

ENDOCRINE-DISRUPTING PHARMACEUTICALS IN THE ENVIRONMENT - THREAT TO THE HEALTH AND SAFETY OF HUMANS AND AQUATIC SPECIES?

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The potential negative effects of pharmaceuticals, especially those with endocrine disrupting (ED) properties, present in the environment has been attracting considerable attention in recent years. These pharmaceuticals enter the environment via anthropogenic activities; however, limited data are available on their fate, behaviour, and pathways. Literature data point to adverse ecological effects of these compounds for example, the feminization of aquatic species due to estrogenic compounds present in different aquatic compartments (1). However, there is no consensus on what risk, if any, these compounds pose to human health. Namely, a lot has been discussed about potential estrogenicity of drinking water and the possible contribution of this phenomenon in the observed rise in human reproductive problems. Although estimations pointed to a negligible risk from synthetic estrogens in drinking water (2), these chemicals have been detected in drinking water at nanogram per litre to microgram per litre concentrations which are the concentrations that potentially can produce adverse effects in humans leading to various endocrine disorders (3). Moreover, it must be considered that humans and other organisms are often exposed to various chemicals mixtures of unknown composition and effects, hence, making the assessment based on a single substance sometimes inadequate. It can be concluded that the presence of pharmaceuticals with ED properties is a rather complex phenomena difficult to predict both due to various pathways they can have in the environment and multiplicity of the effects they can have on human health. However, the evidence collected worldwide are confirming their presence in the environment; hence, future studies need to be pointed towards a better understanding of their fate in the environment, effects of low doses of EDCs exposure and endocrine disorders they can trigger in both animals and humans. Special attention should be also given to the identification of the strengths and limitations of current analytical methods used for their detection and further development of treatment technologies for their removal from water. It is evident that in the future, pharmaceutical research should be pointed not only towards the pharmaceuticals' development, but also towards the development of risk-based models that can predict the potential sources, fate, behaviour and effects of pharmaceuticals once they enter the environment.

References

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LEKOVİ ENDOKRINI OMETAČI U ŽIVOTNOJ SREDINI - PRETNJA PO ZDRAVLJE LJUDI I VODENE VRSTE?

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Potencijalni štetni efekti lekova, posebno onih sa svojstvima endokrinih ometača, prisutnih u životnoj sredini, poslednjih godina privlače sve više pažnje. Ovi lekovi ulaze u životnu sredinu kao posledica antropogenih aktivnosti, ali njihova sudbina i ponašanje, nakon što se nađu u životnoj sredini, i dalje predstavlja nepoznanicu. Literaturni podaci ukazuju na štetne ekološke efekte ovih jedinjenja, na primer, utvrđeno je da estrogena jedinjenja prisutna u različitim vodenim delovima ekosistema izaziva feminizaciju vodenih vrsta (1). Međutim, ne postoji konsenzus o tome kakav rizik ove supstance predstavljaju za ljudsko zdravlje. Naime, mnogo se govori o potencijalnoj estrogenosti vode za piće i mogućoj ulozi ove pojave u uočenom porastu reproduktivnih problema kod ljudi. Iako su procene ukazivale na zanemarljiv rizik od prisustva sintetičkih estrogena u vodi za piće (2), ove hemikalije su ipak izmerene u vodi za piće u koncentracijama od nekoliko nanograma po litru do nekoliko mikrograma po litru, što su koncentracije koje potencijalno mogu izazvati štetne efekte na ljude i dovesti do različitih endokrinih poremećaja (3). Takođe, mora se uzeti u obzir da su ljudi i drugi organizmi često izloženi različitim smešama hemikalija nepoznatog sastava i efekata, pa je procena zasnovana na jednoj supstanci ponekad neadekvatna. Može se zaključiti da je prisustvo lekova sa svojstvima endokrinih ometača u životnoj sredini prilično kompleksna pojava čije je efekte i posledice teško predvideti kako zbog različitih puteva koje mogu imati u životnoj sredini, tako i zbog višestrukih efekata koje mogu imati na zdravlje ljudi. Međutim, dokazi prikupljeni širom sveta potvrđuju njihovo prisustvo u okruženju, pa je buduće studije potrebno usmeriti ka boljem razumevanju njihove sudbine u životnoj sredini, te efekata izloženosti niskim dozama i potencijalnih endokrinih poremećaja koje mogu izazvati kako kod životinja, tako i kod ljudi. Posebnu pažnju treba posvetiti i identifikaciji ograničenja postojećih analitičkih metoda koje se koriste za utvrđivanje prisustva ovih supstanci u vodi, kao i daljem razvoju tretmana za njihovo uklanjanje iz vode. Očigledno je da bi u budućnosti farmaceutska istraživanja trebalo da budu usmerena ne samo na razvoj farmaceutskih proizvoda, već i na razvoj modela koji mogu predvideti potencijalne izvore, sudbinu, ponašanje i efekte lekova kada se nađu u životnoj sredini.

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