MedicalXpress

Study of cat diet leads to key nervous system repair discovery

March 30 2009

Scientists studying a mysterious neurological affliction in cats have discovered a surprising ability of the central nervous system to repair itself and restore function.

In a study published today in the Proceedings of the National Academy of Sciences, a team of researchers from the University of Wisconsin-Madison reports that the restoration in cats of myelin — a fatty insulator of nerve fibers that degrades in a host of human central nervous system disorders, the most common of which is multiple sclerosis — can lead to functional recovery.

"The fundamental point of the study is that it proves unequivocally that extensive remyelination can lead to recovery from a severe neurological disorder," says Ian Duncan, the UW-Madison neuroscientist who led the research. "It indicates the profound ability of the central nervous system to repair itself."

The finding is important because it underscores the validity of strategies to reestablish myelin as a therapy for treating a range of severe neurological diseases associated with the loss or damage of myelin, but where the nerves themselves remain intact.

Myelin is a fatty substance that forms a sheath for nerve fibers, known as axons, and facilitates the conduction of nerve signals. Its loss through disease causes impairment of sensation, movement, cognition and other functions, depending on which nerves are affected.

The new study arose from a mysterious affliction of pregnant cats. A company testing the effects on growth and development in cats using diets that had been irradiated reported that some cats developed severe neurological dysfunction, including movement disorders, vision loss and paralysis. Taken off the diet, the cats recovered slowly, but eventually all lost functions were restored.

"After being on the diet for three to four months, the pregnant cats started to develop progressive neurological disease," says Duncan, a professor of medical sciences at the UW-Madison School of Veterinary Medicine and an authority on demyelinating diseases. "Cats put back on a normal diet recovered. It's a very puzzling demyelinating disease."

The afflicted cats were shown to have severe and widely distributed demyelination of the central nervous system, according to Duncan. And while the neurological symptoms exhibited by the cats are similar to those experienced by humans with demyelination disorders, the malady does not seem to be like any of the known myelin-related diseases of humans.

In cats removed from the diet, recovery was slow, but all of the previously demyelinated axons became remyelinated. The restored myelin sheaths, however, were not as thick as healthy myelin, Duncan notes.

"It's not normal, but from a physiological standpoint, the thin myelin membrane restores function," he says. "It's doing what it is supposed to do."

Knowing that the central nervous system retains the ability to forge new myelin sheaths anywhere the nerves themselves are preserved provides strong support for the idea that if myelin can be restored in diseases such as multiple sclerosis, it may be possible for patients to regain lost or

impaired functions: "The key thing is that it absolutely confirms the notion that remyelinating strategies are clinically important," Duncan says.

The exact cause of the neurological affliction in the cats on the experimental diet is unknown, says Duncan, who was not involved in the original study of diet.

"We think it is extremely unlikely that [irradiated food] could become a human health problem," Duncan explains. "We think it is species specific. It's important to note these cats were fed a diet of irradiated food for a period of time."

Source: University of Wisconsin-Madison (news : web)