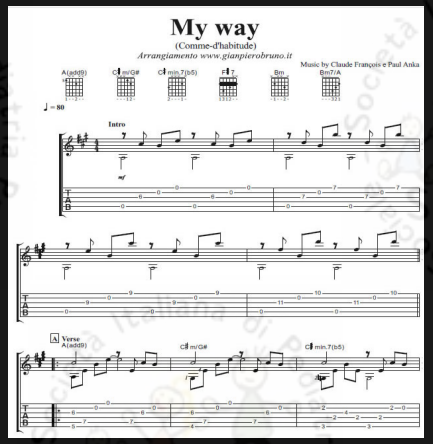

VERDI
MESSA DA REQUIEM



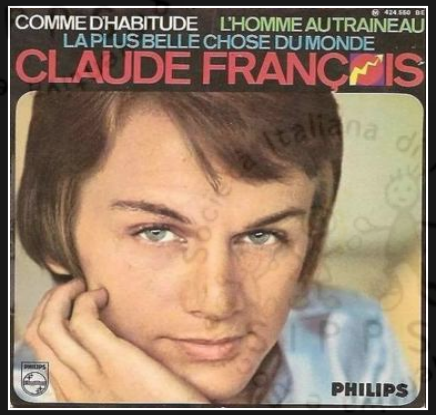
SOFTWARE



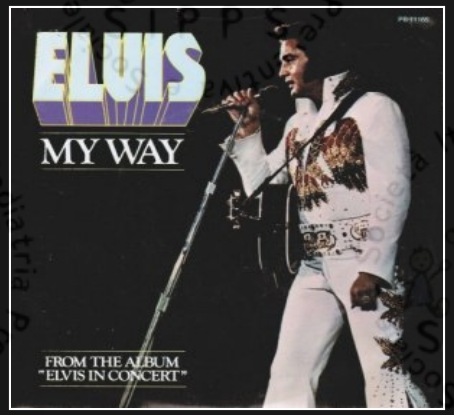
HARDWARE



SOFTWARE



Proto-HARDWARE



SOFTWARE

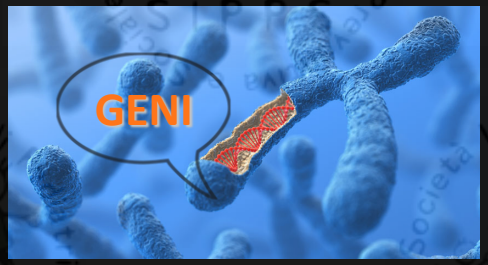
Polymorphisms
Polymorphisms
Polymorphisms

DNA

La data della nostra morte ?

TELOMERI

Raccontano cosa succede all'interno del genoma



Mol Ecol. 2013 Jan;22(1):249-59.
Telomere length and dynamics predict mortality in a wild longitudinal study.
Barrett EL et al.1
School of Biological Sciencesrk, Norwich, Norfolk UK.

Quanto durerà la nostra vita

Our results provide the first clear and unambiguous evidence of a relationship between telomere length and mortality in the wild, and substantiate the prediction that telomere length and shortening rate can act as an indicator of biological age further to chronological age when exploring life history questions in natural conditions

Adesso e nell'ora della nostra morte…

Impact Journals: AGING Open-Access Impact Journal on Aging

Aging (Albany NY). 2016 Sep 28;8(9):1844-1865.

DNA methylation-based measures of biological age: meta-analysis predicting time to death.

Chen BH, Marioni RE, Colicino E, Peters MJ, Ward-Caviness CK, Tsai PC, Roetker NS, Just AC, Demerath EW, Guan W, Bressler J, Fornage M, Studenski S, Vandiver AR, Moore AZ, Tanaka T, Kiel DP, Liang L, Vokonas P, Schwartz J, Lunetta KL, Murabito JM, Bandinelli S, Hernandez DG, Melzer D, Nalls M, Pilling LC, Price TR, Singleton AB, Gieger C, Holle R, Kretschmer A, Kronenberg F, Kunze S, Linseisen J, Meisinger C, Rathmann W, Waldenberger M, Visscher PM, Shah S, Wray NR, McRae AF, Franco OH, Hofman A, Uitterlinden AG, Absher D, Assimes T, Levine ME, Lu AT, Tsao PS, Hou L, Manson JE, Carty CL, LaCroix AZ, Reiner AP, Spector TD, Feinberg AP, Levy D, Baccarelli A, van Meurs J, Bell JT, Peters A, Deary IJ, Pankow JS, Ferrucci L, Horvath S.

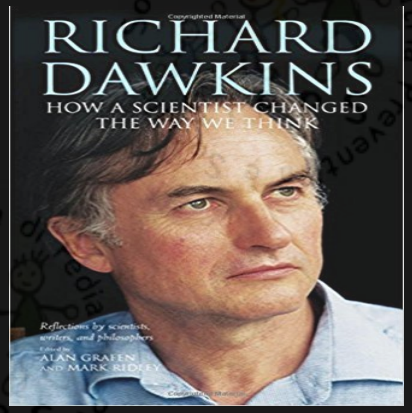
(1) Longitudinal Studies Section, Translational Gerontology Branch, Baltimore, USA.
(2) The NHLBI's Framingham Heart Study, Framingham, MA 01702, USA.
(3) Population Sciences Branch, Division of Intramural Research, USA.
(4) Centre r Cognitive Ageing and Cognitive Epidemiology, University f Edinburgh, UK.
(5) Medical Genetics Section, Centre for Genomic and Experimental Medicine, UK.
(6) Queensland Brain Institute, University of Queensland, Brisbane, QLD, Australia.
(7) Laboratory of Environmental Epigenetics, Columbia University USA.
(8) Department of Internal Medicine, Erasmus University The Netherlands.
(9) Institute of Epidemiology II, Helmholtz Zentrum München, Neuherberg, Germany.
(10) Department of Twin Research and Genetic Epidemiology, Kings College London, (11)Division of Epidemiology and Community Health, USA.
(13) Human Genetics Center, University of Texas USA.
(14) Human Genome Sequencing Center, Baylor College of Medicine, USA.
(15) Center for Epigenetics, Johns Hopkins University, Baltimore, MD 21205, ; USA.
(16) Department of Medicine, Medical School, Boston, MA, ; USA
(17) Institute for Aging Research, Hebrew Senior Life, Boston, MA 02215, USA.
(18) Department of Epidemiology, Harvard School of Public Health, Boston, USA.
(19) Department of Biostatistics, Harvard School of Public Health, Boston, USA.
(20) Department of Biostatistics, Boston, USA
(21) Section of General Internal Medicine, University School of Medicine, USA.
(22) Geriatric Unit, Usl Centro Toscana Florence, Italy.
(23) Laboratory of Neurogenetics, Intramural Research Program, USA
(24) Epidemiology and Public Health, Medical School, University of Exeter, RILD, Exeter EX2 5DW, ; UK.
(25) Research Unit of Molecular Epidemiology, Helmholtz Zentrum München, 85764 Neuherberg, Germany.
(26) Institute of Health Economics and Health Care Management, Helmholtz Zentrum München, 85764 Neuherberg, Germany.
(27) Division of Genetic Epidemiology, Austria.
(28) Institute for Biometrics and Epidemiology, Germany.
(29) University of Queensland Diamantina Institute, Australia.
(30) Department of Epidemiology, Erasmus University Medical Centre, Netherlands.
(31) HudsonAlpha Institute for Biotechnology, Huntsville, USA.
(32) Department of Medicine, Stanford University School of Medicine, USA.
(33) VA Palo Alto Health Care System, Palo Alto CA 94304, USA.
(34) Department of Preventive Medicine, USA.
(35) Robert H. Lurie Comprehensive Cancer Center, USA.
(36) Department of Medicine, Brigham and Women's Hospital, USA.
(37) Center for Translational Science Children's National Medical Center, USA.
(38) Department of Family Medicine and Public Health, USA.
39) Department of Epidemiology, University of Washington USA.
(40)Public Health Sciences Division, Seattle, USA.
(41) Departments of Medicine, Molecular Biology/Genetics, USA.
(42) Department of Environmental Health, USA.
(43) Department of Psychology, University of Edinburgh, UK.
(44) Department of Biostatistics, School of Public Health, USA.

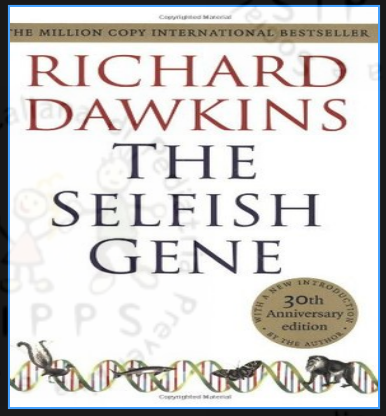
Salvo complicazioni, sto per morire.

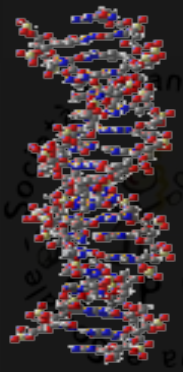
Jules Renard

GENE EGOISTA

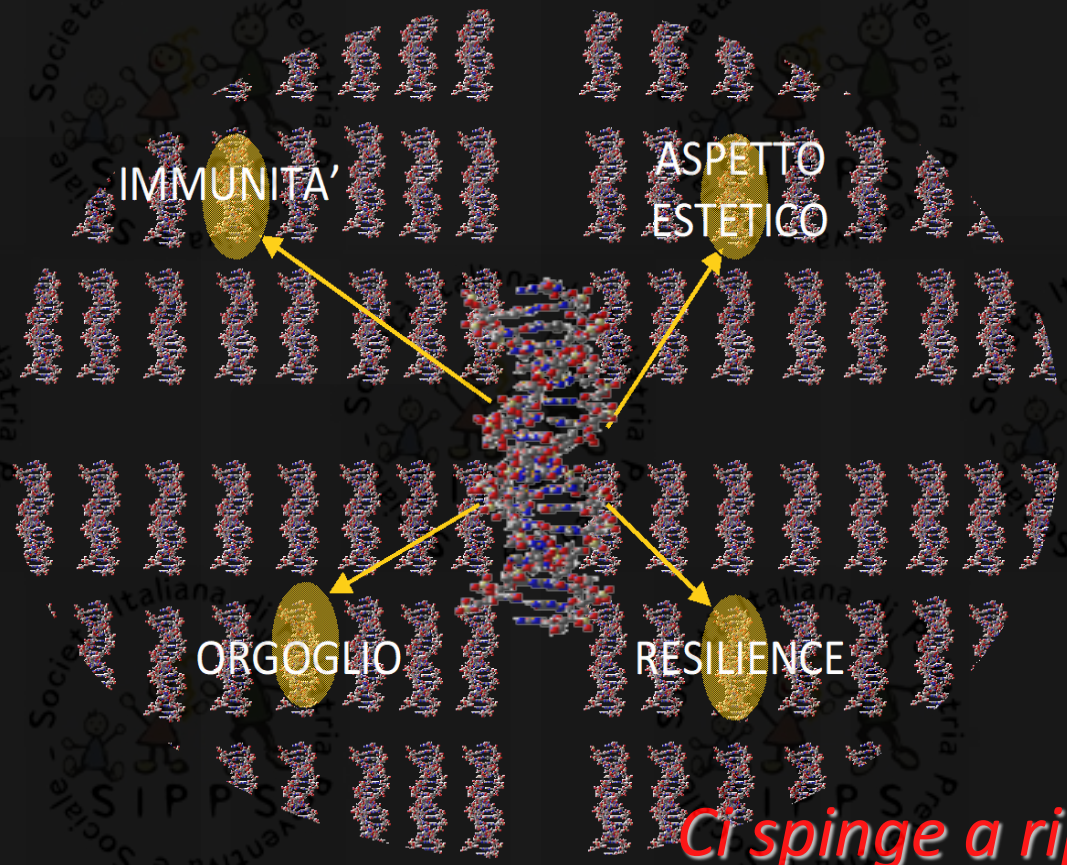
Il regista occulto delle nostre vite







La parte immortale di ogni essere vivente

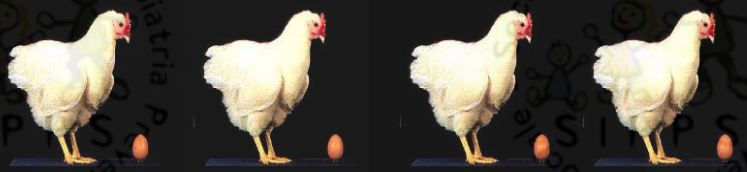


Ci spinge a riprodurci

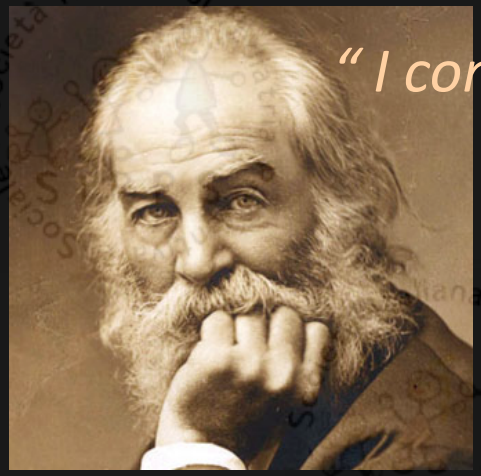
La gallina è un espediente al quale l’uovo ricorre per fare un altro uovo

Samuel Butler

Piccoli pollai



Grandi dinastie

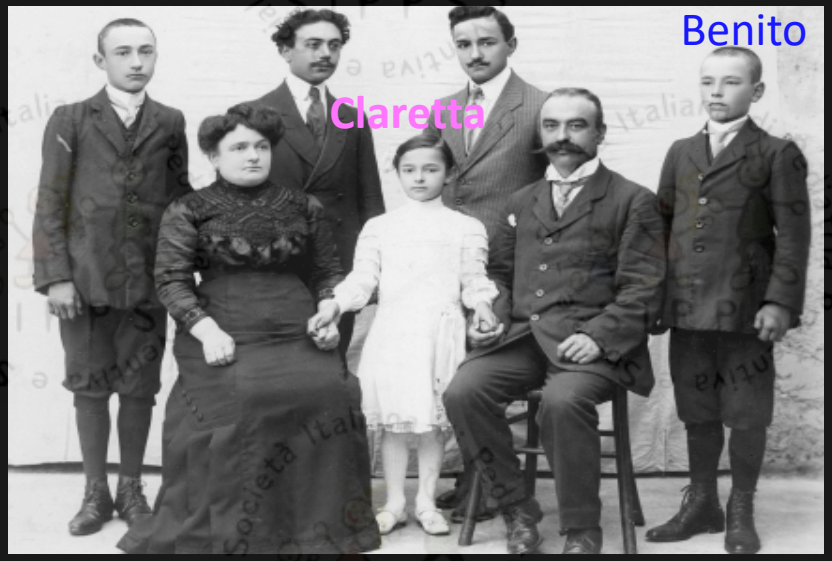


“ I contain multitudes…”

