

**The Lord is like a strong tower, where the righteous can go and be safe.**

Proverbs 18:10

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# DIYARYO KABITENYO

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**Be alert, stand firm in the faith, be brave, be strong.**

1 Corinthians 16:13

## ‘Hot Meals On Wheels’ of PH Red Cross deployed in Cavite

To provide ready-to-eat meals to 200 lockdown affected residents, the Philippine Red Cross (PRC) sent out its “Hot Meals On Wheels” to the province of Cavite.

“Patuloy ang ating paghahatid ng pag-asa sa pamamagitan ng food truck sa Cavite upang matulongan ang naapektuhan ng lockdown,” PRC Chairman and Chief Executive Officer (CEO) Richard Gordon said in a statement last Oct. 6.

Gordon said that his heart is close to Cavite because of his grandmother who hails from the province. “Gayunpaman, kahit saan man sulok ng bisnes, walang mawalan sa

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### VaxCertPh booths now open in Robinsons Place Imus

Robinsons Malls Department of Information and Communications Technology (DOH), Department of Interior and Local Government (DILG),

Department of Information and Communications Technology (DICT) in implementing the VaxCertPh program, a portal for the

issuance of coronavirus disease 2019 (Covid-19) vaccination certificates to fully inoculated overseas Filipino workers (OFWs) and Filipinos

going abroad.

The VaxCertPH platform serves as the country's unified vaccine certificate system under the DICT and

Department of Health (DOH). The digital vaccine certificates complies with the digital guidelines issued by

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# DIYARYO KABITENYO

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ARNULFO BARCO  
Publisher - EditorGENER BARCO  
Operations Manager

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## Papi

Publishers Association of the Philippines, Inc.

# Iron deficiency in middle age is linked with higher risk of developing heart disease

Approximately 10% of new coronary heart disease cases occurring within a decade of middle age could be avoided by preventing iron deficiency, suggests a study published October 5, 2021 in ESC Heart Failure, a journal of the European Society of Cardiology (ESC).

"This was an observational study and we cannot conclude that iron deficiency causes heart disease," said study author Dr. Benedikt Scheegge of the University Heart and Vascular Centre Hamburg, Germany. "However, evidence

is growing that there is a link and these findings provide the basis for further research to confirm the results."

Previous studies have shown that in patients with cardiovascular diseases such as heart failure, iron deficiency was linked to worse outcomes including hospitalizations and death. Treatment with intravenous iron improved symptoms, functional capacity, and quality of life in patients with heart failure and iron deficiency enrolled in the FAIR-HF trial. Based on these re-

sults, the FAIR-HF trial is investigating the impact of intravenous iron supplementation on the risk of death in patients with heart failure.

The current study aimed to examine whether the association between iron deficiency and outcomes was also observed in the general population.

The study included 12,164 individuals from three European population-based cohorts. The median age was 59 years and 55% were women. During the baseline study visit, cardiovascular risk factors and comorbidities such as smoking, obesity, diabetes and cholesterol were assessed via a thorough clinical assessment including blood samples.

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(HOT... from page 1)

panahon ng pandemya, at ang Red Cross ay nariyan kung saan ang tulong ay kailangan," he added.

The "Hot Meals On Wheels" catered to persons with disabilities, solo parents, and senior citizens at Brgy. Poblacion 2 and 4 in Gen. Emilio Aguinaldo, Cavite on Oct. 5.

The PRC Cavite Chapter, led by its administrator Luz Acencio, continues to roll out its "Hot Meals On Wheels" to provide immediate food assistance to the most vulnerable

individuals of Cavite. Earlier, the chaplain also distributed food packs to 273 individuals at the isolation facilities and vaccination sites.

To provide access to far-flung communities needing immediate assistance, PRC started various initiatives to bring PRC's humanitarian services through "Bakana" Bus, Hot Meals on Wheels, mobile clinics, amphibian trucks, and the M/V PRC Amazing Grace which is the country's only humanitarian vessel.

