CHEMISTRY

Brain Chemistries Differ

Brain tissue taken from lobotomy patients is showing differences in chemical actions between those of rats and guinea pigs and humans, particularly in handling of glucose.

➤ SOME BASIC ideas about the chemistry of the human brain are being changed in research at the University of California School of Medicine, San Francisco.

The studies are being made with brain tissue removed from mentally ill patients receiving lobotomy operations.

Until recently most conceptions about human brain chemistry came from test tube studies of rat and guinea pig brain tissue because "living" human brain tissue has been difficult to get for test tube studies.

Now Dr. H. W. Elliott and V. C. Sutherland of the University find big differences between rat and human brain chemistry. The biggest difference is in the way human and rat brain tissue handles glucose, a common sugar which is apparently the main fuel for the brain.

Research had shown that fresh rat brain tissue in a test tube will deteriorate rapidly if glucose is not placed in the solution. It was assumed that the same thing would happen to human brain tissue.

But the California scientists found that fresh human brain tissue will respire, or "breathe," at a fairly high level for three hours in the test tube without the addition of glucose.

This indicates that there must be some substance in the human brain tissue capable of keeping up respiration which is either not present or is incapable of doing the same job in rat brain.

Further experiments pointed to glutamate, an amino acid salt, as the possible sustaining substance. In separate experiments, glutamate kept respiration up in the human brain just as high as glucose could. Glutamate will not do the same thing in rat brain tissue.

Since glutamate is the building block of proteins, the scientists figure that proteins may provide more energy for the brain than has been supposed.

This conclusion ties in with clinical studies on hypoglycemia, induced by insulin shock, in which the system suffers a shortage of sugar. Glucose was the only thing that could bring patients out of such shocks until a physician found that glutamate would do the same thing.

The studies were made by putting brain tissue in a nourishing solution in a test tube, then pumping pure oxygen through the tube so the fresh tissue could stay "alive" and "breathe." Conditions in the tube were changed by adding substances like glucose, glutamate, and various other chemicals. A measure of oxygen consumption by the tissue told how the different substances affected the tissue.

The scientists said the brain tissue from the mentally disturbed patients appeared to be normal in structure, and no differences in test tube function were noted from one mental condition to another. However, the existence of "biochemical lesions" which might contribute to both the psychotic condition and abnormal chemistry cannot be completely discounted.

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AERONAUTICS

20,000 Miles-Per-Hour Jet Flights Predicted

➤ JET PLANES may be flying "in the foreseeable future" at speeds of 20,000 miles an hour, a New York University aeronautical professor stated in New York.

This is 2,500 miles an hour faster than rocket expert Dr. Wernher von Braun figures an object must fly to escape from the earth's gravity into space.

Speaking on the "Future of Jet Propulsion," Prof. Frederick K. Teichmann, head of New York University's Guggenheim School of Aeronautics, predicted that future jet engines may develop so much power they could propel a plane at speeds approaching 20,000 miles an hour—more than 15 times the speed of the rotation of the earth at its equator.

The jet engines would develop about 500,000 pounds of thrust, which is about 125 times the power of today's greatest piston engines, he predicted.

But such high-powered engines will not be particularly useful unless science can figure out how to get around the problem of heat created by air friction when a plane flies in the supersonic speed range.

At 40,000 feet and at speeds of 1,300 miles an hour, a plane's inner and outer surfaces may get hotter than 200 degrees Fahrenheit. Unless counteracted by some refrigeration scheme, the heat will weaken most metals now being used. Titanium seems to promise the 20th-century jet pilot a plane that can zoom around faster than planes now made of aluminum or magnesium alloys.

Prof. Teichmann also foresees the day of pilotless cargo planes that will spirit garden tools and pianos from the factory to the salesroom in short order. The planes, capable of flying global routes, also may carry airmail.

Science News Letter, March 7, 1953

LARGEST AUTOMATIC GUN—The Skysweeper, a new 75 mm. anti-aircraft gun, has radar and computer mounted integrally with the weapon for quick and accurate spotting, tracking and interception of low-flying, high-speed enemy aircraft. Usable in all types of weather, the "artillery machine gun" can fire 45 twelve and one-half pound shells a minute. It was developed by Army Ordnance.