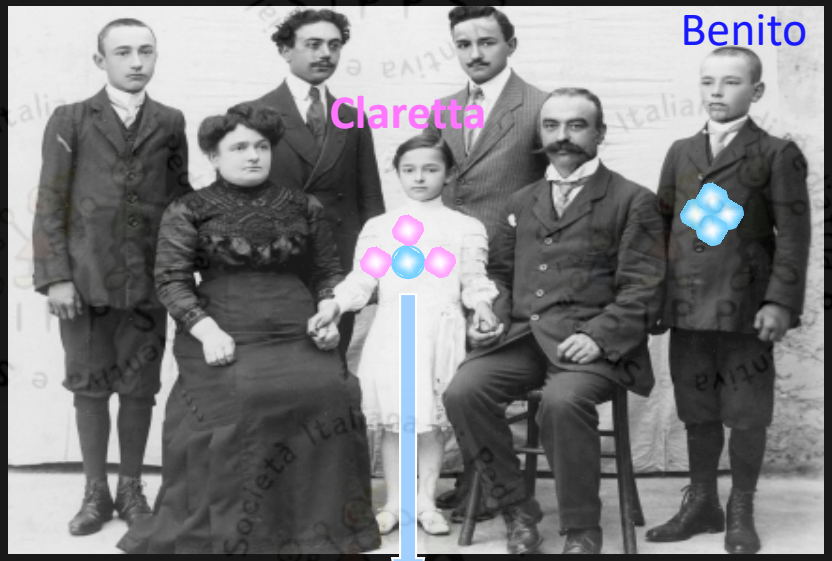
Walt Whitman

Song of Myself

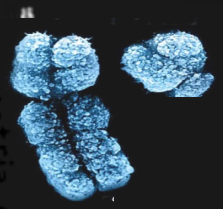
Claretta e Benito


Benito
Claretta

MICROCHIMERISMO



Cariotipo

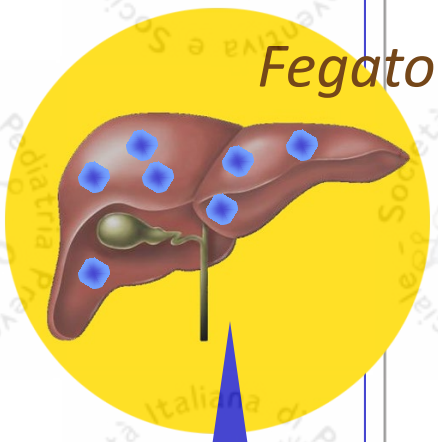


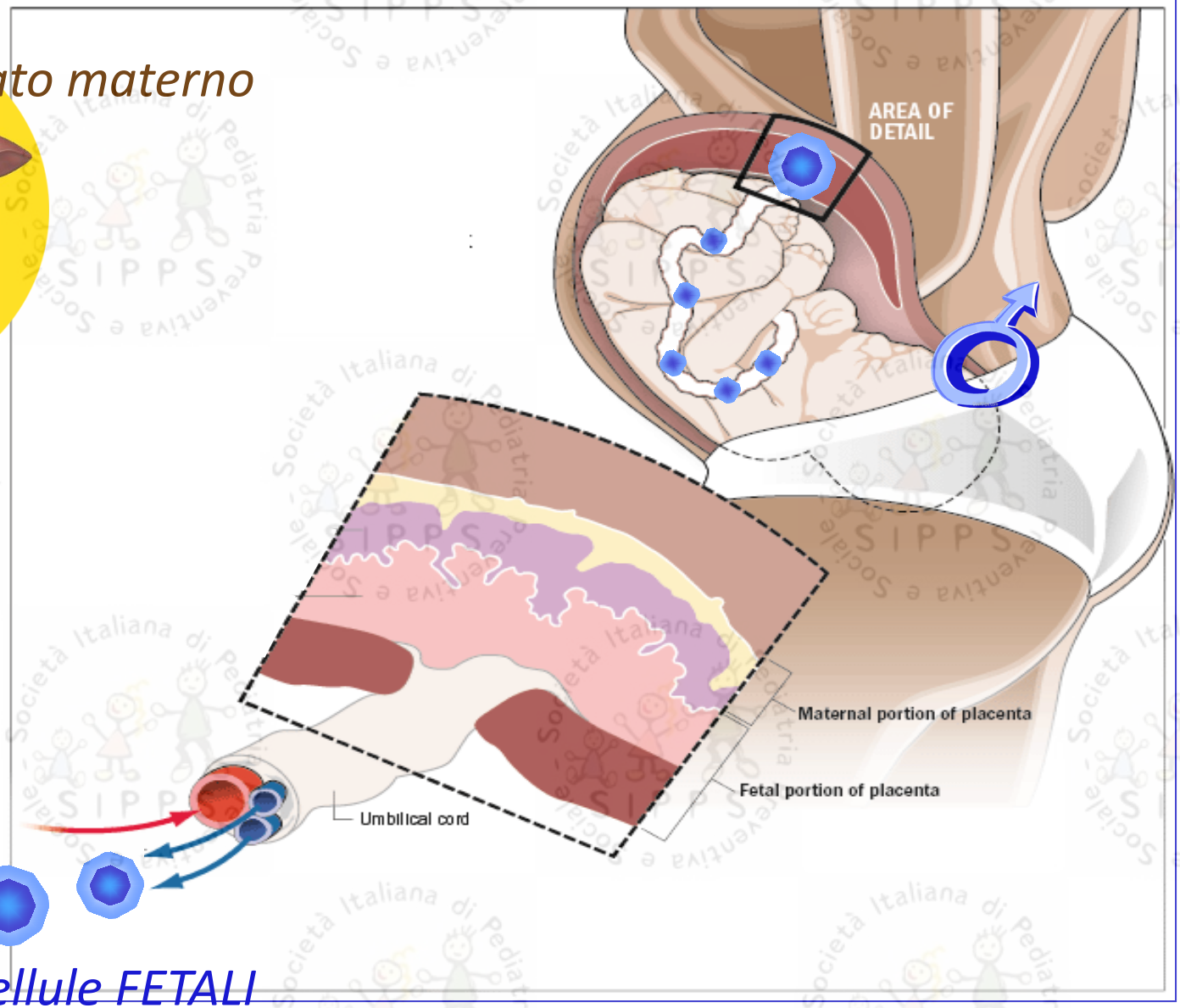
MISTERO

Geck Pet al
Symptotic detection of chimerism: Y does it matter?
Chimerism. 2013 Oct-Dec;4(4):144-6

Prima gravidanza

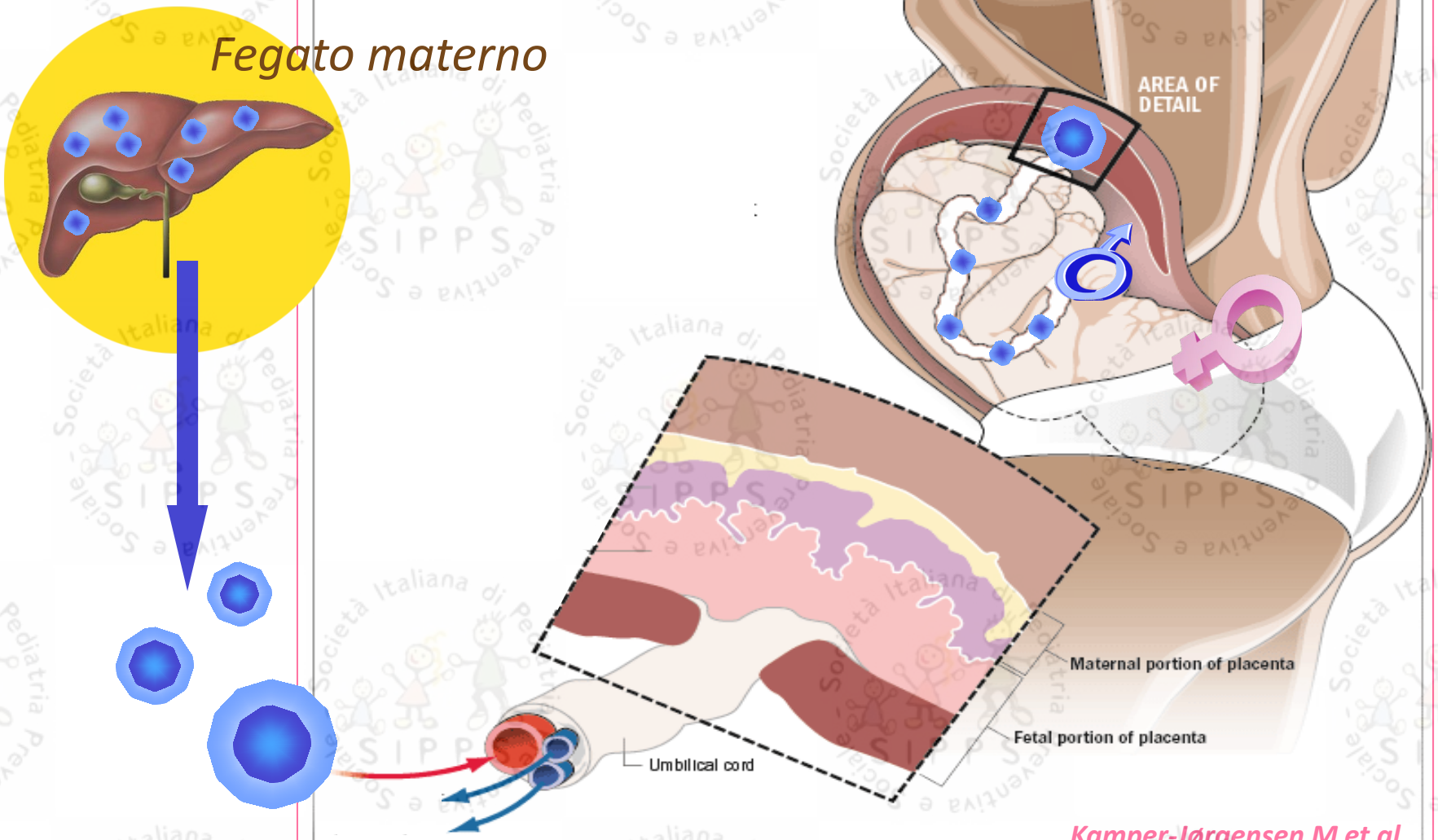
Fegato materno





Cellule FETALI

Seconda gravidanza



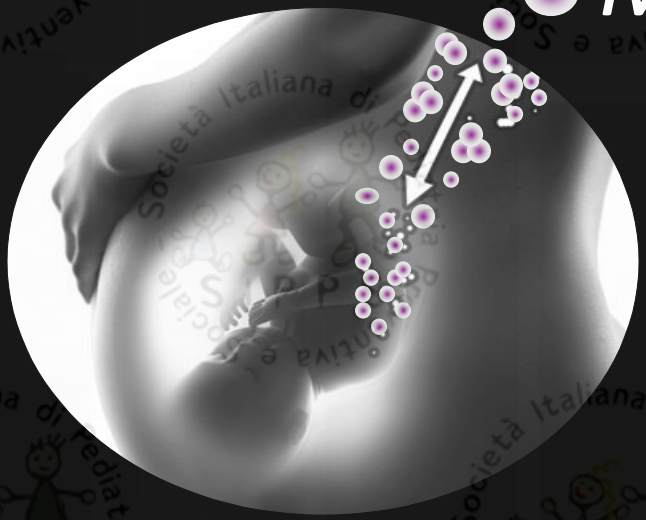
Kamper-Jørgensen M et al.

Male microchimerism and survival among women.

Int J Epidemiol. 2014 Feb;43(1):168-73.

Passaggio trans-placentare

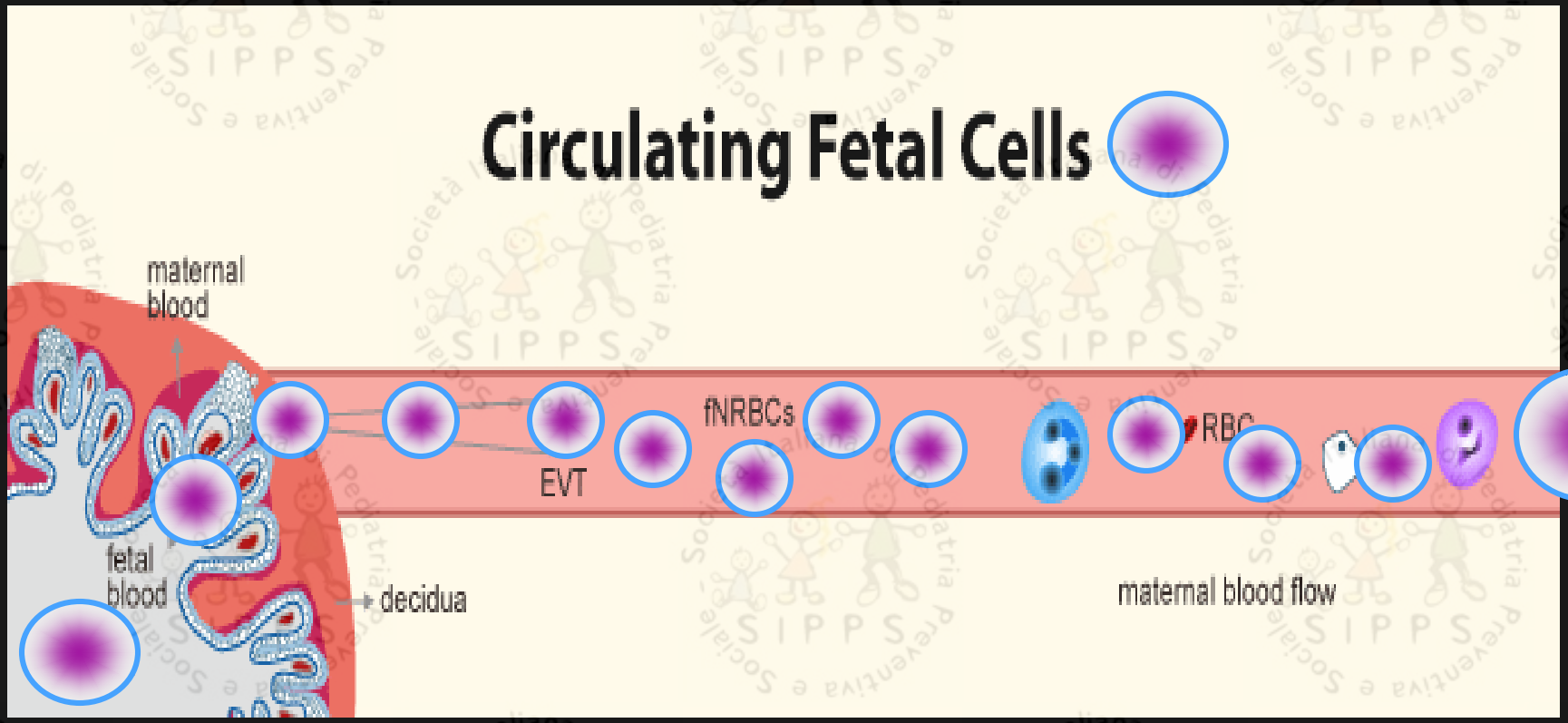
Migrazione

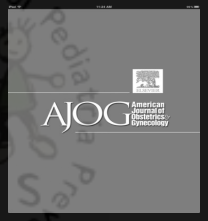


Stem Cell Rev. 2018 Oct;14(5):632-641.

Incognito: Are Microchimeric Fetal Stem Cells that Cross Placental Barrier Real Emissaries of Peace?

Cismaru CA et al.





Coata G et al.

