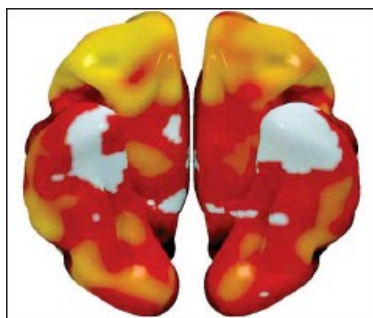


- Heart / Brain

Scientists uncover early links between cardiovascular risk and brain metabolism

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Feb. 17, 2021 he links between cardiovascular disease and cognitive impairment begin years before the appearance of the first clinical symptoms of either condition.



In a study carried out at the Centro Nacional de Investigaciones Cardiovasculares (CNIC) in partnership with Santander Bank and neuroimaging experts at the Barcelona β Brain Research Center (BBRC, the research center of the Fundaci3n Pasqual Maragall), the investigators have identified a link between brain metabolism, cardiovascular risk, and atherosclerosis during middle age, years before the first appearance of symptoms, medicalxpress.com reported.

The report, published in the Journal of the American College of Cardiology (JACC), is important because it suggests that intervention in a modifiable condition (cardiovascular disease) could prevent the development of dementia, a disease for which there is currently no cure. Dr. Valent3n Fuster, CNIC and Mount Sinai Heart general-director, physician-in-chief of the Mount Sinai Hospital and a lead author on the study, said, "Although everybody knows about the importance of caring for ourselves and controlling cardiovascular risk factors in order to avoid a heart attack, the association of these same risk factors with cognitive decline may increase awareness of the need to acquire healthy habits from the earliest stages of life." Moreover, the results provide yet more support for the importance of implementing primary cardiovascular prevention strategies in middle age as a valuable therapeutic approach to slowing or even halting brain alterations that could contribute to future cognitive decline. cognitive impairment

The advanced stages of vascular disease and dementia often occur together, but until now this association has not been documented at earlier stages. The Cniccoordinated study, led by Dr. Marta Cort3s Canteli, shows that in middle age, years before any clinical signs appear, atherosclerosis and cardiovascular risk factors already show an association with low metabolism in brain regions implicated in the future development of dementia, especially Alzheimer's disease.

The advanced stages of neurodegenerative and vascular diseases often occur together, and research in recent years has established close links between cognitive decline and a number of cardiovascular risk factors, including hypertension, obesity, and high cholesterol.

Using advanced imaging by positron emission tomography (PET), the research team quantified brain metabolism in more than 500 participants in the PESA-CNICSANTANDER study. The participants had an average age of 50 years and no symptoms, but already had evidence of atherosclerosis in their arteries.

PESA-CNIC-SANTANDER, directed by Dr. Valentín Fuster, is a prospective study of more than 4000 asymptomatic middle-aged participants who have been exhaustively assessed for the presence and progression of subclinical atherosclerosis since 2010.

The new study reveals a link between elevated risk of a cardiovascular event and low brain metabolism. “When brain metabolism declines, the brain’s ability to handle adverse events can be compromised. Depending on the brain area affected, this can lead to a range of distinct problems,” explained study co-first author Dr. Cortés Canteli, a CNIC investigator and Miguel Servet fellow.

cardiovascular risk

“We found that a higher cardiovascular risk in apparently healthy middle-aged individuals was associated with lower brain metabolism in parietotemporal regions involved in spatial and semantic memory and various types of learning,” said Dr. Cortés Canteli. Dr. Juan Domingo Gispert, head of the Neuroimaging group at the BBRC, noted that “the brain areas showing low metabolism in participants with higher cardiovascular risk are the same areas affected in Alzheimer’s disease, suggesting that these individuals may have higher than normal vulnerability to this disease.”

“We think that cardiovascular risk factors that affect the large vessels carrying blood from the heart to the brain also affect the small vessels in the brain,” asserted Dr. Fuster.

The study is the largest of its type to date in a healthy middle-aged population and could signal a paradigm change in the understanding of the links between vascular and brain disease, say the authors

Among the modifiable cardiovascular risk factors most closely associated with a reduction in brain metabolism, the investigators saw the biggest effect with hypertension. “We found that the same risk factors that damage the heart and the large arteries, and especially hypertension, are closely linked to the decline in brain metabolism years before the appearance of symptoms,” said Dr. Fuster.

More than a century after the first powered flight on Earth, NASA intends to prove it’s possible to replicate the feat on another world.

Transported aboard the Mars 2020 spacecraft that arrives at the Red Planet on Thursday, the small Ingenuity helicopter will have several challenges to overcome – the biggest being the rarefied Martian atmosphere, which is just one percent the density of Earth’s, AFP reported.

Ultralight

It might be called a helicopter, but in appearance it's closer to minidrones we've grown accustomed to seeing in recent years.

Weighing just four pounds (1.8 kilograms), its blades are much larger and spin about five times faster – 2,400 revolutions per minute – than would be required to generate the same amount of lift back on Earth.

It does however get some assistance from Mars, where the gravity is only a third of that on our home planet.

Mars Helicopter Ingenuity has four feet, a box-like body, and four carbon-fiber blades arranged in two rotors spinning in opposite directions. It comes with two cameras, computers, and navigation sensors.

It's also equipped with solar cells to recharge its batteries, much of the energy being used for staying warm on cold Martian nights, where temperatures fall to minus 130 degrees Fahrenheit (minus 90 degrees Celsius).

The helicopter is hitching a ride on the belly of the Perseverance rover, which will drop it to the ground once it has landed then drive away.

90 second flights

Up to five flights of gradual difficulty are planned, over a window of one month, within the first few months of the mission.

Ingenuity will fly at altitudes of 1015 feet (3-5 meters) and travel as far as 160 feet (50 meters) from its starting area and back.

Each flight will last up to a minute and half – compared to the 12 seconds the Wright brothers achieved with the first powered, controlled flight in Kitty Hawk, North Carolina in 1903.

Like the Perseverance rover, Ingenuity is too far away from Earth

to be operated using a joystick, and is therefore designed to fly autonomously.

Its onboard computers will work with its sensors and cameras to keep it on a path programmed by its engineers.

But the outcome of these flights will be learned only after they took place.

What's the goal?

NASA describes Ingenuity's mission as a "technology demonstration": A project that seeks to test a new capability together with the astrobiology mission of Perseverance.

If it's successful, however, it "basically opens up a whole new dimension of exploring Mars," said Bob Balaram, Ingenuity's chief engineer.

Future models could offer better vantage points not seen by current orbiters or by slow-moving rovers on the ground, allowing the helicopters to scope out terrain for land-based robots or humans.

They could even help carry light payloads from one site to another – such as the rock and soil samples Perseverance will be collecting in the next phase of the Mars 2020 mission.