(DuoCartPh... from page 1)

the World Health Organization (WHO). In addition, the DuoCartPh aims to represent the certificate holder's vaccination status and to provide OFWs a vaccination certificate that

will be recognized in foreign jurisdiction. DuoCartPh is accepted in all countries.

DuoCartPh booth is now open in Robinsons Place Imus, Cavite.

**AFFIDAVIT OF SELF-ADJUDICATION**

NOTICE is hereby given that the estate of the late **MARIA MYRNAG LANGIT** (also known as **MYRNAG LANGIT**) who died intestate on August 29, 2021 at Divine Grace Medical Center, Tapan, General Trias City, Cavite, described as Lot 1220-A, consisting of parcel of land without any improvement erected thereon situated in Barangay Pansa, Tansa, Cavite with a total area of **ONE THOUSAND TWO HUNDRED SEVENTY NINE (1,279) SQUARE METERS**, embraced by Transfer Certificate of Title No. T-956778 has been self-adjudicated by her legal and forced heir **ELOISA MARIE L. NUADA** on September 21, 2021 in Tansa, Cavite, Philippines before Notary Public Atty. Jaime B. Arca and entered in his Notarial Register as Doc. No. M, Page No. 6, Book No. XXI, Series of 2021.

(Sgt.) **Hels-Albant**

Publication: **DIYARYO KABITENYO**  
Dates: September 27, October 4 & 11, 2021

# Neuroscientists map major circuit in the mouse brain

A UCLA study using mice reveals new insights into the wiring of a major circuit in the brain that is attacked by Parkinson's and Huntington's disease. The findings could help scientists' understanding of how these disorders arise in the human brain and pinpoint new therapeutic targets.

Published October 6, 2021 in *Nature*, the research is part of a special package of 17 articles written by a consortium of neuroscientists nationwide. The work was conducted under the

auspices of the BRAIN Initiative Cell Census Network (BICCN) as part of a massive effort to compile a complete atlas of cells in the brain. The ambitious project aims to unlock the mysteries of the primary motor cortex, a part of the mammalian brain that controls movement.

With funding from the National Institute of Mental Health and the National Institutes of Health's BRAIN Initiative, the UCLA team meticulously investigated how the mouse brain is wired.

Their research analyzed 600 pathways and catalogued nerve-cell connectivity to create a wiring diagram of critical brain circuits.

"Like any explorer traveling deep into uncharted territory, we make maps to guide future visitors," said Dr. Hong-Wei Dong, the study's lead author and a professor of neurobiology at the David Geffen School of Medicine at UCLA. "My lab mapped out the circuitry of the mouse brain to enable other

scientists to conduct more accurate experiments in mouse models of diseases like Parkinson's or Huntington's disease."

Dong and his colleagues labeled a small number of individual neurons with a green dye, enabling the team to track their connections with other neurons through arm-like projections called axons and dendrites. These connections, called circuits, process and communicate distinct types of sensory information in the brain.



REPUBLIC OF THE PHILIPPINES  
PROVINCE OF CAVITE  
MUNICIPALITY OF MENDEZ PEÑANO  
OFFICE OF THE LOCAL CIVIL REGISTRAR

**NOTICE TO THE PUBLIC**

CC-0010-2021 RA 10172

In compliance with the publication requirement set pursuant to OCRG Memorandum Circular No. 2013-1 Guidelines in the Implementation of the Administrative Order No. 1 Series of 2012 (IRR on R.A. 10172), Notice is hereby served to the public that **NELIA F. OCTAVIANO** has filed with this Office, a petition for Correction of Clerical Error in the Date of Birth, from **SEPTEMBER 26, 1953 to SEPTEMBER 14, 1953** in the Certificate of Live Birth of **NELIA PEÑANO** at Mendez, Cavite and whose parents are **VEDAL PEÑANO** and **NICOLASA ERNL**.

Any person adversely affected by said petition may file his written opposition with this office not later than October 18, 2021.