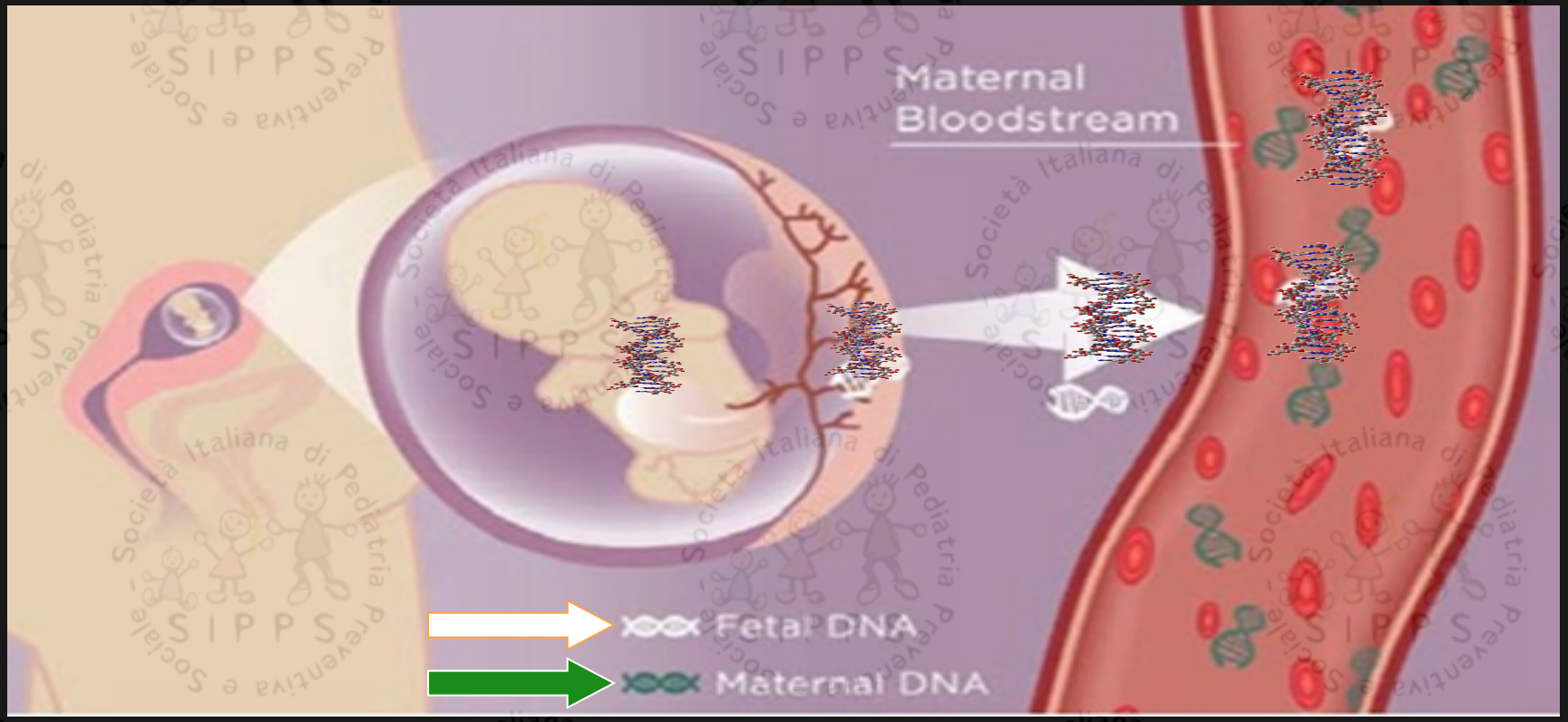
Persistence of male hematopoietic CD34+ cells in the circulation of women does not affect prenatal diagnostic techniques.

Am J Obstet Gynecol. 2009 May;200(5):528.e1

Mikhail MA et al.

High frequency of fetal cells within a primitive stem cell population in maternal blood.

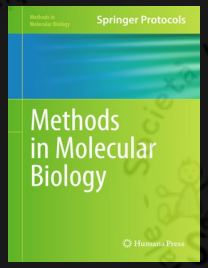
Hum Reprod. 2008 Apr;23(4):928-33.



Breveglieri G et al.

Non-invasive Prenatal Testing Using Fetal DNA.

Mol Diagn Ther. 2019 Feb 2.



Stray J et al.

Isolation of Cell-Free DNA from Maternal Plasma.

Methods Mol Biol. 2019;1885:309-323.

Trends Mol Med. 2013 May;19(5):271-2.

Amniotic fluid stem cells and fetal cell microchimerism.

Rosner M et al.

-Medical Genetics, Medical University of Vienna, Austria.

During pregnancy, mobilized pluripotent fetal stem cells of yet unidentified in vivo significance float in the amniotic fluid

Circulating fetal cells

Fetal stem cells

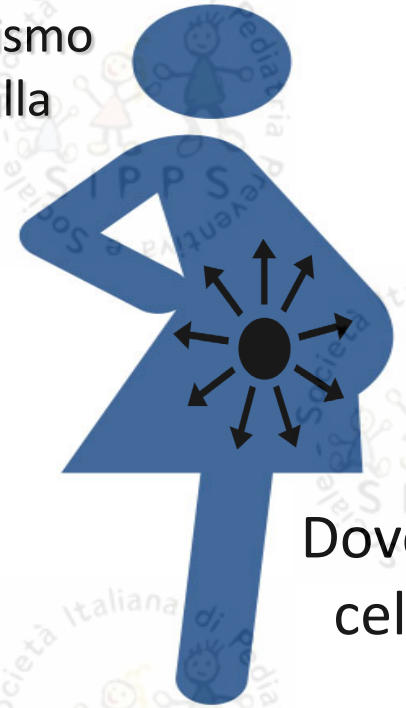
We argue that circulating fetal cells and the pluripotent amniotic fluid cells might share a common origin.

Leiden University Medical Center

Rijnink EC et al.

-Department of Pathology
-Department of Medical Statistics and Bio-Informatics
-Department of Obstetrics & Gynaecology

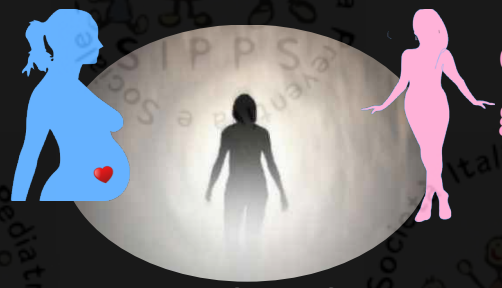
Il Microchimerismo è in relazione alla gravidanza ?



Dove migrano le cellule fetali ?

26

donne decedute durante la gravidanza o entro 1 mese dalla nascita di un figlio.



Donne decedute

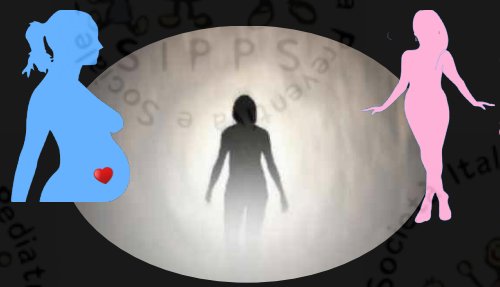
26

donne non gravide che avevano già avuto un figlio

26

donne decedute durante la gravidanza o entro 1 mese dalla nascita di un figlio.

ibridazione in situ cromosoma Y



Donne decedute

Nuclei cromosomiali positivi

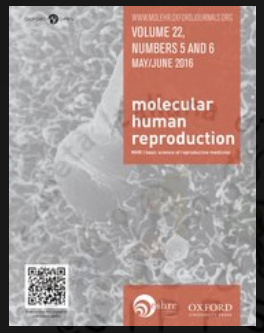
per milione di nuclei segnati

Durante la gravidanza si realizza un aumento delle cellule chimeriche

26

donne non gravide che avevano già avuto un figlio

ibridazione in situ cromosoma Y

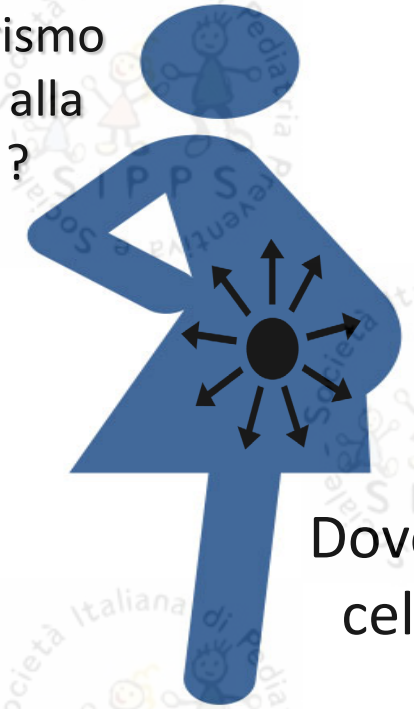


Mol Hum Reprod. 2015 Nov;21(11):857-64.

Tissue microchimerism is increased during pregnancy: a human autopsy study.

Rijnink EC et al.

Il Microchimerismo è in relazione alla gravidanza ?



Dove migrano le cellule fetali ?

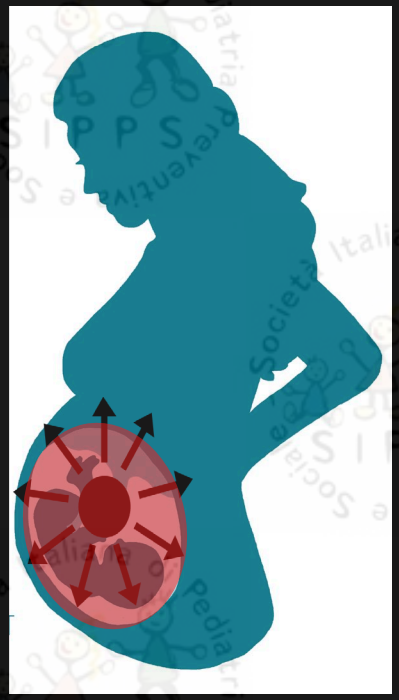
Gammill HS et al.

Department of Obstetrics Gynecology
Department of Pediatrics
Seattle Children's Hospital

MISTERO

BAD INFLUENCER

Cosa può interferire con la migrazione delle cellule fetali ?



Placenta. 2017 Dec;60:130-133.

Microchimerism: Defining and redefining the prepregnancy context: A review.

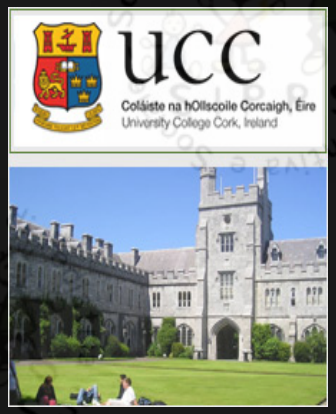
Gammill HS et al.

-

The amount, type, and persistence of microchimerism are influenced by:

Obstetric characteristics
Pregnancy complications
Eposures to infection
and other factors…

Microchimerism



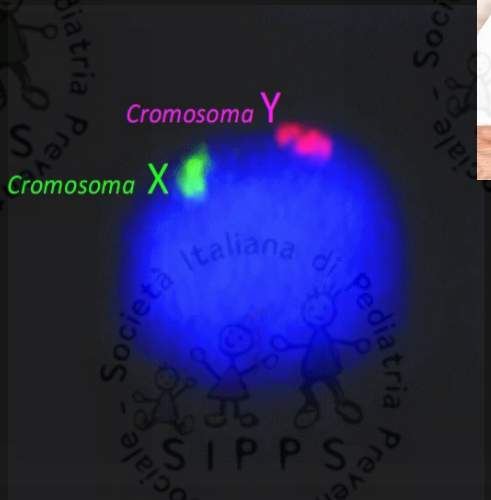
Chimeras. 2014;5(2):40-52.

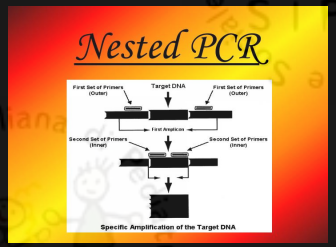
Microchimeric fetal cells play a role in maternal wound healing after pregnancy.

Mahmood U et al.

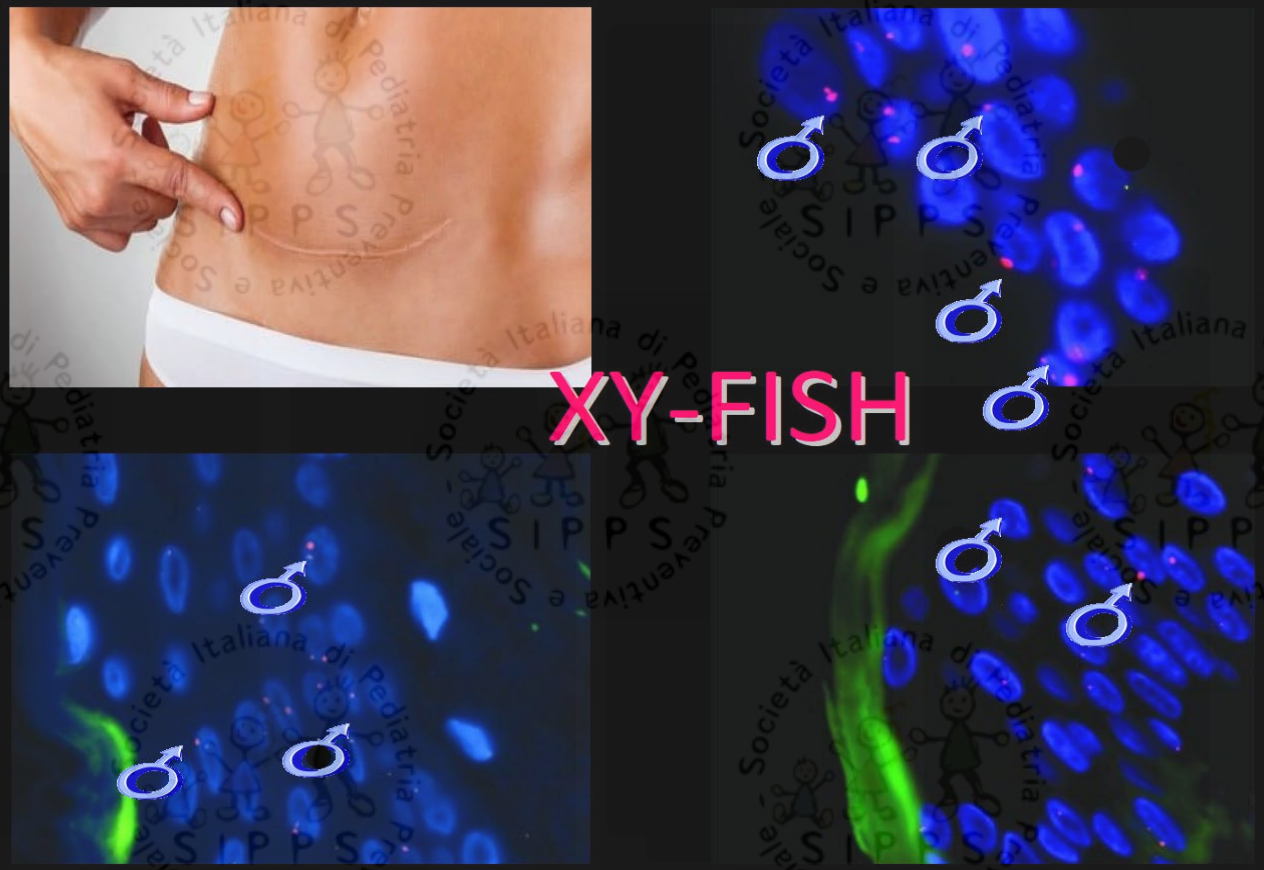
Anu Research Centre; Department of Obstetrics and Gynaecology; University College Cork; Cork University Maternity Hospital; Cork, Ireland.

biopsie





Identificazione di cellule fetali “presunte maschili”
in cicatrici CS materne guarite dopo la gravidanza



fluorescence in situ hybridization

Presumibilmente in risposta a “segnali” prodotti da lesioni cutanee le cellule fetali migrano nell’area lesionata ed intervengono nella riparazione .

LIFE Clinic
Long-term Infant-to-adult Follow-up & Evaluation

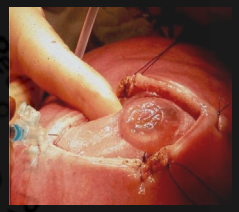
Saadai P et al.

