

## 1 保健科学課

### (1) 他誌投稿論文抄録

#### ◇ 食品由来感染症の病原体情報の解析及び共有化システムの構築に関する研究

厚生科学研究費補助金（新興・再興感染症及び予防接種政策推進研究事業）食品由来感染症の病原体情報の解析及び共有化システムの構築に関する研究  
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腸管出血性大腸菌（EHEC）の分子疫学的解析法（MLVA）の構築のため精度管理の実施及び技術研修会を開催した。また、研修会においてMLVAトラブルシューティング集が必要との統一見解により、「EHEC MLVA フラグメント解析判定事例集」案を作成した。

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#### ◇ Influenza A(H1N1)pdm09 virus exhibiting reduced susceptibility to baloxavir due to a PA E23K substitution detected from a child without baloxavir treatment

Antiviral Research 180, 104828, 2020

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Human-to-human transmission of PA I38 mutant influenza A(H3N2) viruses with reduced baloxavir susceptibility has been reported in Japan. In December 2019, we detected a PA E23K mutant A(H1N1)pdm09 virus from a child without

baloxavir treatment. The PA E23K mutant virus exhibited reduced baloxavir susceptibility but remained susceptible to neuraminidase inhibitors. Epidemiological data suggest possible transmission of this PA E23K mutant virus among humans, although its growth capability relative to that of the wild-type virus was reduced. Therefore, baloxavir susceptibility monitoring of influenza viruses is essential.

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#### ◇ A genome epidemiological study of SARS-CoV-2 introduction into Japan

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After the first case of COVID-19 in Japan on 15 January 2020, multiple nationwide COVID-19 clusters were identified by the end of February. The Japanese government focused on mitigating emerging COVID-19 clusters by conducting active nationwide epidemiological surveillance. However, an increasing number of cases appeared until early April, many with unclear infection routes exhibiting no recent history of travel

outside Japan. We aimed to evaluate the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) genome sequences from COVID-19 cases until early April and characterise the genealogical networks to demonstrate possible routes of spread in Japan.

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#### ◇ ワックス掛けによるタンデムマス検査におけるロイシン及びイソロイシン定量への影響について

日本マスキング学会誌 第30巻(3号)、31-43、2020

石川貴雄、手塚美智子、吉永美和、野町祥介、細海伸仁、矢野公一

新生児マスキングの一次対象疾患の一つであるメープルシロップ尿症(MSUD)は、分岐鎖アミノ酸であるバリン(Val)、ロイシン(Leu)、イソロイシン(Ile)の代謝に関する先天性疾患であり、タンデムマス検査では、ろ紙血中の分岐鎖アミノ酸の測定値がカットオフ値を上回った場合、陽性として

判定している。同検査では多検体処理を行うため、カラム分離を経ないフローインジェクション法を用いており、互いに構造異性体であるロイシン及びイソロイシンについては両者の合計値(Leu+Ile)として測定している。今回、私たちは、Leu+Ileの定量に用いている内部標準物質が異常高値を示すことによって、Leu+Ile 定量値が低値となるため、偽陰性判定を導きかねない現象を経験した。

本現象はアッセイ内の特定医療機関、特定採血日の検体に認められた。そこで内部標準物質と同様のフラグメントイオンを発生する物質の混入によるものと仮定して検討を行ったところ、原因はジエチレングリコールモノエチルエーテルの混入であると考えられた。同物質用途にワックス添加剤用途があったこと、また、ワックス掛けによるロイシン及びイソロイシン定量への影響について報告があったことを踏まえて、医療機関へ問合せたところ、本現象を認めた検体の採血日近辺に複数医療機関でワックス掛けを実施していた。このことから本現象の発生要因としてワックス掛けが強く示唆された。

当該現象の再発防止策としては、採血医療機関及び検査機関において、ワックス掛けの際には、採血用紙及び乾燥中等の検体を別室に隔離することが挙げられる。また、ワックス掛けの影響に基づく偽陰性の発生を回避するためには、検査機関は内部標準物質のシグナル値をモニタリングすることが重要である。