(Sgt.) **REYNALDO E. BACOS**  
Municipal Civil Registrar

DIYARYO KABITENYO - October 4 & 11, 2021



REPUBLIC OF THE PHILIPPINES  
Local Civil Registry Office  
Municipality of Tansa  
Province of Cavite



**NOTICE OF PUBLICATION**

In compliance with Sec. 5 of Rep. Act No. 9648, a notice is hereby served to the public that **MA. CONSOLACION P. ALARCA** has filed with this office a petition for **CHANGE OF FIRST NAME (OCRO & LCRO Copy)** from **Maria Consolacion** to **Ma. Consolacion** in the **CERTIFICATE OF LIVE BIRTH** of one **MARIA CONSOLACION BAUTISTA PADUA** who was born on August 28, 1961 at Tansa, Cavite and parents were **Juan Barbachano Padua & Basilia Reyes Bautista**.

Any person adversely affected by said petition may file his written opposition with this Office not later than October 18, 2021.

(Sgt.) **MA. THERESA J. CESA**  
Municipal Civil Registrar

DIYARYO KABITENYO - October 4 & 11, 2021

**EXTRA JUDICIAL SETTLEMENT OF ESTATE WITH WAIVER OF RIGHTS**

NOTICE is hereby given that the estate of the late **ROWENA SANTON MANALLE** who died intestate on March 24, 2019 at Pasing Buaya, Imus City, Cavite, consisting of a personal property with Branch number 2771 of City of Imus, Cavite particularly described as follows:

MAKE	Honda TXM1199
DENOMINATION	Three46
PLATE NO.	WEX0704
ENGINE NO.	KR0508942160
CHASSIS NO.	K1000842160
NV FILE NO.	0412-0000147284

has been adjudicated and extra-judicially settled by and between her heirs, **JUAN KATRINA BEA S. MANALLE** hereby WAIVES, RENOUNCES and QUITS CLAIMS, Interest, whomever SHARE, RIGHT, INTEREST, OWNERSHIP, and PARTICIPATION she has in the above described personal property in favor of **ROBERTO C. MANALLE JR.** on October 26, 2020 at the City of Imus, Cavite, Philippines before Notary Public Atty. Ramil S. Sasi and entered in his Notarial Register as Doc. No. 222, Book No. 46, Page No. VIII, Series of 2020.

(Sgt.) **ROBERTO C. MANALLE JR. and KATRINA BEA S. MANALLE** assisted by her father

Publication: **DIYARYO KABITENYO**  
Dates: October 4, 11 & 18, 2021

In particular, the researchers scrutinized the cortico-basal ganglia-thalamic loop, a crucial neural circuit that links regions in the brain that regulate movement, emotions and complex cognitive processes like learning and memory. The loop is affected by neurodegenerative disorders like Parkinson's disease and Huntington's disease, and a range of other neurological and psychiatric disorders.



Republic of the Philippines  
Province of Cavite  
Municipality of Alfonso

OFFICE OF THE MUNICIPAL CIVIL REGISTRAR

NOTICE FOR PUBLICATION

In compliance with Section 5 of R.A. No. 9048, a notice is hereby served to the public that ARNELX DACULLA has filed with this office a petition for change of first name from FELIX to ARNEL in the birth certificate of FELIX SANGALANG DACULLA who was born on February 21, 1974 at Ilog, Alfonso, Cavite, and whose parents are Clemente Silvan Darcilla and Lamila A. Sogalang.

Any person adversely affected by said petition may file his written opposition with this Office not later than October 25, 2021.

(Sgt.) TERESITA A. GALANG  
Civil Registrar

DIYARYO KABITENYO - October 11 & 18, 2021



Republic of the Philippines  
OFFICE OF THE CITY  
CIVIL REGISTRAR  
City of General Trias, Cavite  
(0402) 509-5014

NOTICE OF PUBLICATION

In compliance with Section 5 of R.A. 9048, notice is hereby served to the public that NELSON B. ALEJAGA JR. has filed with this office a petition for Change of First Name from JAIME to RONALDO in the birth certificate of JAIME CENCERO BALEBIO who was born on 07 October 1959 at General Trias, Cavite and whose parents are Leonardo C. Hilarin and Rosaline M. Centeno.