Division of Pediatric Surgery and The Fetal Treatment Center,
Department of Surgery, University of California, San Francisco, San Francisco,

Maternal microchimerism levels were increased in patients who had open fetal surgery compared with *controls*

Open fetal surgery

Post natal repair



SPINA BIFIDA

Healthy controls

Patients who had fetal intervention at the time of delivery did not demonstrate increased microchimerism

Chimerism. 2012 Jul-Dec;3(3):1-3.

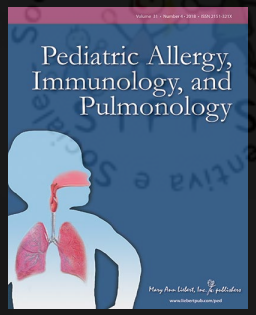
Increased maternal microchimerism after open fetal surgery.

Saadai P et al.

Division of Pediatric Surgery and The Fetal Treatment Center, Department of Surgery, University of California, San Francisco, San Francisco, CA, USA.

MICROCHIMERISMO & Latte

Una relazione intrigante



2018 Mar

Pediatr Allergy Immunol. 2018 Mar;29(2):133-143.

Breastmilk cell trafficking induces microchimerism-mediated immune system maturation in the infant.

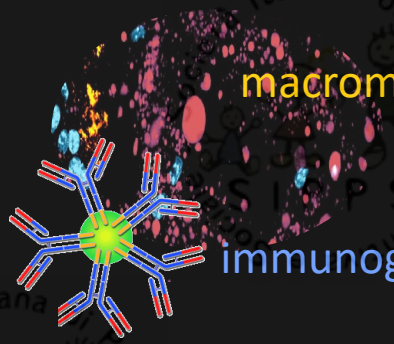
Molès JP et al

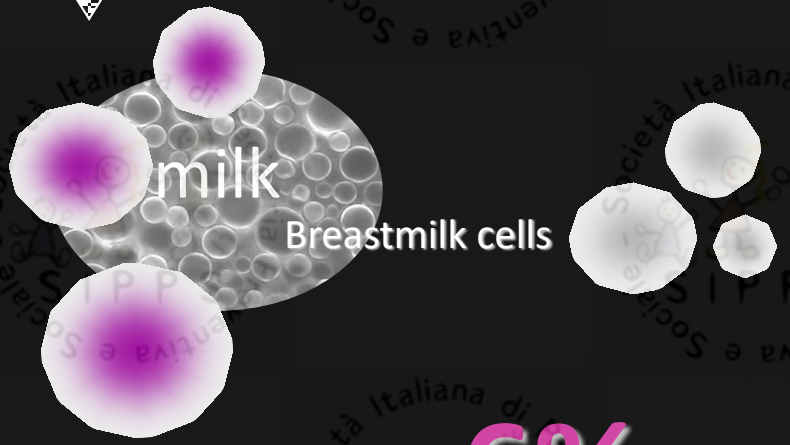
-Pathogenesis and Control of Chronic Infections, INSERM, EFS, Université de Montpellier, France.
-Department of Bacteriology-Virology and Department of Medical Information, Montpellier, France.
-Department of Paediatrics and Child Health, School of Medicine, University of Zambia.
-Institute for Medical Immunology, Université Libre de Bruxelles, Belgium.
-Division of Infectious Diseases & International Health, Department of Medicine, University of Virginia, USA.

PERMEABILITA' INTESTINALE

Neonatal period in response to local inflammation or introduction of a weaning food

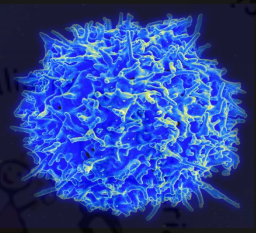
First days *Post-partum*





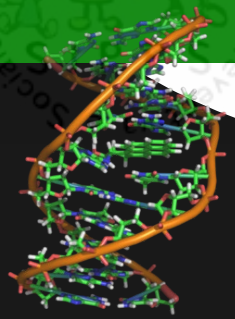
Progenitor/stem cells **6%**

L'allattamento al seno genera cellule **T regolatorie (Treg)** che sopprimono l'immunità antimaterna.



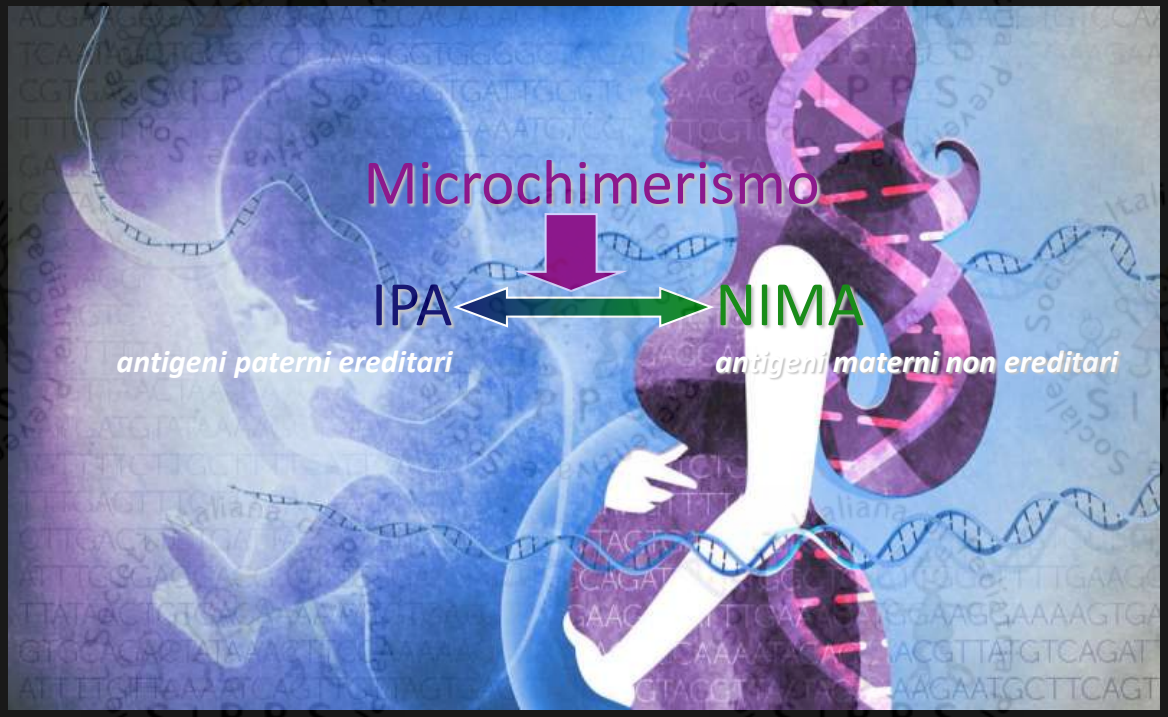
Il **microchimerismo delle cellule staminali** può indurre tolleranza agli **antigeni materni non ereditari (NIMA)**

Prodotti proteici derivati da geni polimorfici che le madri esprimono ma non la progenie.



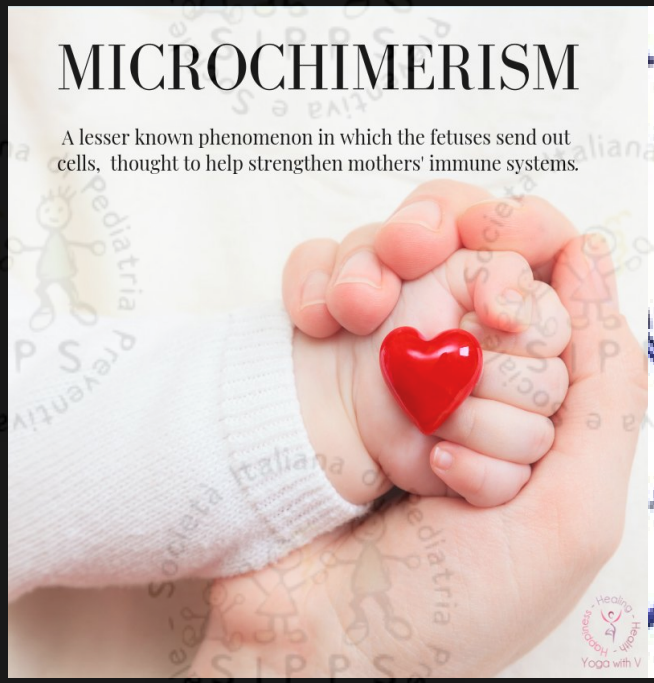
effetto **NIMA**

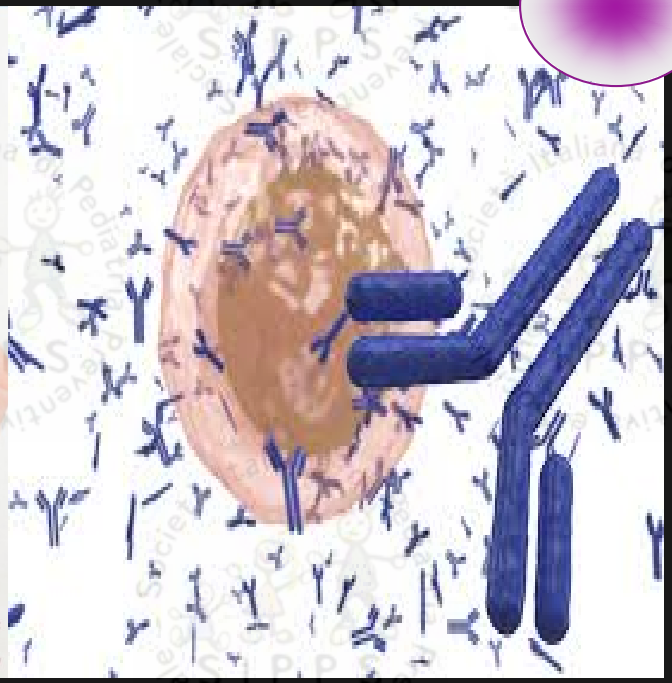
allotolleranza microchimerismo indotta



MICROCHIMERISM

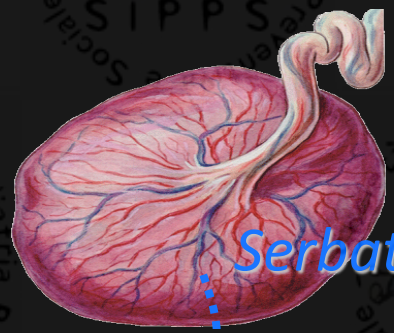
A lesser known phenomenon in which the fetuses send out cells, thought to help strengthen mothers' immune systems.





Esosomi

PLACENTA



PLACENTA

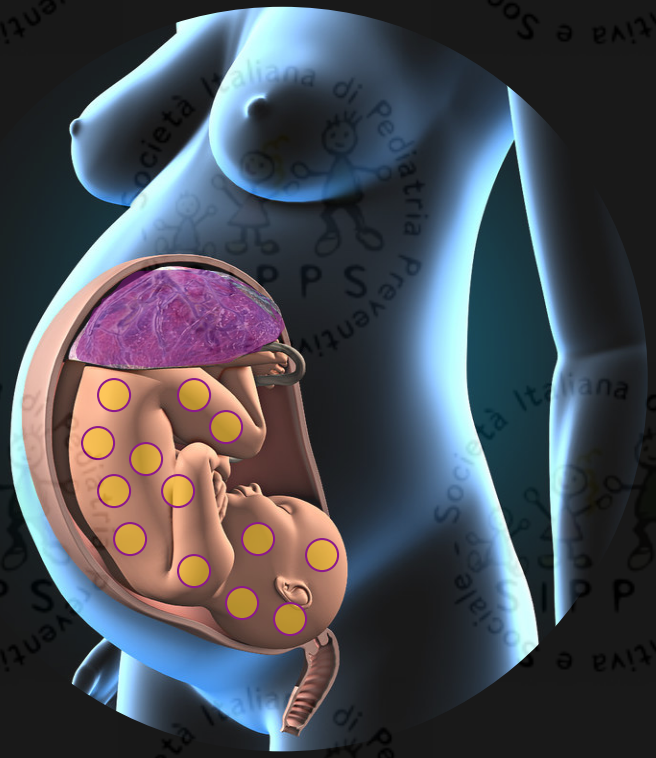
Serbatoio staminale

Prog Mol Biol Transl Sci. 2017;145:163-179.

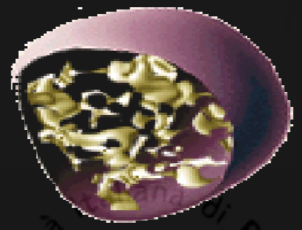
Role of Exosomes in Placental Homeostasis and Pregnancy Disorders.

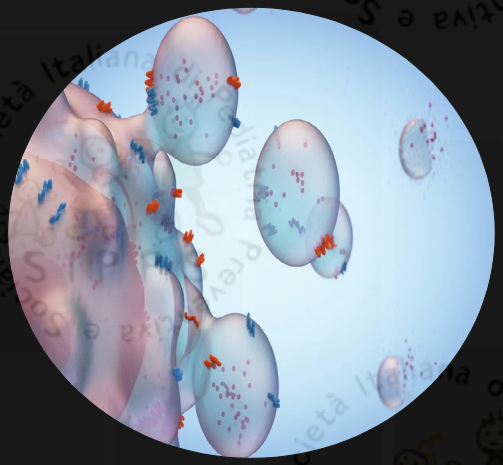
Salomon C

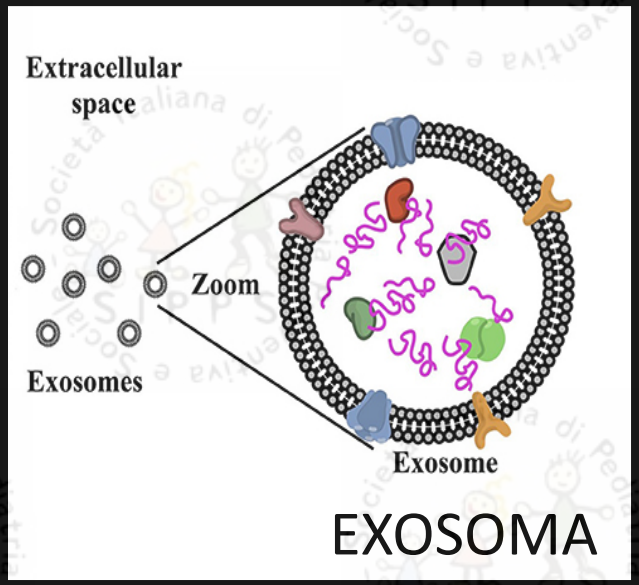
Le cellule placentari possono comunicare con i tessuti materni regolando la loro funzione



Attraverso il "sistema" delle VESCICOLE TRANSFER (EV) extracellulari

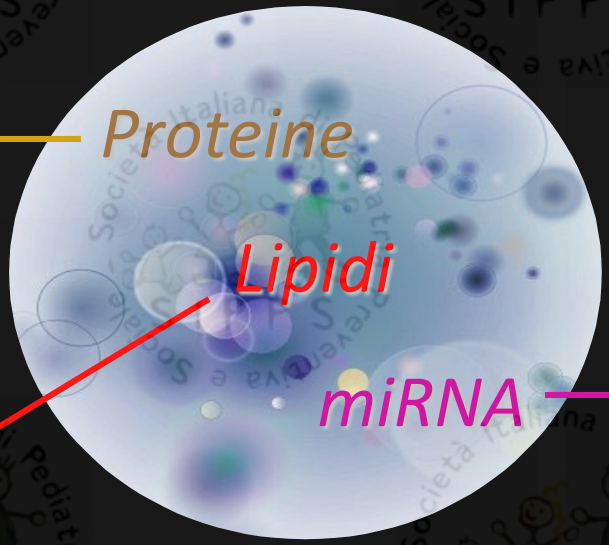


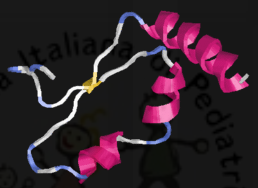


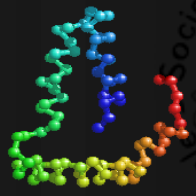


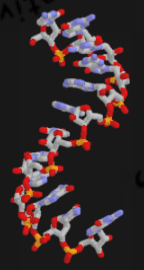
EXOSOMA

EXOSOMA









Markers
Epigenetici

Gli EV intervengono nella regolazione delle risposte immunitarie e regolano l'adattamento materno-metabolico alla gestazione

Sono dimostrabili nella circolazione materna dalla sesta settimane.

