Health risks of methylmercury with special reference to fetus

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Mercury (Hg) has long been used by humans because of its physical and chemical usefulness. However, mercury is toxic, and mercury poisoning has occurred repeatedly since the Middle Ages. The main chemical forms of mercury are elemental (Hg°), divalent (Hg^{2+}), and methylmercury (MeHg; CH_3-Hg^+), which are metabolized in different ways and have differing toxicities. Most mercury emissions into the environment is elemental mercury. The elemental mercury is oxidized in the environment and some of it is converted into MeHg mainly by aquatic bacteria. MeHg is a known neurotoxin, and the cause of Minamata disease. It bioaccumulates in fish and shellfish, and especially in high trophic level fish and sea mammals through the aquatic food web. Most human exposure to MeHg is through fish consumption. MeHg easily penetrates the blood-brain barrier and its target organ is the brain. Especially, fetuses are known to be a high-risk group for MeHg exposure, because susceptibility of the brain during the late gestation period is thought to be highest. In this presentation, we summarize the MeHg metabolism in human, toxicity and exposure evaluation, the differences in MeHg transfer from mothers to infants during gestation and lactation period, and the thresholds for the onset of symptoms caused by MeHg. We also present the historical lessons from Minamata disease in Japan, and the risks and benefits of maternal fish consumption to fetus from the standpoint of MeHg and docosahexaenoic acid (DHA, C22:6n-3).

Reconstruction of redox condition during the early Aptian Ocean Anoxic Event (OAE) Ia, 'Goguel', in the Vocontian Basin by geochemical and lithological approach

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Continuous 60-m long limestone marl sedimentary sequences including the early Aptian (Cretaceous) black shale intervals ('Goguel'; OAE Ia) obtained at the Les Sauzeries in the Vocontian Basin, southeast France, was examined for understanding of nature of redox oceanic conditions during extreme warm periods. The sequence was examined in a detailed lithology for lamination and bioturbation intensity, organic carbon content and stable isotope, major elements in 100μm-scale by non-destructive XRF-scanning (TATSCAN-F), and redox-sensitive trace element contents. The Goguel level contains high total organic carbon content (~5wt%) which is the fifth time richer than limestone marl. Obvious 6 per mil negative shifts of organic carbon isotope ratio was appeared in the lower part of the Goguel, however, it occurred just after starting of black shale deposition. Black shale is well laminated, dark, organic and pyrite-rich lithofacies with high redox-sensitive trace element contents and with scarcely bioturbation, implying deposited under anoxic condition. Dark gray marl is dark and have relatively high organic and pyrite contents with massive facies and with high values of trace elements that is anoxic to slightly oxygenated condition. Gray marl, light gray marl, and limestone is light-colored, intensively bioturbated, organic and pyrite-poor lithofacies with low trace element contents, representing oxic condition. It is revealed that benthic environments during OAE Ia were divided into several anoxic /oxic stages with fluctuating on 10-100 kyrs timescale. The rhythms were also obvious in out of Goguel intervals of more oxygenated environments. Combined approach of ichnology and geochemistry, rather than single proxy, provides better estimations covering full-range of redox bottom environments, full-ranging from anoxic to oxic conditions.