Any person adversely affected by said petition may file his/her written opposition to this Office not later than October 25, 2021.

(Sgt.) ARLENE E. BUSTONG  
City Civil Registrar

DIYARYO KABITENYO - October 11 & 18, 2021

REPUBLIC OF THE PHILIPPINES  
LOCAL CIVIL REGISTRY OFFICE  
PROVINCE OF CAVITE  
MUNICIPALITY OF NAIC

NOTICE OF PUBLICATION

In compliance with Sec. 5 of R.A. 9048, a notice is hereby served to the public that (Petitioner) has filed with this Office a petition for Change of First Name from MERLE to LIRA in the birth certificate of MERLE VERGARA CALANTOG, born on AUGUST 27, 1961 at NAIC, CAVITE, child of spouses MACARIO NAZARENO CALANTOG and RUPINA LINTOK VERGARA.

Any person adversely affected by said petition, may file his written opposition to this Office not later than October 25, 2021.

(Sgt.) GLORIA P. BAGO  
Municipal Civil Registrar

DIYARYO KABITENYO - October 11 & 18, 2021



Republic of the Philippines  
Province of Cavite  
OFFICE OF THE CITY CIVIL REGISTRAR  
Trece Martires City

R.A. Form No. 10.1 (LCRO)

NOTICE FOR PUBLICATION

In compliance with Section 5 of Republic Act No. 9048, a notice is hereby served to the public that ROWENA S. BIMBO has filed with this office a PETITION FOR CHANGE OF FIRST NAME from "ROSILA" to "ROWENA" in the Certificate of Live Birth of ROSILA SAMOYA BIMBO who was born on JUNE 28, 1987 at MAYAN, ZAMBOANGA DEL NORTE and whose parents are ROMEO D. BIMBO and ROSALINDA B. SAMOYA.

Any person adversely affected by said petition may file his/her written opposition with this office not later than October 25, 2021.

(Sgt.) MAXIMO JR. L. LINTOK  
City Civil Registrar

DIYARYO KABITENYO - October 11 & 18, 2021

EXTRAJUDICIAL SETTLEMENT OF ESTATE  
OF THE DECEASED DANILO TAPAWAN REYES

NOTICE is hereby given that the estate of the deceased DANILO TAPAWAN REYES who died intestate on August 24, 2021 at Imus City, Cavite, consisting of bank account with the PHILIPPINE NATIONAL BANK (PNB-Imus Branch) the PHILIPPINE NATIONAL BANK (PNB-Imus Branch) under Savings Account No. 243310145340 with a balance of P292,589.70 as of June 30, 2021 has been adjudicated and extrajudicially settled by and among his heirs with waiver, rights and interests in favor of CLARITA L. REYES solely and exclusively; and for and in consideration of the said withdrawal release/transfer of said fund, they, the heirs above-mentioned, hereby expressly and absolutely renounce, release and forever and discharge the PNB, its administrators and assigns and/or any of its officers or employees from any and all claims, suits, actions or causes of action which their successors or assigns now have, or in the future may have against the said Bank in connection with said deposit and they hereby further obligate themselves jointly and severally, to indemnify the said Bank, its administrator and assigns and/or its officers or employees for any loss or damages which they may sustain arising out of any claim/suit or proceedings initiated by any third person or entity whether private or governmental including, but not limited to, claims by excluded heirs or tax claims by the government in September 22, 2021 at Imus City, Cavite before Notary Public Atty. Carlos Emmanuel C. Montoya and entered in his Notarial Register as Doc. No. 71, Page No. 15, Book No. XIV, Series of 2021.