Aunentano nelle gravidanze complicate
(preeclampsia e nel diabete mellito gestazionale)

Diseases. 2017 Mar 15;5(1).

Milk's Role as an Epigenetic Regulator in Health and Disease

Melnik BC

Il latte è il **principale modulatore epigenetico** *dell'espressione genica un vero e proprio* **"sistema dopante"** *nello sviluppo dei mammiferi.*

L'allatamento al seno attraverso il trasferimento di **miRNA** fornisce i *segnali* appropriati per un'adeguata *programmazione epigenetica* del neonato.

UNIVERSITÄT OSNABRÜCK

Boldo Melnik

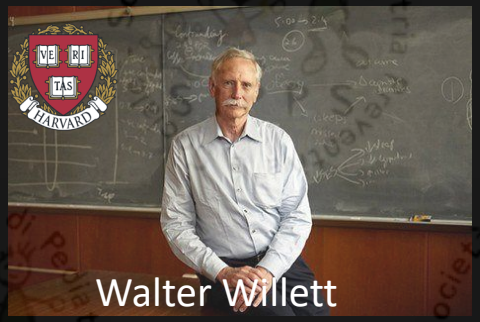
Department of Dermatology, Environmental Medicine and Health Theory,
University of Osnabrück, Osnabrück, Germany.

Il consumo di latte promuove o aggrava l‘ acne vulgaris

Alcuni esosomi del latte inducono l'obesità, il diabete di tipo 2, il cancro e numerose le malattie neurodegenerative

Il consumo di latte e prodotti lattiero-caseari aumenta il rischio di fratture ossee nelle persone di età avanzata

E’ dimostrata una correlazione significativa tra la dose di consumo di latte e il rischio di mortalità



Walter Willett

Recent epidemiological research, especially of the Harvard group around Walter Willett provided strong evidence that dairy food and milk consumption increase the risk of bone (hip) fractures in people of higher age.

Feskanich D, Bischoff-Ferrari HA, Frazier AL, **Willett WC.**
Milk consumption during teenage years and risk of hip fractures in older adults.
JAMA Pediatr. 2014 Jan;168(1):54-60.

Feskanich D, Meyer HE, Fung TT, Bischoff-Ferrari HA, **Willett WC.**
Milk and other dairy foods and risk of hip fracture in men and women.
Osteoporos Int. 2018 Feb;29(2):385-396.

*Fung TT, Meyer HE, **Willett WC,** Feskanich D.*
Protein intake and risk of hip fractures in postmenopausal women and men age 50 and older.
Osteoporos Int. 2017 Apr;28(4):1401-1411.

Karl Michaelsson of the Karolinska Institute showed a significant correlation between the dose of milk consumption and mortality risk.

Michaëlsson K ET AL..
Milk intake and risk of mortality and fractures in women and men: cohort studies.
BMJ. 2014 Oct 28;349:g6015.

1

Deficient miRNA transfer

Artifical formula feeding

Disturbed postnatal epigenetic programming

➤ Increased risk for diseases of civilization

2

Physiological miRNA transfer

Breastfeeding

Appropriate postnatal epigenetic programming

➤ Reduced risk for diseases of civilization

3

Persistent miRNA transfer

Cow milk consumption

Persistent epigenomic disturbances

➤ Increased risk for diseases of civilization

4

Persistent + increased miRNA transfer

Milk of dairy cows increased in lactation performance

Persistent + increased epigenomic distubances

➤ Exaggerated risk for diseases of civilization

J Transl Med. 2019 Jan 3;17(1):3.

Exosomes of pasteurized milk: potential pathogens of Western diseases.

Melnik BC & Schmitz G.

Department of Dermatology,
Environmental Medicine and Health Theory,
University of Osnabrück, Osnabrück, Germany.

Institute for Clinical Chemistry and Laboratory Medicine,
University Hospital Regensburg, University of Regensburg,
PMID: 30602375

Exosomes of pasteurized milk
may represent new pathogens
that should not reach the human food chain.

ESOSOMI

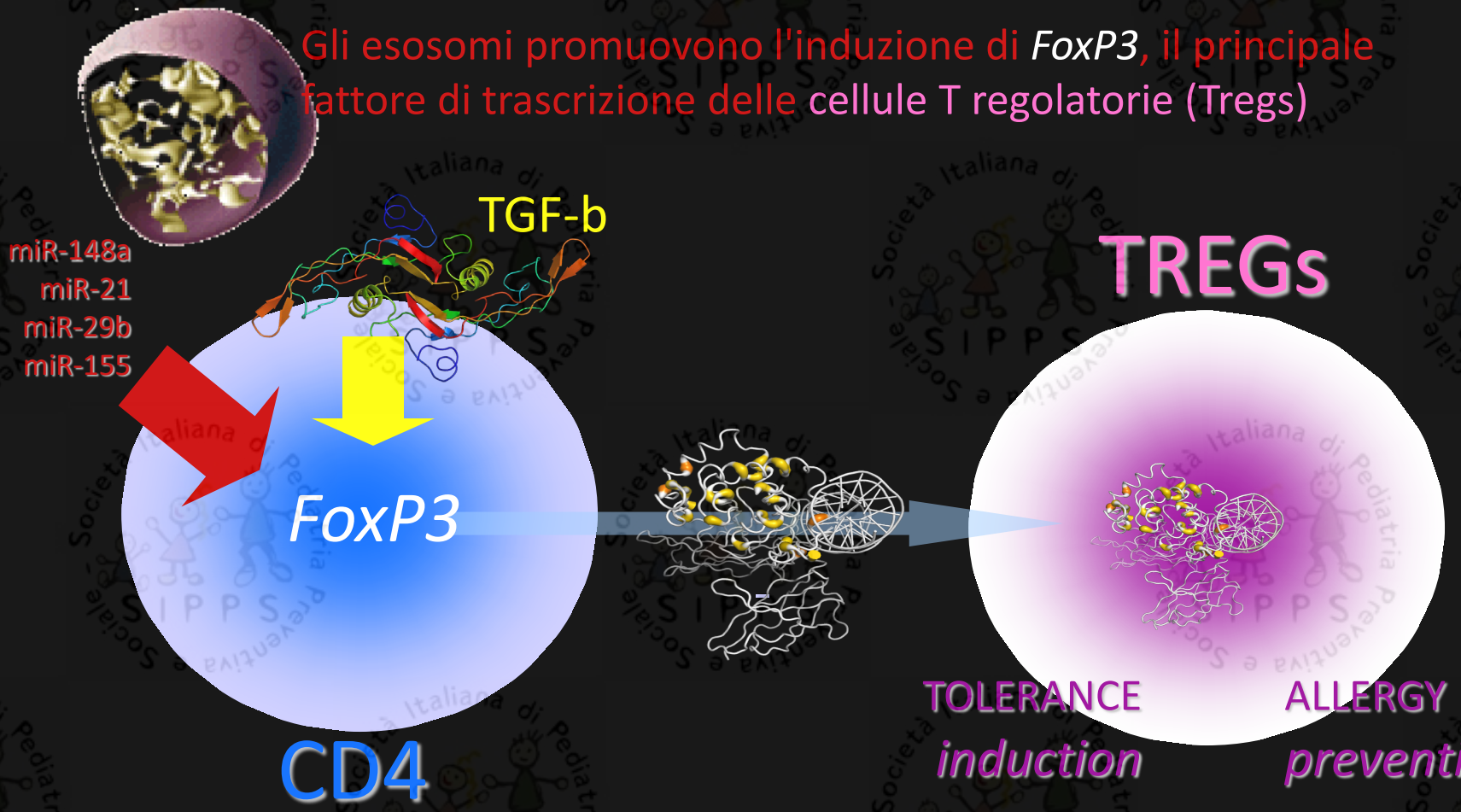
La pastorizzazione del latte vaccino protegge le vitamine termolabili e altri composti organici

Non altera gli esosomi bioattivi/ biodisponibili e le vescicole extracellulari di 40-120 nm

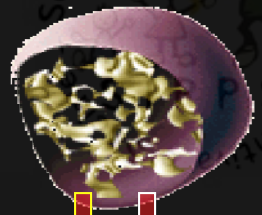
Tuttavia, le prove epidemiologiche e traslazionali presentate in questa revisione indicano che

l'assunzione prolungata di esosomi attraverso il latte pastorizzato può portare un rischio per malattie croniche

Gli esosomi promuovono l'induzione di *FoxP3*, il principale fattore di trascrizione delle cellule T regolatorie (Tregs)



Questo meccanismo previene lo sviluppo di allergie durante l'allattamento o il consumo di latte crudo durante la prima infanzia



Il *miR-21* e miR-148a sono promotori della adipogenesi

miR-21

miR-148a

STAMINALE

PPARγ

Pre-ADIPOCITI

Aumenta l'espressione del gene FTO associato all'obesità

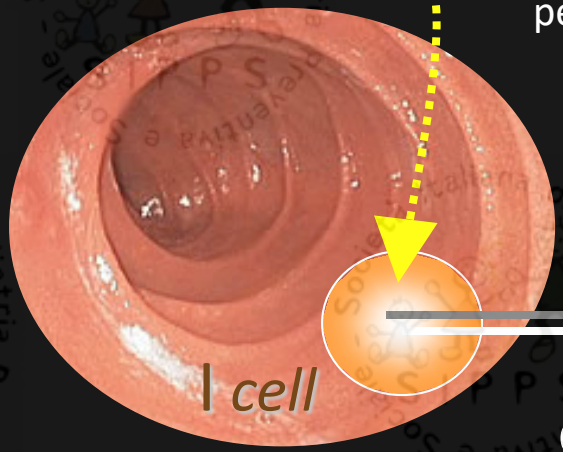
ADIPOCITA

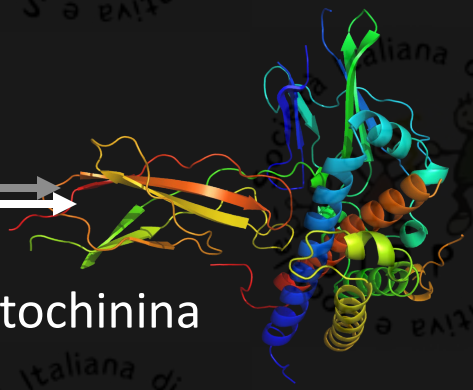
IPOTALAMO

IPERFAGIA

miR-148a

Il **mir-148a** mantiene il **"cervello affamato"** per aumentare l'assunzione di latte durante il periodo dell'allattamento al seno



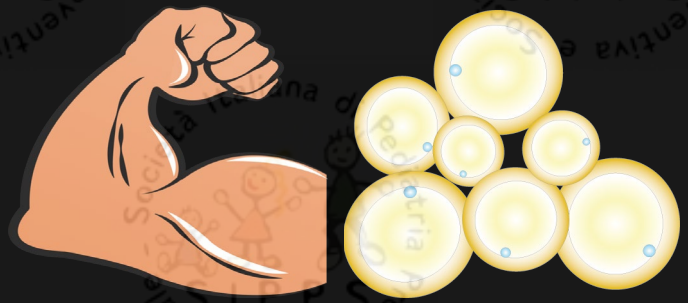


Colecistochinina

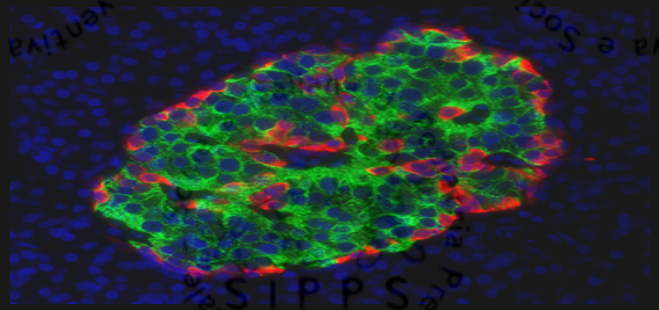
Il consumo di latte vaccino pastorizzato può mantenere uno stato di iperfagia che promuove l'obesità

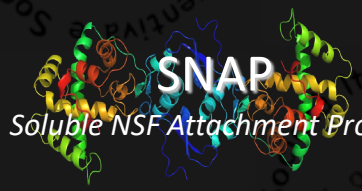
miR29b

Insulin responding peripheral cell



Insulin producing beta-cell

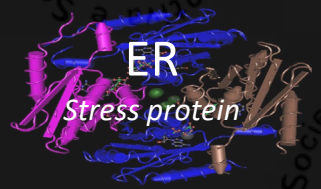




SNAP

Soluble NSF Attachment Protein

Il miR29b promuove l'insorgenza del DIABETE tipo 2



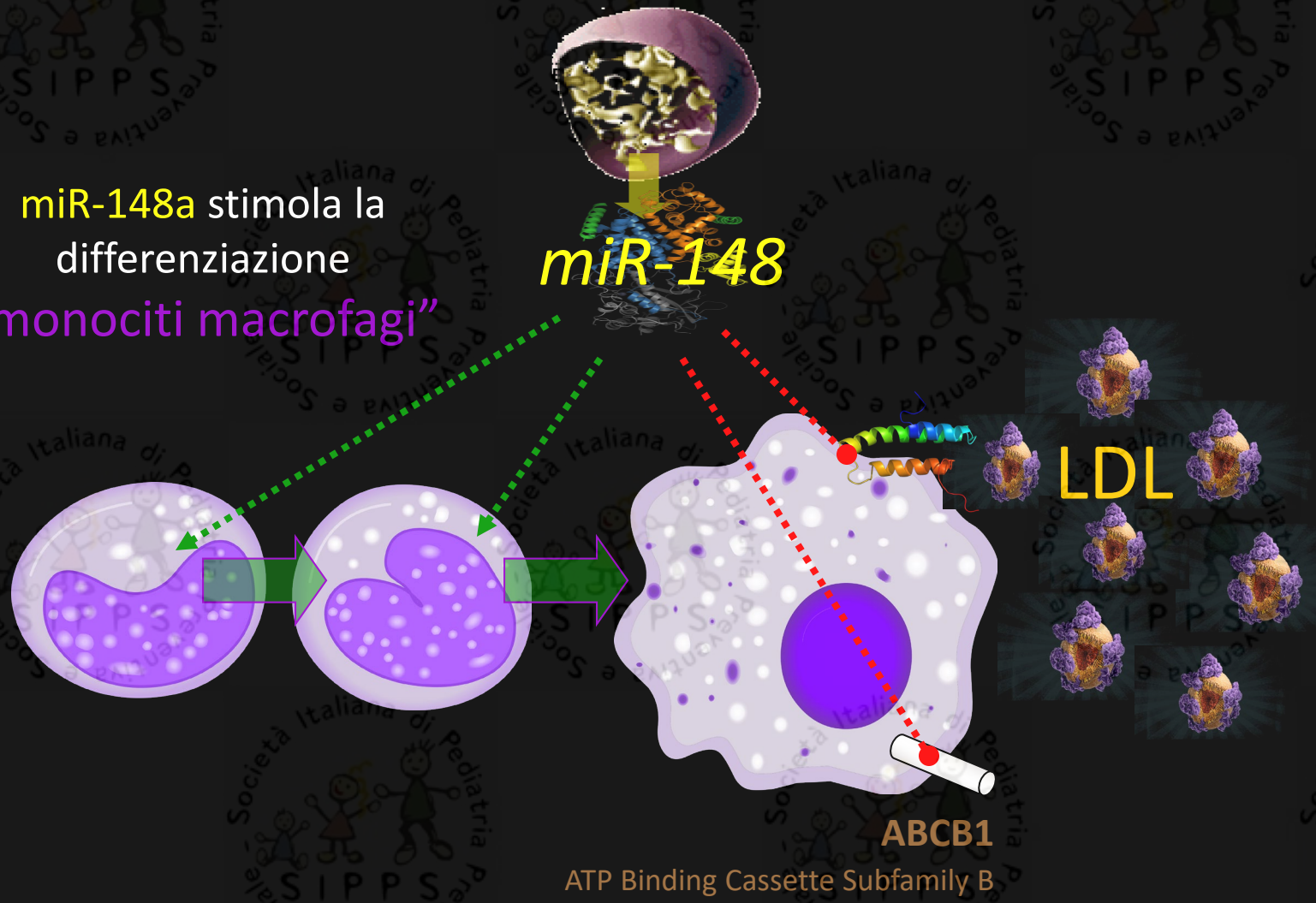
ER

Stress protein

GLUT-1e4

Apoptosi

miR-148a stimola la differenziazione “monociti macrofagi”



La soppressione mediata da miR-148a del ABCA1 attenua il trasporto inverso di colesterolo e quindi promuove l'accumulo di lipidi nei macrofagi.

