Researchers investigate neuro-behavioral effects of dental amalgam fillings

SEATTLE, USA: Researchers have discovered that common genetic variants of metallothionein (MT), a protein that has the capacity to bind heavy metals, increase susceptibility of children to mercury toxicity from dental amalgam and other sources. In a study of 330 children, they found that boys carrying the variants were more prone to neuro-behavioral deficits associated with mercury.

The study included 164 boys and 166 girls aged 8 to 12 who participated in the Casa Pia Study of the Health Effects of Dental Amalgam in Children, a study investigating the health effects of low-level mercury exposure conducted between 1996 and 2006 among students of the Casa Pia school system in Lisbon, Portugal.

Scientists at the University of Washington evaluated whether MT1M and MT2A gene status, genes that have been reported to alter mercury toxicokinetics in adults, affected the relationship between urinary mercury concentration and neurobehavioral functions in children. They evaluated the urinary mercury levels and neurobehavioral performance of the children annually from baseline through seven years of follow-up after initial placement of dental amalgam or composite resin tooth fillings. Eighty-one boys and 74 girls received composite fillings, while 83 boys and 92 girls received amalgam fillings.

Among boys, numerous significant interaction effects between the genetic variants of MT1M and MT2A and mercury exposure were observed, spanning multiple domains of neurobehavioral function, the researchers said. Impaired performance was noticed primarily within the domains of visual spatial acuity and learning and memory, with some additional impacts on attention and motor function. However, all associations were restricted to boys with MT1M and MT2A variants in particular, although mercury exposure from dental amalgam was comparable among boys and girls.

The authors said that the findings may have important public health implications for future strategies aimed at protecting children and adolescents from the potential health risks associated with mercury exposure.

The study population had an average IQ score of 86 and relatively higher urinary mercury at baseline, implying higher perinatal mercury exposure. The researchers suspected that exposures associated with fossil fuel combustion for multiple uses within the local urban environment were possible sources of mercury. In addition, fish consumption, a source of inorganic mercury, could have contributed to elevated urinary mercury levels among the children. According to the researchers, Portugal has the highest fish consumption per capita in Europe. More than 60 percent of parents or caregivers of the children in the study reported that their children consumed fish on a weekly basis.

The study, titled “Modification of Neurobehavioral Effects of Mercury by Genetic Polymorphisms of Metallothionein in children,” was published online on July 1 in the Neurotoxicology and Teratology journal.