(Sgt.) All Heirs

Publication: DIYARYO KABITENYO  
Dates: October 11, 18 & 25, 2021

EXTRAJUDICIAL SETTLEMENT OF ESTATE  
OF THE DECEASED  
ROBERTO DE SAHAGUN GONZALES

NOTICE is hereby given that the estate of the deceased ROBERTO DE SAHAGUN GONZALES who died intestate on June 28, 2012 at Bacoor, Cavite, consisting of real property with improvements situated in the Barangay of Salinas, Municipality of Bacoor, Province of Cavite, Island of Luzon, containing an area of TWENTY FOUR (24) SQUARE METERS, with TECHNICAL DESCRIPTION, Lot 17, Block 9, subdivision 197704 SALINASVILLE II HOMEOWNERS ASSOC. has been adjudicated and extrajudicially settled by and among his heirs on October 8, 2021 at the City of Imus, Cavite before Notary Public Atty. Carlos Emmanuel C. Montoya and entered in his Notarial Register as Doc. No. 269, Page No. 56, Book No. XXV, Series of 2021.

(Sgt.) All Heirs

Publication: DIYARYO KABITENYO  
Dates: October 11, 18 & 25, 2021

# Better understanding of cystic fibrosis

Researchers at the University of Saskatchewan (USask) are hopeful new understanding of cellular defects related to Cystic Fibrosis (CF) could help pave the way for treatment of the disease. A team in the College of Medicine led by Drs. Juan Llanowski (PhD) and Julian Tam (MD) found that sodium transport is abnormal in lungs

with CF. The researchers, affiliated with the Respiratory Research Centre, studied the swine model of CF and used a specialized microelectrode technique that allowed them to perform experiments with very high resolution. They discovered there is excessive sodium absorption in the small airways, a previously unstudied site in the body.

"A precise understanding of the cellular basis of CF lung disease is a prerequisite for the development of treatments such as gene therapy

that have the potential to cure CF," said Tam. "CFTR modulators, such as Trikafta, can improve life for about 90 per cent of patients. Our work is especially relevant to that 10 per cent of people with CF who cannot benefit from these medications." Their findings were published in the journal Cell Reports on Oct. 5.

**DEED OF EXTRA JUDICIAL SETTLEMENT OF ESTATE OF THE LATE GUILLERMO LEE**

NOTICE is hereby given that the estate of the late GUILLERMO LEE who died intestate on April 28, 2020 at Gen. Trias City, Cavite, consisting of interest, title and participation over TWENTY ONE (21%) PERCENT share over each and every parcel of land situated in Cavite City, some with improvements erected thereon, and more particularly described as follows:

**(1) Transfer Certificate of Title No. T-19733**

A parcel of land situated in the Dist. of Cavidad, City of Cavite, containing an area of ONE HUNDRED EIGHTY (180) SQUARE METERS, more or less.

**(2) Transfer Certificate of Title No. T-18724**

A parcel of land situated in the Dist. of Cavidad, Cavite City, containing an area of ONE HUNDRED EIGHTY (180) SQUARE METERS, more or less.

**(3) Transfer Certificate of Title No. T-19735**

A parcel of land situated in the Dist. of Cavidad, Cavite City, containing an area of ONE HUNDRED NINETY SEVEN (197) SQUARE METERS, more or less.

**(4) Transfer Certificate of Title No. T-18726**

A parcel of land situated in the Dist. of Cavidad, Cavite City, containing an area of TWO HUNDRED (200) SQUARE METERS, more or less.

**(5) Transfer Certificate of Title No. T-19737**

A parcel of land situated in the Dist. of Cavidad, Cavite City, containing an area of ONE HUNDRED FIFTY (150) SQUARE METERS, more or less.

**(6) Transfer Certificate of Title No. T-19738**

A parcel of land situated in the Dist. of Cavidad, Cavite City, containing an area of ONE HUNDRED FIFTY (150) SQUARE METERS, more or less.

**(7) Tax Declaration No. 02-0907-090709**

A two-story building  
Location: Calabar N.,  
Barangay: Stg. 37 (Cadena de Amor), Cavidad,  
Cavite City

**(8) Tax Declaration No. 02-0907-090709**

A two-story building  
Location: Calabar N.,  
Barangay: Stg. 37 (Cadena de Amor), Cavidad,  
Cavite City

and in Las Pilas City, the following properties:

**(1) Transfer Certificate of Title No. T-62493**

A parcel of land situated in the Bo. of Talon, Mun. of Las Pilas, Prov. of Rizal (Metro Manila) Island of Luzon, containing an area of FOUR HUNDRED SIX (406) SQUARE METERS, more or less.

