KONCENTRACIJA IN/ALI ODSTRANJEVANJE ENTERIČNIH VIRUSOV IZ VOD S POMOČJO CIM MONOLITOV

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Povzetek

Prisotnost enteričnih virusov v jezerih, rekah in vodnih zajetjih je najpogosteje posledica onesnaževanja s fekalijami. Povečana koncentracija virusov v vodah se lahko pojavlja tudi ob naravnih nesrečah ali morebitnih bioterorističnih napadih. Ker so infektivne že nizke koncentracije enteričnih virusov, kot so rotavirusi in norovorusi, je pred detekcijo virusov v vodah nujno potreben korak koncentriranja virusov.

Pred kratkim razvito metodo koncentriranja rotavirusov s pomočjo CIM monolitne kromatografije (Gutierrez-Aguirre et al, J Chromatogr A., 2009, 1216:2700-4) smo združili z detekcijo za rotavirus specifične reakcije RT-qPCR (Gutierrez-Aguirre et al, J Clin Microbiol., 2008, 46:2547-54), ki omogoča detekcijo izjemno nizkih koncentracij rotavirusov v vodah. Novo metodo koncentriranja smo primerjali s tangencialno ultrafiltracijo na okoljskih vzorcih vod iz Slovenije in dobili zadovoljive rezultate v prid novi metodi (Gutierrez-Aguirre et al, J Chromatogr A., 2011, 1218:2368-73). Kombinacijo koncentriranja s pomočjo CIM monolitov in detekcije RT-qPCR smo uspešno prilagodili za detekcijo virusov v vodah na terenu (Gutierrez-Aguirre et al, J Chromatogr A., 2011, 1218:2368-73). CIM monoliti so bili prav tako uporabljeni za koncentriranje drugih virusov, kot so kalicivirus, ki je bil koncentriran iz ustekleničene vode (Kovač et al., J Virol. Meths., 2009, 162:272-5), in rastlinski virusi, koncentrirani iz namakalnih vod (Kramberger et al., J. Virol. Meths., 2004, 120:51-57).

Trenutno se ukvarjamo s projektom, kjer veliko kapaciteto vezave in možnost velikih pretokov CIM monolitov izkoriščamo za odstranjevanje virusov iz vod, hkrati pa z združevanjem omenjene metode z elektroporacijo razvijamo novo metodo dezinfekcije vod.

Abstract (Arial)

Enteric viruses can be present in lakes, rivers and public water supplies under a variety of circumstances, such as natural disasters, bioterrorism or faecal contamination. Low concentration of enteric viruses, such as rotaviruses and noroviruses, can still lead to disease development. In order to detect such concentrations in water samples, concentration prior to detection is essential.

We combined a recently developed rotavirus concentration method based on the use of CIM monolithic supports (Gutierrez-Aguirre et al, J Chromatogr A., 2009, 1216:2700-4) and a rotavirus specific RT-qPCR (Gutierrez-Aguirre et al, J Clin Microbiol., 2008, 46:2547-54) for the detection of extremely low concentrations of

rotavirus in water samples. The new methodology was compared to concentration using tangential flow ultrafiltration in different environmental samples collected in Slovenia with satisfactory results (Gutierrez-Aguirre et al, J Chromatogr A., 2011, 1218:2368-73). In addition, the combination of CIM concentration and qPCR detection was successfully adapted for on-site detection using the portable Smartcycler real time PCR device (Gutierrez-Aguirre et al, J Chromatogr A., 2011, 1218:2368-73). CIM monoliths have also been used to bind and concentrate other viruses such as Caliciviruses from bottled water (Kovac et al., J Virol. Meths., 2009, 162:272-5) or plant viruses from irrigation waters (Kramberger et al., J. Virol. Meths., 2004, 120:51-57).

At present we are working on a project where we are exploiting the high binding capacity and fast flow rates of CIM monoliths, to use them as a virus removal tool, and, in combination with another physical technique such as pulsed electric field, implement a novel water disinfection methodology.

Viri

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