#### ◇ Repeatability and Reliability of Home-Based Stool Color Card Screening for Biliary Atresia Based on Results in China and Japan

Tohoku J. Exp. Med., 252, 365-372, 2020

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Biliary atresia (BA) is the most frequent hepatic cause of death in early childhood. Early referral and timely

Kasai portoenterostomy are essential for the improvement of long-term native liver survival rate of BA patients. Screening with stool color card (SCC) has been implemented in Japan since 1994. Recently current digital edition of SCC consisted of seven digitally created images was introduced to China. Our study aimed to evaluate the repeatability and reliability of same edition of SCC used in Beijing, China and Sapporo,

Japan. In Beijing from 2013 to 2014, SCCs were distributed to infants' guardians by trained nurses in maternal facilities during information sessions on neonatal screening programs. SCC was used at three checkpoints for each infant after birth for screening. The SCC data were collected from 27,561 infants (92.5%) in Beijing by 42-day health checkup, mobile phone and social network services. In Sapporo from 2012 to 2015, the SCCs with a postcard and guardian instructions were inserted into Maternal and Child Health Handbook and distributed to all pregnant women. The data were collected from a total of 37,478 (94.3%) infants in Sapporo via the postcard during the 1st month infant health checkup. We thus identified two BA patients in Sapporo and two BA patients in Beijing. High rates of sensitivity and specificity in both cities were observed. The frequency distribution of color images on SCC reported in both cities was similar. This study shows excellent repeatability and reliability of the current digital edition of SCC.

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## 2 生活科学課

### (1) 他誌投稿論文抄録

#### ◇ Inflow and outflow loads of 484 daily-use chemicals in wastewater treatment plants across Japan

Environmental Monitoring and Contaminants Research Vol.1, pp.1- 16, 2021

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With the increasing number and volume of chemicals used in modern life, their adverse effects on human health and aquatic organisms have increased concerns as well. To formulate appropriate management plans, the amounts/volumes used and emitted of these chemicals must be regulated. However, no data are available on the use of most chemicals, particularly daily-use chemicals such as pharmaceuticals and personal care products (PPCPs). Herein, we tested eight activated sludge wastewater treatment plants (WWTPs) across Japan, each servicing populations of over 200,000, to investigate the emissions of 484 chemicals including 162 PPCPs. Twenty-four-hour composite samples were collected before and after the activated sludge component of treatment in each season of 2017. Targeted substances were solid-phase extracted and subsequently measured by LC-QTOF-MS-Sequential Window Acquisition of All Theoretical Fragment-Ion Spectra Acquisition. The mean number of the detected substances and their mean total concentrations in inflows (n=32) and outflows (n=32) were 87 and 92 and 108,517 and 31,537 ngL<sup>-1</sup>, respectively. Pharmaceuticals comprised 50% of the screened chemicals in the inflow. The median removal efficiency was 31.3%: 29.2% for pharmaceuticals and 20.2% for pesticides, which were similar to those in the literature. Cluster analysis showed that spatial differences among the WWTPs are larger than seasonal differences in the same WWTP. Regardless, we detected seasonal differences in the amounts of substances in the inflows: the amounts of sucralose, UV-filters,

and insecticides were larger in summer than in winter, whereas those of ibuprofen and chlorpheniramine were larger in winter than in summer. The total inflow and outflow population equivalent loads estimated using wastewater volume, detected concentrations, and populations were 44.7 and 13.0 g 1,000 capita<sup>-1</sup> d<sup>-1</sup>, respectively. The extrapolated total annual Japan-wide inflow and outflow loads were 2,079 and 671 tons y<sup>-1</sup>, respectively. Using the data obtained in this study, we identified 13 candidates of marker substances for estimating real-time population in a sewage treatment area and 22 candidates of marker substances for sewage contamination.

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