**(2) Transfer Certificate of Title No. T-62352**

A parcel of land situated in the Bo. of Talon, Mun. of Las Pilas, Prov. of Rizal (Metro Manila) Island of Luzon, containing an area of ONE THOUSAND FIVE HUNDRED SIXTY EIGHT (1,568) SQUARE METERS, more or less.

**(3) Tax Declaration No. T-016-6450**

A two-story commercial building  
Location of Property: Alibang-Zapote Road  
Barangay: Talon Castro, Las Pilas City  
Lot No. 1-E-1-A

**(4) Tax Declaration No. F-016-6666**

A ground floor store  
Location of Property: Alibang-Zapote Road  
Barangay: Talon Castro, Las Pilas City  
Lot No. 1-E-1-B

**(5) Tax Declaration No. F-016-6666**

A two-story warehouse  
Location of Property: Alibang-Zapote Road  
Barangay: Talon Castro, Las Pilas City  
Lot No. 1-E-1-B

That likewise, the above named deceased, GUILLERMO LEE, as widower, left several parcels of land, some with improvements erected thereon, located at Cavite City and more particularly described as follows:

**(1) Transfer Certificate of Title No. T-19739**

A parcel of land situated in the Dist. of Cavidad, Cavite City, containing an area of THREE HUNDRED TWENTY ONE (321) SQUARE METERS, more or less.

**(2) Transfer Certificate of Title No. T-19740**

A parcel of land situated in the Dist. of Sta. Cruz, Cavite City, Island of Luzon, containing an area of SIXTY EIGHT (68) SQUARE METERS, more or less.

**(3) Transfer Certificate of Title No. T-19741**

A parcel of land situated in the City of Cavite, containing an area of ONE HUNDRED NINETY THREE (193) SQUARE METERS, more or less.

A parcel of land situated in the City of Cavite, containing an area of SIXTY ONE (61), more or less.

**(4) Transfer Certificate of Title No. T-19754**

A parcel of land situated in the City of Cavite, containing an area of ONE HUNDRED EIGHTY SIX (186) SQUARE METERS, more or less.

**(5) Tax Declaration No. 01-2009-00248**

A two-story building  
Location of Property: Barina N.,  
Brgy. 9 (Kawaray)  
Sta. Cruz, Delabaco  
Cavite City

**(6) Tax Declaration No. 01-2009-00249**

A one-story building  
Location of Property: 124 F. Dela Cruz St.,  
Brgy. 39 (Accion)  
Cavidad  
Cavite City

That, moreover, the above named deceased, GUILLERMO LEE, married to Eufrosina Glize Lee (the said wife having died on February 25, 1997, at Manila, and which estate of said deceased, Eufrosina Glize Lee, has already been extra-judicially settled in 1997 by all the heirs), left several parcels of land, without improvements, located at Cavite City and San Mateo, Rizal, and more particularly described as follows, to wit:

**(1) Transfer Certificate of Title No. T-19872**

A parcel of land situated in the Barrio of Sta. Cruz, Cavite City, Island of Luzon, containing an area of ONE HUNDRED SEVENTY (170) SQUARE METERS, more or less.

**(2) Transfer Certificate of Title No. N-493185**

A parcel of land situated in the Barrio of Angad, Municipality of San Mateo, Province of Rizal, containing an area of FORTY EIGHT (48) SQUARE METERS, more or less.

has been adjudicated and extra-judicially settled by and among his heirs in equal shares on March 26, 2021 at Tagaytay City before Notary Public Amy Valentin C. Chua and entered in his Notarial Register as Doc. No. 97, Page No. 21, Book No. CLXXX, Series of 3021.