Gli Esosomi del latte nella patogenesi della malattia di Parkinson

miR-148a

miR-155

DNA

metiltransferasi 1

TNF-α

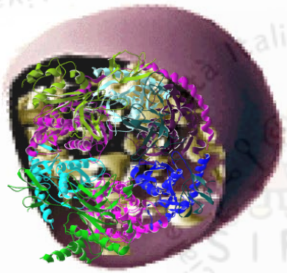
α-sinucleina

Flogosi

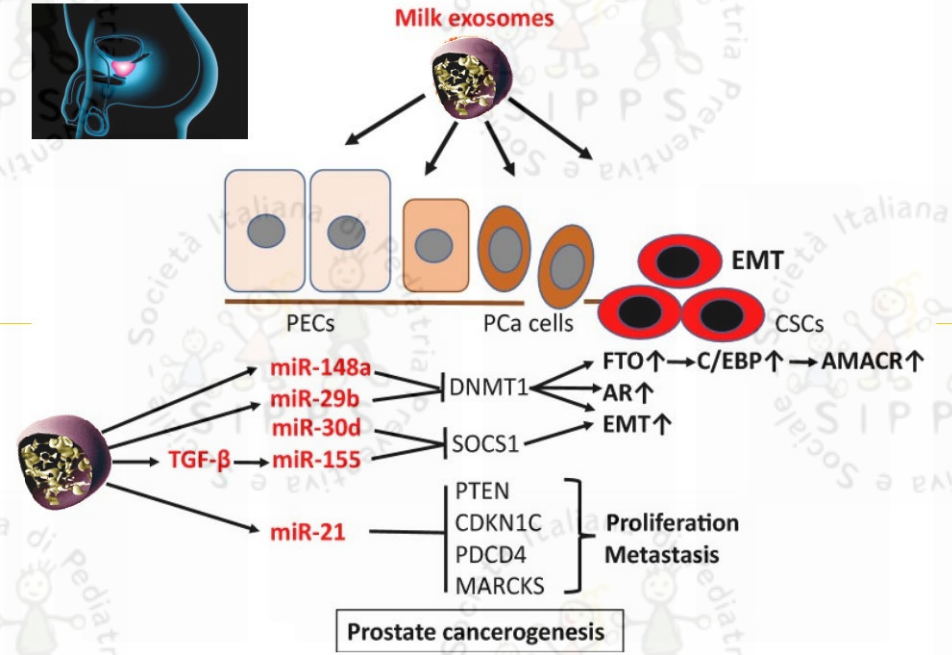
PARKINSON

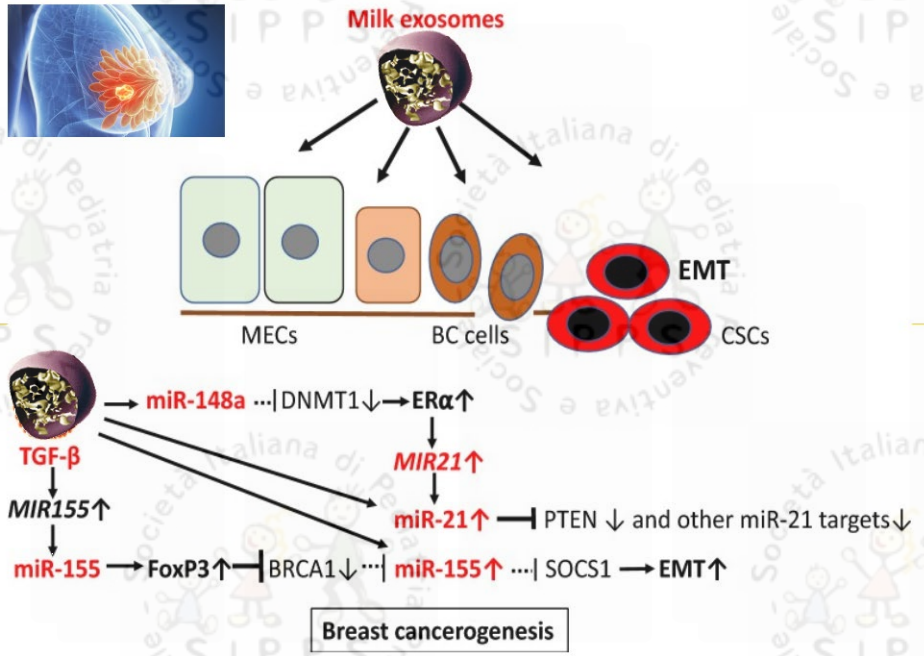
Neuroinfiammazione

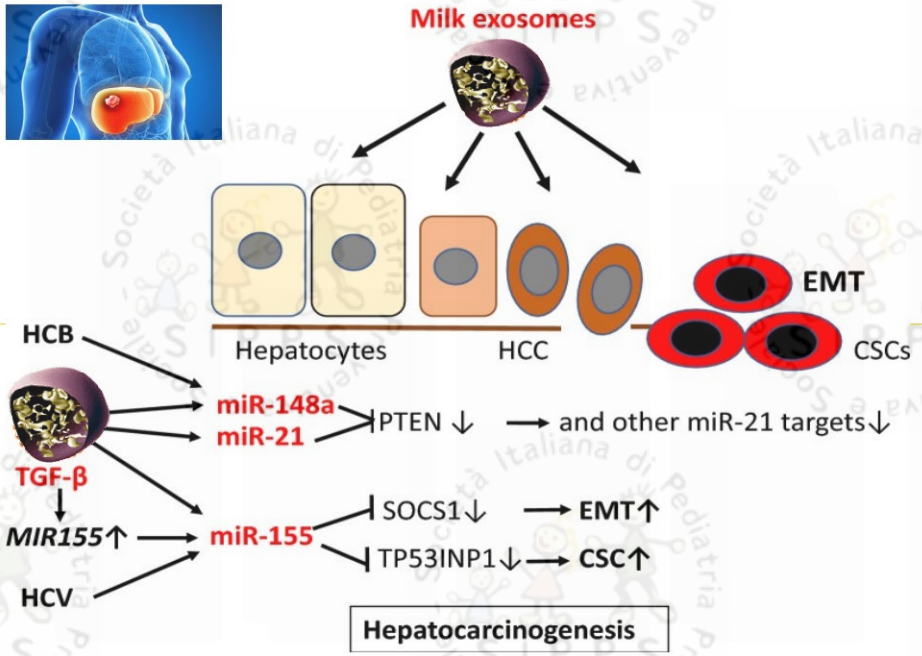
MILK EXOSOMES



miR








EXOSOMES *free*

Dal *Microchimerismo* al:

Nat Rev Immunol. 2017 Aug;17(8):483-494.

Immunological implications of pregnancy-induced microchimerism.

Kinder JM et al.

- Division of Infectious Disease, Cincinnati Children's Hospital & Perinatal Institute. USA.
-Laboratory for Experimental Feto-Maternal Medicine,
- Department of Obstetrics and Prenatal Medicine, University Medical Center Hamburg-Eppendorf, Germany.

Le **cellule microchimiche** esprimono tratti antigenici non ereditari e familiari rilevanti non sono "ricordi" casuali della gravidanza

sono intenzionalmente mantenute nelle madri e nella loro prole per promuovere l'idoneità genetica migliorando l'esito delle future gravidanze

grazie ad un MICROCHIOMA biologicamente attivo formato da cellule geneticamente estranee.

Protezione

Ca. Mammario

Neoplasie epiteliali

Tumori

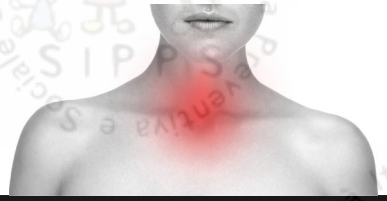
MICROCHIOMA

MICROCHIOMA

Autoimmuni

Tiroidite di Hashimoto

Malattia di Graves

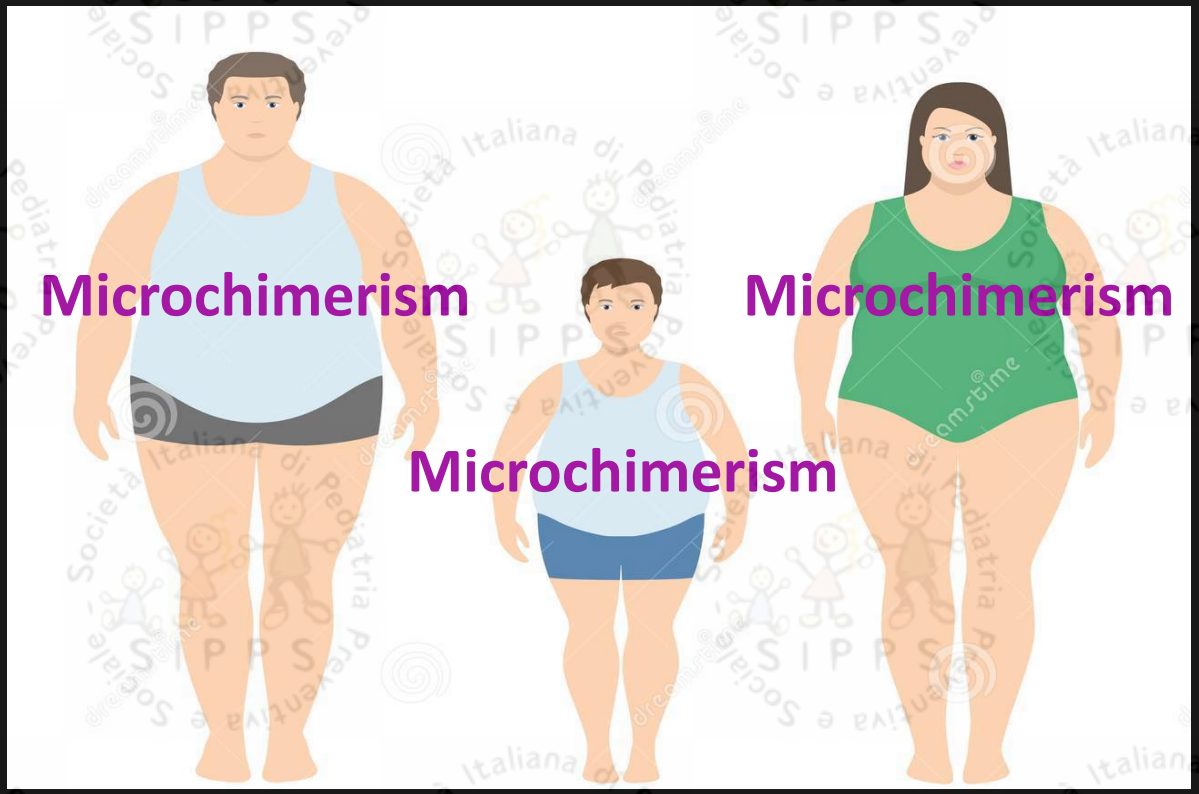


Aggravamento

Med Hypotheses. 2012 Apr;78(4):528-32.

A role for microchimerism in obesity and evolution?

Schnitzler M



Bioessays. 2015 Oct;37(10):1106-18.

Fetal microchimerism and maternal health: a review and evolutionary analysis of cooperation and conflict beyond the womb.

Boddy AM et al.

-Department of Psychology, Arizona State University, Tempe, AZ, USA.
-Center for Evolution and Cancer, University of California San Francisco, San Francisco, CA, USA.
-Center for Evolution and Medicine, The Biodesign Institute, Arizona State University, USA.
-School of Life Sciences, Arizona State University, Tempe, AZ, USA.

Salute emotiva e materna

Migliorano la produzione di latte

Funzione tiroidea

Malattia autoimmune

Guarigione delle ferite

Prevenzione neoplasie

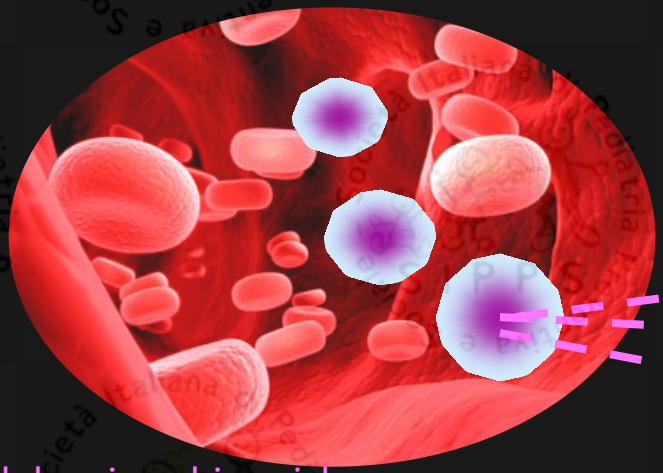
J Clin Endocrinol Metab. 2012 May;97(5):1452-61.

Microchimerism and endocrine disorders.

Fugazzola L et al.

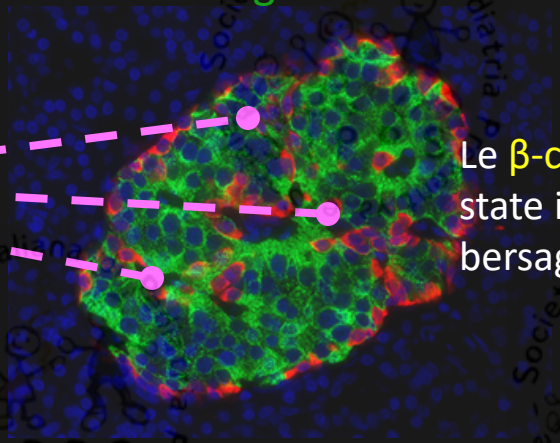
Department of Medical Sciences, University of Milan,
Istituto di Ricovero e Cura a Carattere Scientifico Ca' Granda, Milan, Italy.

Diabete di tipo 1



le cellule microchimeriche circolanti sono statisticamente superiori rispetto ai controlli.

Insula di Langherans



Le β-cellule femminili sono state ipotizzate come bersagli di autoimmunità

Gynecol Obstet Fertil. 2011 Apr;39(4):224-31.

