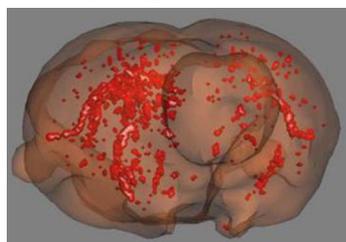


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CHEMISTRY, PHYSIOLOGY

Glycananoparticles may diagnose preclinical brain disease

Diagnostics for brain diseases such as ischemic stroke, multiple sclerosis, and HIV-related dementia generally rely on images obtained by using MRI. However, such images typically reveal only



MRI imaging of glycananoparticles with sialyl Lewis groups.

brain changes that occur late in the disease's progression, after the brain has been damaged. To diagnose brain diseases in earlier stages, Sander van Kasteren *et al.* designed glycananoparticles with glycan ligands such as sialyl Lewis^x that allow visualization of acute inflammation. The sialyl Lewis^x group on the reagent specifically tar-

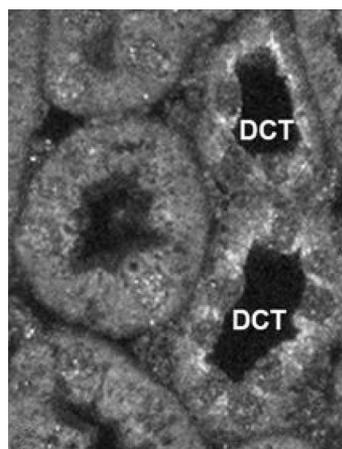
gets the CD62 carbohydrate-binding transmembrane proteins in the brain that are up-regulated in the inflammatory response to brain disease. A cross-linked, amine-functionalized, dextran-coated particle forms the core of the reagent, with an *S*-cyanomethyl functional group acting as a masked reactive group for the attached carbohydrate groups. In vitro biomarker binding assays and in vivo targeting and imaging confirmed the selectivity of the glycananoparticle binding with the CD62 proteins. Furthermore, the high iron content of the glycananoparticles improved detection on MRI scans. The authors say that such high-iron glycananoparticles raise the possibility of detecting brain diseases in the preclinical stage. — C.A.

“Glycananoparticles allow pre-symptomatic in vivo imaging of brain disease” by Sander I. van Kasteren, Sandra J. Campbell, Sébastien Serres, Daniel C. Anthony, Nicola R. Sibson, and Benjamin G. Davis (see pages 18–23)

GENETICS

A gene in the hypertension haystack

Hypertension contributes to morbidity and mortality around the world, but the genetic basis for this disorder is poorly understood. Studies of rare, monogenic forms of hypertension have implicated



Immunolocalization of SPAK, a protein encoded by *STK39*, in distal convoluted tubules (DCT).

several genes involved in renal sodium transport, but the physiological links to the more common forms of hypertension remain unclear. Using a genome-wide association scan in Amish subjects, Ying Wang *et al.* identified common variants in *STK39*, a serine/threonine kinase gene, associated with differences in blood pressure. Amish subjects carrying alleles associated with high blood pressure had, on average, a 3.3-mmHg increase in systolic blood pressure. Previous studies of non-Amish subjects had revealed a similar, albeit smaller, increase. Wang *et al.* found that

STK39 protein is expressed in the distal nephron, where it can interact with WNK kinases and cation-chloride cotransporters, which are mutations that cause monogenic forms of hypertension. Because the *STK39* variants did not alter protein structure, the authors hypothesize that the variant associated with high blood pressure likely exhibits increased transcription activity, which may influence blood pressure by increasing *STK39* levels and altering sodium excretion from the nephron. — C.A.

“Whole-genome association study identifies *STK39* as a hypertension susceptibility gene” by Ying Wang, Jeffrey R. O’Connell, Patrick F. McArdle, James B. Wade, Sarah E. Dorff, Sanjiv J. Shah, Xiaolian Shi, Lin Pan, Evadnie Rampersaud, Haiqing Shen, James D. Kim, Arohan R. Subramanya, Nanette I. Steinle, Afshin Parsa, Carole C. Ober, Paul A. Welling, Aravinda Chakravarti, Alan B. Weder, Richard S. Cooper, Braxton D. Mitchell, Alan R. Shuldiner, and Yen-Pei C. Chang (see pages 226–231)

MEDICAL SCIENCES

Chemical prophylactic against emphysema

Cigarette smoke generates reactive oxygen species, which cause inflammation and lung damage that can lead to bronchitis and emphysema. Researchers have suspected that some individuals