(Sgd): AR Miles

Publication: DIARIO KABITENYO  
Dates: October 11, 18 & 25, 2021

**Small molecule may prevent metastasis in colorectal cancer**

Colorectal cancer is projected to claim 53,000 lives in the United States this year alone and, as with most cancers, the disease is deadliest when it metastasizes. It follows that the most effective way to control it would be a drug that targets metastasis itself -- preventing cancer cells from breaking off the primary tumor, or rearing in rogue cells before they spread throughout the body and

seed secondary tumors. Now, a new study identifies a small molecule that could, in the future, be administered alongside standard chemotherapy to stave off colorectal cancer metastasis.

The research, published in Science Advances, demonstrated how the compound, named EGX-202, hits a key pathway that cancer cells rely upon to boost energy, thereby killing them and shrinking

tumors in mice. The findings have already led to a clinical trial in humans and may eventually give rise to a novel therapy that increases survival rates for multiple gastrointestinal cancers.

"Colorectal cancer is one of the top causes of cancer-related mortality," says Rockefeller's Schall Tavaroz, head of the Elizabeth and Vincent Meyer Laboratory of Systems Cancer Biology.



## Neuroscientists roll out first comprehensive atlas of brain cells

When you clicked to read this story, a band of cells across the top of your brain sent signals down your spine and out to your hand to tell the muscles in your index finger to press down with just the right amount of pressure to activate your mouse or track pad.

A slew of new studies now shows that the area of the brain responsible for initiating this action — the primary motor cortex, which controls movement — has as many as 116 different types of cells that work together to make this happen.

The 17 studies, appearing online Oct. 6 in the journal *Nature*, are the result of five years of work by a huge consortium of researchers supported by the National Institutes of Health's Brain Research Through Advancing Innovative Neurotech-

nologies (BRAIN) Initiative to identify the myriad of different cell types in one portion of the brain. It is the first step in a long-term project to generate an atlas of the entire brain in help understand how the neural networks in our head control our body and mind and how they are disrupted in cases of mental and physical problems.

"If you think of the brain as an extremely complex machine, how could we understand it without first bricking it down and knowing the parts?" asked cellular neuroscientist Helen Hataup, a University of California, Berkeley, associate professor of molecular and cell biology and co-author of the flagship paper that synthesizes the results of the other papers. "The first page of any manual of how the brain works should

read: Here are all the cellular components, this is how many of them there are, here is where they are located and who they connect to."

Individual researchers have previously identified dozens of cell types based on their shape, size, electrical properties and which genes are expressed in them. The new studies identify about five times more cell types, though many are subtypes of well-known cell types. For example, cells that release specific neurotransmitters, like gamma-aminobutyric acid (GABA) or glutamate, each have more than a dozen subtypes distinguishable from one another by their gene expression and electrical firing patterns.

While the current papers address only

the motor cortex, the BRAIN Initiative Cell Census Network (BICCN) — created in 2017 — endeavors to map all the different cell types throughout the brain, which consists of more than 160 billion individual cells, both neurons and support cells called glia. The BRAIN Initiative was launched in 2013 by then-President Barack Obama.

"Once we have all those parts defined, we can then go up a level and start to understand how those parts work together, how they form a functional circuit, how that ultimately gives rise to perceptions and behavior and much more complex things," Hataup said.

Together with former UC Berkeley professor John Ngai, Hataup and UC Berkeley colleague Dirk Hockmeyer have already

used CRISPR-Cas9 to create mice in which a specific cell type is labeled with a fluorescent marker, allowing them to track the connections these cells make throughout the brain. For the flagship journal paper, the Berkeley team created two strains of "knock-in" reporter mice that provided novel tools for illuminating the connections of the newly identified cell types, she said.

"One of our many limitations in developing effective therapies for human brain disorders is that we just don't know enough about which cells and connections are being affected by a particular disease and therefore can't pinpoint with precision what and where we need to target," said Ngai, who led UC Berkeley's Brain Initiative efforts before being tapped last year to direct the en-

tire national initiative. "Detailed information about the types of cells that make up the brain and their properties will ultimately enable the development of new therapies for neurologic and neuropsychiatric diseases."