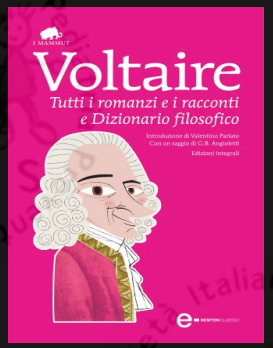
Is fetal microchimerism beneficial for the fetus or the mother

Boyon C

Eur J Obstet Gynecol Reprod Biol. 2011 Oct;158(2):148-52.

Fetal microchimerism: benevolence or malevolence for the mother?

Boyon C(1)

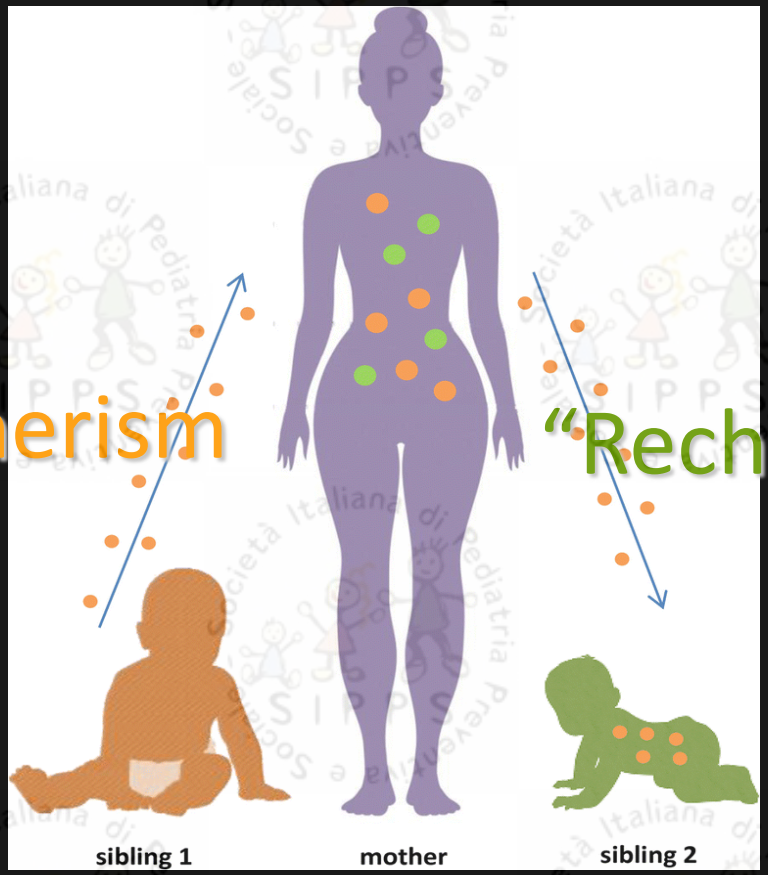


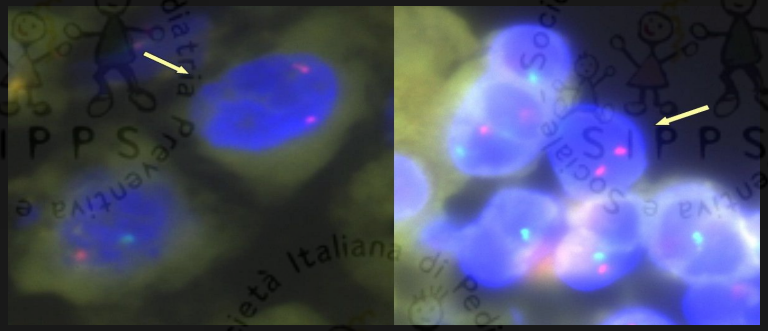
Candide

Il dubbio non è piacevole, ma la certezza è ridicola

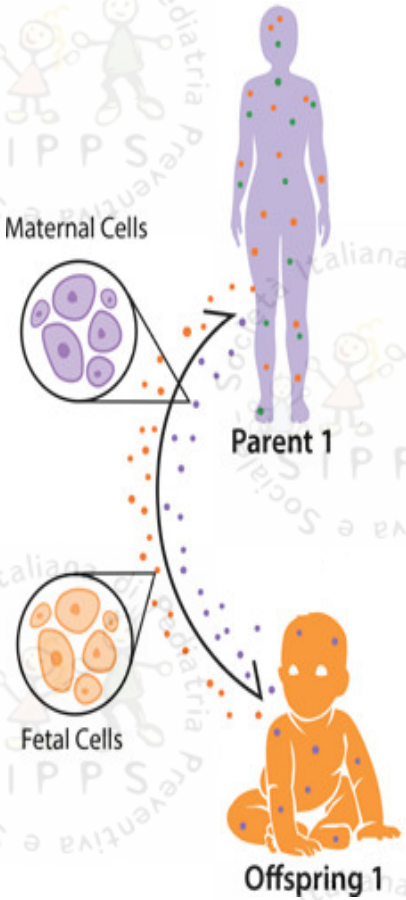
Chimerism

"Rechimerism"

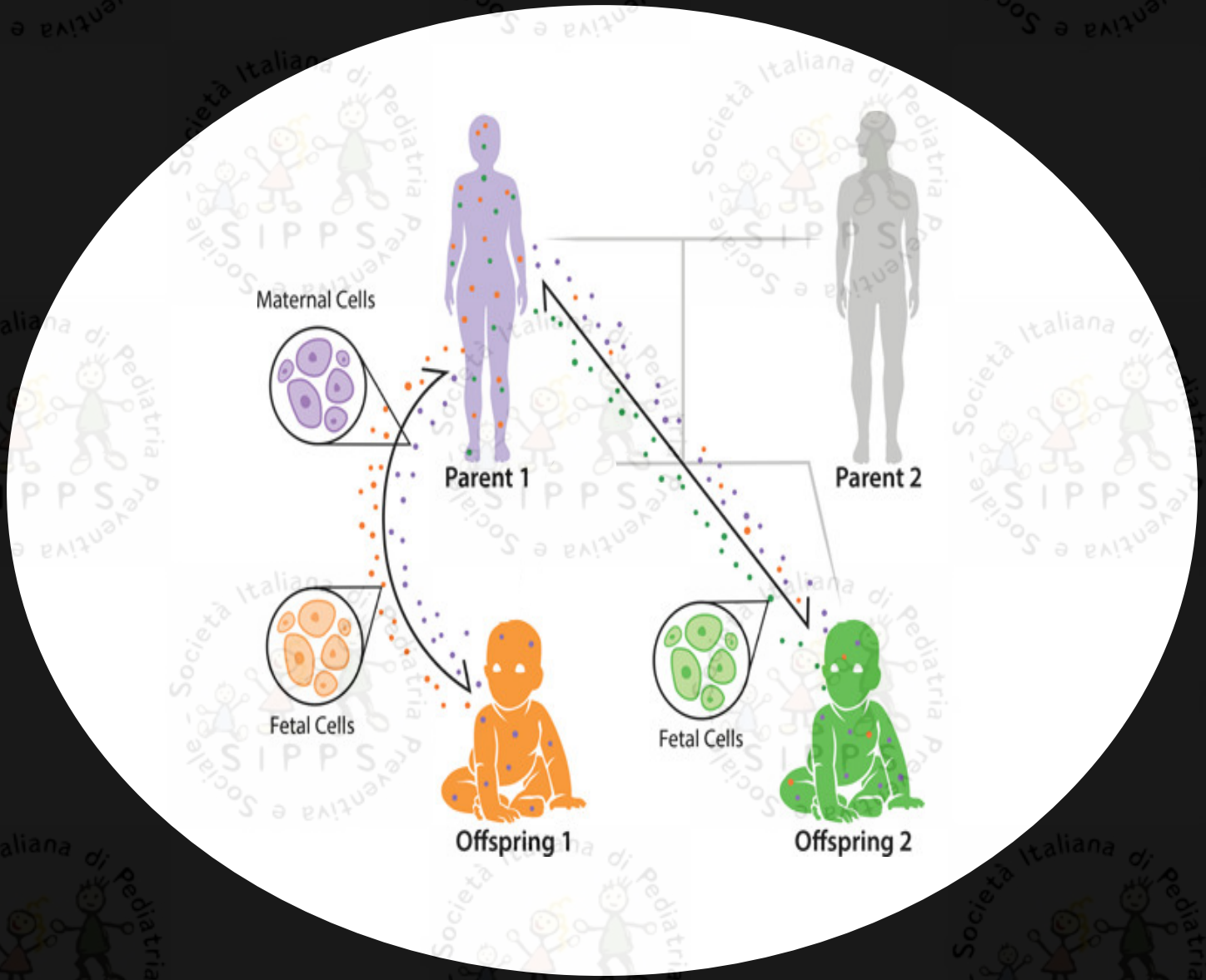




MICROCHIMERISMO

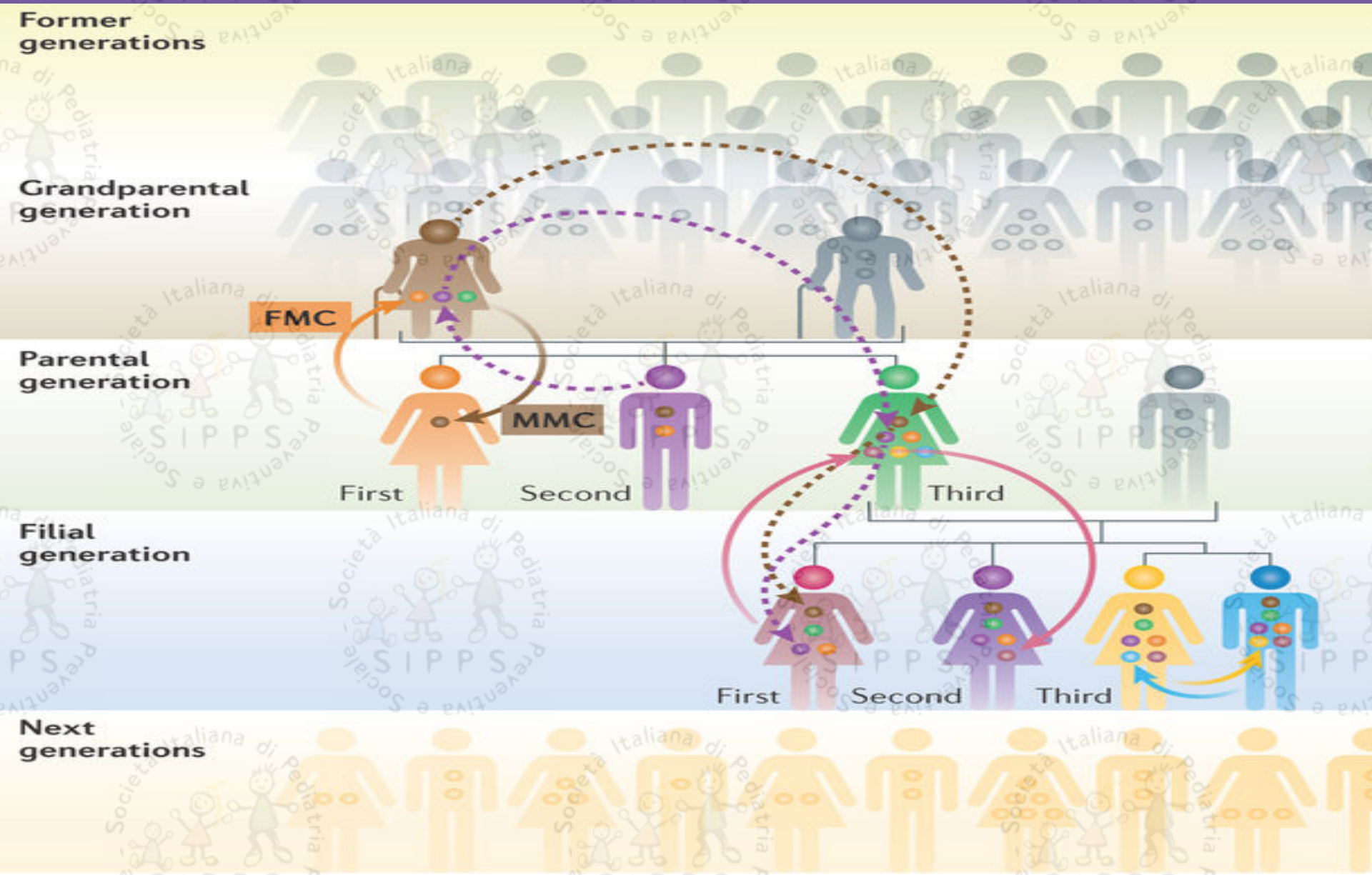


MICROCHIMERISMO



nature REVIEWS IMMUNOLOGY

Trasmissione transgenerazionale di cellule staminali



Cellule che viaggiano nel tempo…

PLoS One. 2011;6(8):e24101.

Pregnancy, microchimerism, and the maternal grandmother.

Gammill HS et al.

Division of Clinical Research, Fred Hutchinson Cancer Research Center
Seattle, Washington, United States of America.

Trasferimento genico

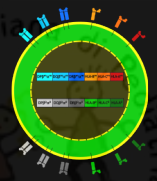
Transgenerazionale

Followed longitudinally

HLA-genotyped

DRB1
DQA1
DQB1

DRB1
DQA1
DQB1

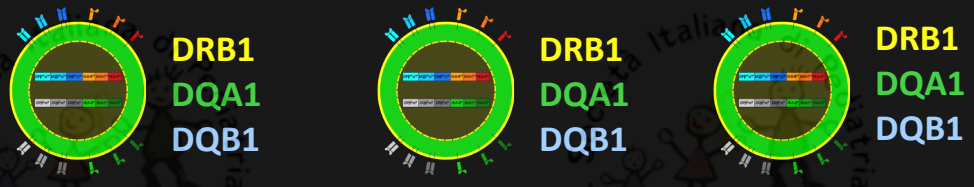


DRB1
DQA1
DQB1

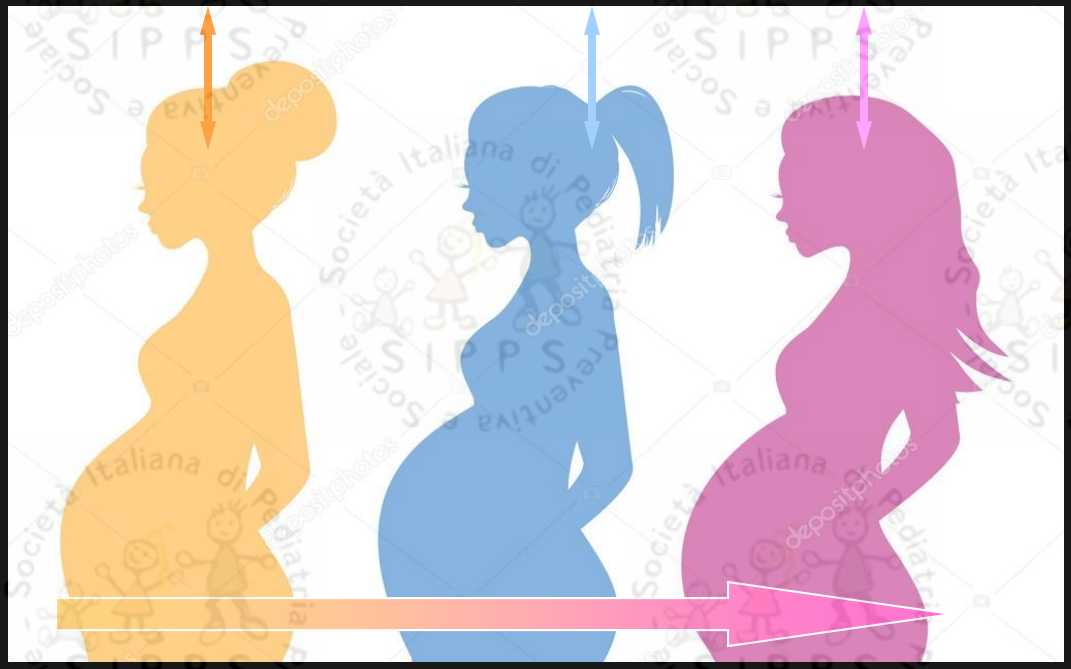
PCR *real time*

Followed longitudinally

HLA-genotyped



PCR *real time*



Il trasferimento del microchioma delle nonne è rilevabile durante una gravidanza “normale” e diminuisce in preeclampsia e rappresenta un marker di un sano adattamento materno alla gravidanza.