Ngai is one of 13 corresponding authors of the flagship paper, which has more than 250 co-authors in all.

Hataup, Hockmeyer and Ngai collaborated on an earlier study to profile all the active genes in single dopamine-producing cells in the mouse's midbrain, which has structures similar to human brains. This same profiling technique, which involves identifying all the specific messenger RNA molecules and their levels in each cell, was employed by other BICCN researchers to profile cells in the motor cortex.

# Clean air matters for a healthy brain

Two USC researchers whose work linked air pollution to a greater risk of Alzheimer's disease and faster cognitive decline are seeing signs that cleaner air can make a difference in brain health.

Cars and factories produce a fine particulate known as PM2.5 that USC-led studies have linked to memory loss and Alzheimer's disease. Smaller than the width of a human hair, these tiny particles pose a big problem. Once inhaled, they pass directly from the nose up and into the brain, beyond the blood-brain barrier that normally protects the brain from dust or other invaders.

In a research letter published October 7, 2021 in *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*, the USC researchers described how their labs each independently reported indications of recent decreases in neurotoxicity (damage to the brain or nervous system caused by exposure to toxic substances) of PM2.5 air pollution in humans and mice.

University Professor Caleb Finch and associate professor of gerontology and sociology Jennifer Ailshire, both with the USC Leonard Davis School of Gerontology, focused on PM2.5 pollution.

Long-term exposure to PM2.5 has been linked to premature death, particularly in people with chronic heart or lung diseases.

Ailshire's research, published earlier this year in the *Journal of Alzheimer's Disease*, showed a strong association between cognitive deficits and air pollution among people with lower levels of education in 2004.

Based on data from the nationwide Health and Retirement Study, her work showed that, when exposed to PM2.5, adults 65 and older who had fewer than eight years of education faced a greater risk of cognitive impairment.

## Think a census of humans is hard? Try counting their brain cells!

In 2013, the U.S. government began investing \$100 million to decipher how the human brain works in a collaborative project called the BRAIN Initiative. Cold Spring Harbor Laboratory (CSHL) and other researchers built tools and set standards for describing all the cells in the brain. On October 7, 2021 the initiative reached a major milestone, publishing a comprehensive census of cell types in the mouse, monkey, and human primary motor cortex in *Nature*.

The BRAIN Initiative Cell Census Network (BICCN) is the consortium of neuroscientists, computational scientists, physicists, geneticists, and instrument makers within the BRAIN Initiative tasked with counting and mapping all the cells in the brain.

Z. Josh Huang, an adjunct professor at CSHL, leads one branch of the BICCN that includes five principal investigators from CSHL and researchers from other institutions. His lab outlined ways to classify new cell subtypes within the mouse forebrain based on their shapes, connections, and the genes they use. CSHL Professor Partha Mitra and other CSHL collaborators taught a computer to recognize different parts of neurons, then mapped the cells onto a topological world to see how those neurons are likely to connect. CSHL Associate Professor Jesse Gillis' lab developed a statistics-based computer tool to categorize cells based on similarities in their component parts. This program, called MetaNeighbor, uses RNA transcripts (the instructions to build the components) to compare and categorize mammalian brain cells.

CSHL Professor Anthony Zador's lab developed MAPseq to map how different brain cells connect and interact. Several years later,

Zador and his team developed BARseq and BARseq2, which can map connections and gene-use in thousands of neurons in a single mouse at single-neuron resolution.

CSHL Associate Professor Pavel Osten leads another branch of the BICCN dedicated to finding anatomical differences between female and male mouse brains. He and his lab developed qBrain, a method that combines brain imaging techniques to map cells and connections of the mouse primary motor cortex in three dimensions.

The atlases and catalogs published by the BICCN so far are frameworks upon which neuroscientists can now build. Neuroanatomists will be able to compare the human brain to the brains of other species. The BICCN scientists hope that within the next ten years, thousands of human brains will be mapped.

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