Chimerism. 2013 Jan-Mar;4(1):18-9.

We are all born as microchimera.

Dierselhuis M et al.

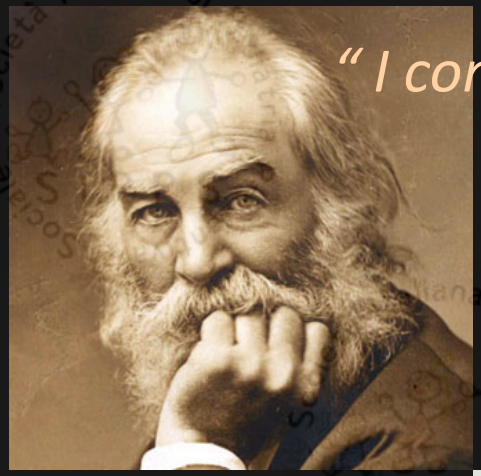
Department of Pediatrics, Leiden University Medical C
The Netherlands.

Nobody is born naïve: we are all microchimera's.

Il passaggio tran-materno delle cellule
dai fratelli maggiori è una possibile fonte di

Microchimerismo non fetale

nelle donne nullipare

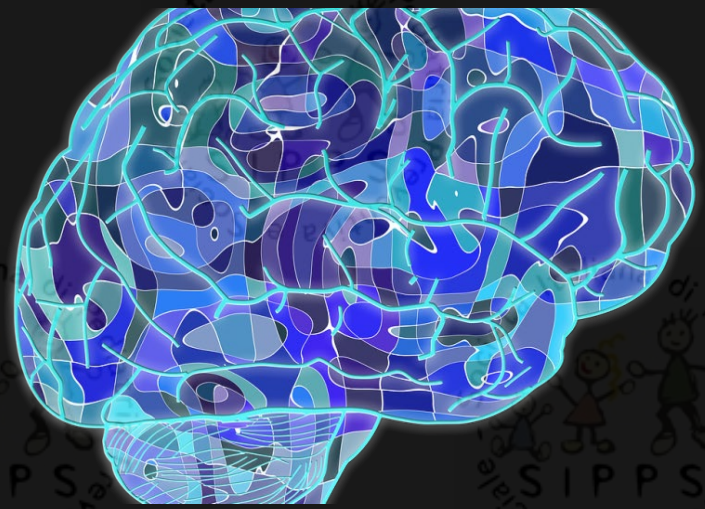


“ I contain multitudes…”

Walt Whitman

Song of Myself

Déjà vu



Transport across

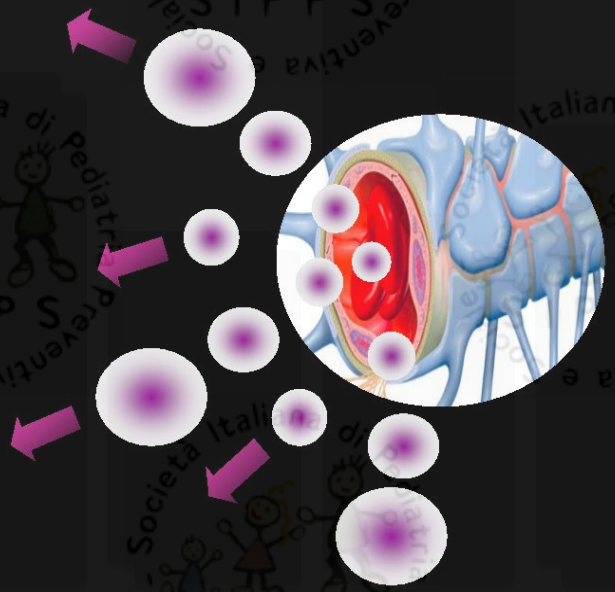
Blood Brain Barrier

Transport across BBB

Dawe GS et al
Cell migration from baby to mother.
Cell Adh Migr. 2007 Jan-Mar;1(1):19-27..

Tanaka A et al.
Fetal microchimerisms in the mother: immunologic implications.
Liver Transpl. 2000 Mar;6(2):138-43.

Boyon C et al.
Is fetal microchimerism beneficial for the fetus or the mother
Gynecol Obstet Fertil. 2011 Apr;39(4):224-31..

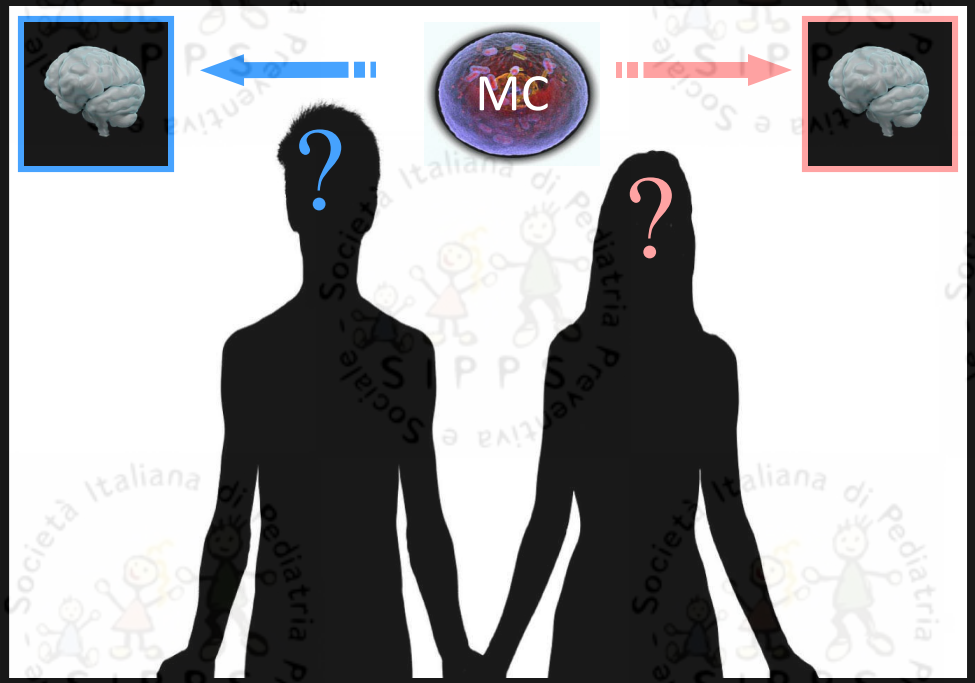


Chimerism. 2013 Jan-Mar;4(1):32-3.

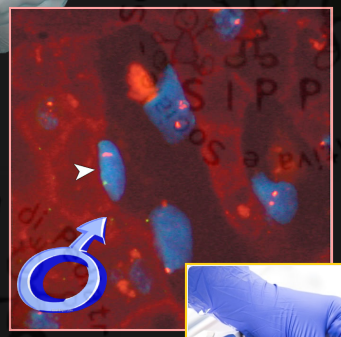
Microchimerism in the human brain: more questions than answers.

Chan Wfet al.

Department of Biochemistry, University of Alberta, Edmonton, AB Canada.

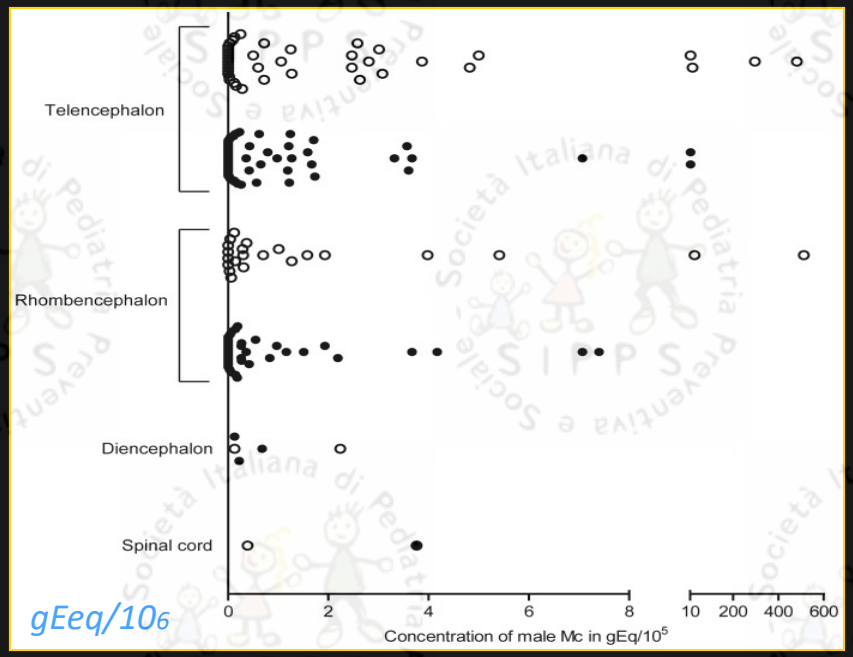


male MC



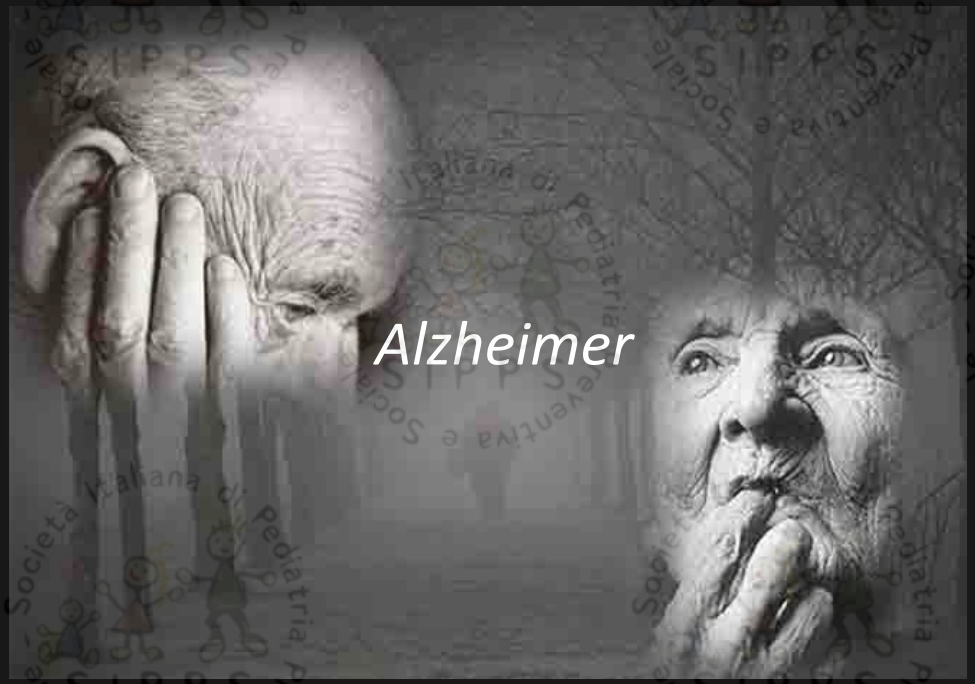
PCR quantitativa in tempo reale

Concentration of male MC



*Le cellule "**MC maschili** "sono presenti prevalentemente* **nelle donne (67%)**

Sono o statisticamente inferiori nelle donne affette da **ALzheimer**


Alzheimer

Se non riesci a ricordare dove hai messo le chiavi, non pensare subito all'Alzheimer. Inizia invece a preoccuparti se non riesci a ricordare a cosa servono le chiavi."
Rita levi Montalcini

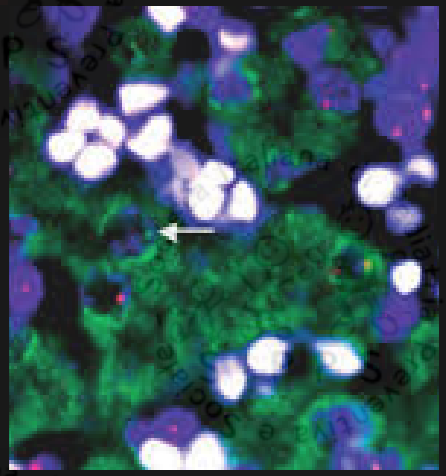
Una cosa buona dell'Alzheimer... incontri ogni giorno gente nuova.
Woody Allen

Il cervello delle donne

Contrasti adolescenziali

Condivisione istintiva

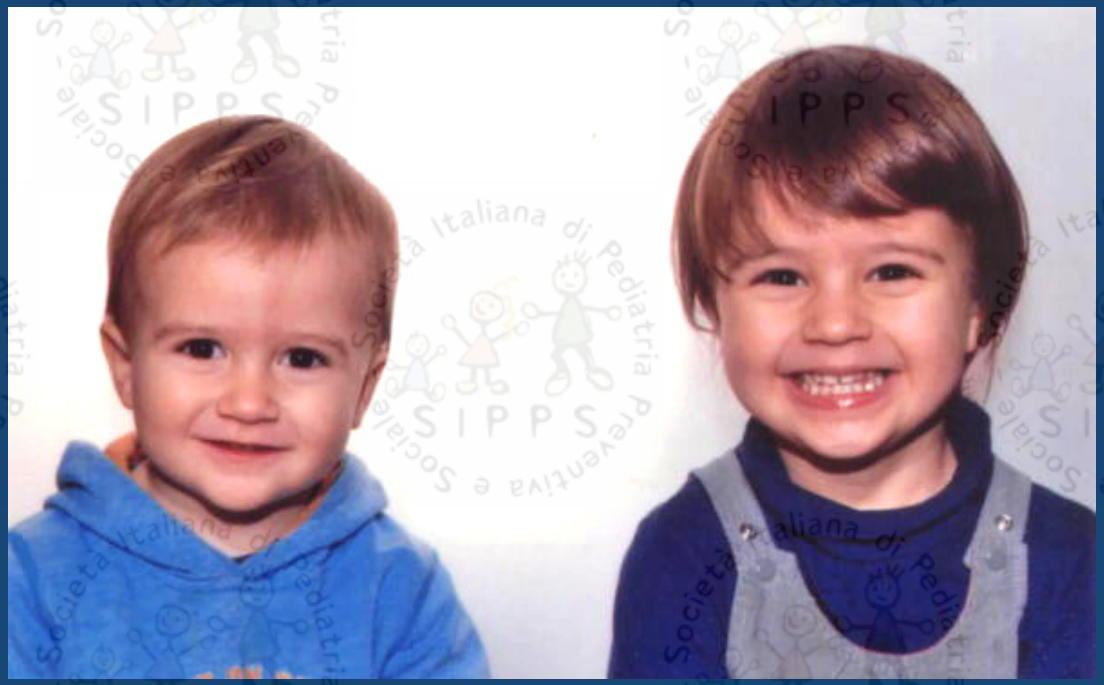
MiSteRO



I giocattoli più semplici
quelli che anche il bambino più piccolo
riesce ad usare
vengono chiamati nonni.

I nonni sono coloro che
vengono da lontano
e vanno via per primi
ad indagare oltre la vita….

Vi ringraziamo per l'attenzione



che avete dedicato a nostro nonno

Giulia e Jozio

To be continued…