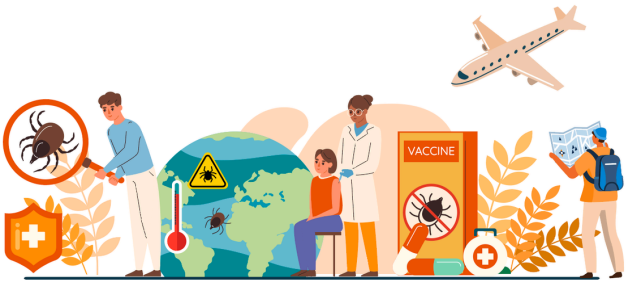

NECTM9

9TH CONFERENCE OF THE NORTHERN EUROPEAN CONFERENCE ON TRAVEL MEDICINE

Copenhagen, Denmark , May 22-24, 2024

EVERYTHING IS RISKY WHEN TICKS GET FRISKY

Travellers grossly underestimate the risk of tick-borne diseases that are globally on the rise. A novel machine-learning tool can assist healthcare professionals in evaluating the risk for tick-borne encephalitis in travellers and provide evidence-based recommendations for prevention.

At present, it is difficult to evaluate the risk of tick-borne diseases like Lyme borreliosis and tick-borne encephalitis (TBE) and to communicate this risk to travellers. As Dr. Kelly pointed out, one reason is that most TBE risk maps that can be accessed online are inconsistent and difficult to interpret, especially for non-professionals.

Tick-transmitted arboviruses underlying TBE are transmitted by hard ticks, with small rodents serving as the primary vertebrate hosts. When multiple ticks feed in close proximity on the same host (a process known as co-feeding), pathogens can be transferred from one tick to another. This mechanism helps maintain the arbovirus across different life stages of the vector [1]. Humans and dairy animals are dead-end hosts for these pathogens. However, cattle may transmit the virus through their milk, and humans can be infected by consuming raw milk or milk products. The natural maintenance and enzootic transmission of tick-borne pathogens are complex processes.

For diseases like Lyme borreliosis, the perceived risk is often much lower than the actual hazard. However, travellers typically have less experience and knowledge about ticks compared with local inhabitants. "They underestimate the risk, and when travelling to a high-risk area, they are less likely to take preventive measures as compared with the endemic population," Dr. Kelly explained. Locals are more aware of the risk and are more likely to use repellents and check for ticks, thereby decreasing their risk.

According to Dr. Kelly, people have limited knowledge of Lyme disease and are therefore uncertain about how to protect themselves. It is incumbent upon academics to ensure that people are well-informed about ticks and the associated risks.

Environmental factors impact tick lifecycles

The risk of Lyme disease varies year to year, partly due to the multi-year life cycles of Ixodes scapularis, commonly known as the black-legged or deer tick. Life cycles of Ixodes species can range between 2–6 years based on host availability, weather, and suitable habitats. "It is difficult because we have to take into account many overlapping tick life cycles," Dr. Kelly explained. For TBE, most cases are recorded when the nymphs, or young ticks, are active. Due to climate change, the peak season for nymph activity is shifting earlier and earlier in the year.

In Norway, the seasonal peak in cases of Lyme borreliosis shifted from mid-October in the mid-1990s to early September in 2018, about six weeks earlier than 25 years before. This shift exceeds seasonal shifts observed in plant phenology and previous model predictions [2]. The data correlates with the increasing activity of *Ixodes ricinus* nymphs over that time; a phenomenon which is observed globally. Additionally, an extended vegetation period provides more resources for ticks.

TBE risk

TBE incidence is heterogeneous but increasing across Europe, including in the Northern countries [3,4]. As Dr. Kelly pointed out, in Scandinavia, key environmental factors influencing TBE risk include deer and rodent populations, elevation, and land cover such as scrub forests.

Risk is an integral part of a patient's journey and depends on several factors: environmental risk, which tends to be higher in rural areas; behavioural-based risk, where activities like hiking in the mountains are riskier than shopping in the city; and disease risk, which is based on the vulnerability of a person. These factors collectively determine which populations are at a higher risk of disease and could benefit the most from personal protection measures.

Due to the complex nature of the enzootic cycle, defining the risk of TBE can be challenging. Machine-learning models that leverage environmental data such as climate, habitat, and animal hosts/reservoirs may offer a more efficient approach to defining this risk. Therefore, Pfizer developed a TBE risk assessment tool aimed at rapidly assessing personal risk. The purpose of this prototype is to help healthcare providers in evaluating their patients' potential risk for TBE based on guidelines from both native and destination countries, thereby raising awareness of TBE. After input of the travel destination, month of travel, intended activities, and duration of stay, the tool provides individualized recommendations regarding preven- tion measures. In some cases, it may also recommend getting a TBE vaccine.

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PFIZER BREAKFAST SYMPOSIUM
EVERYTHING IS RISKY WHEN TICKS GET FRISKY

Dr. Patrick Kelly – Director of Global Medical and Scientific Affairs for Tick-borne Diseases Vaccines at Pfizer, USA

NECTM9

9TH CONFERENCE OF THE NORTHERN EUROPEAN CONFERENCE ON TRAVEL MEDICINE

Copenhagen, Denmark , May 22-24, 2024

CLIMATE CHANGE
PRESENT AND FUTURE EXTREMES

Global warming is occurring at a faster pace than anticipated. Greenhouse gas emissions must be reduced by almost half, to minimize the risk of reaching critical tipping points and reduce harmful effects on human health and ecosystems.

"I think we all know that our planet is warming up dramatically. A global warming limit of 1.5°C is not only a scientific target but also a threshold where we are likely to witness even more pronounced climate changes due to the reaching of tipping points in different places of the world," explained Prof. Mernild.

According to the Climate Change 2023 Report by the Intergovernmental Panel on Climate Change (IPCC), the CO2 concentration today is higher than at any point in the past 2 million years [1]. About 42% of the cumulative net CO2 emissions occurred between 1990 and 2019. These changes were accompanied by an increasing occurrence of weather extremes such as heatwaves, heavy precipitation, droughts, and tropical cyclones. Human influence was very likely also the main driver of sea level rise, since at least 1971.

To achieve climate goals, next to awareness, both adaptation and mitigation financing would need to increase significantly. To limit warming to 1.5°C with no or limited overshoot, global greenhouse gas (GHG) emissions need to be reduced by 43% by 2030 compared to 2019 levels. Deep, rapid, and sustained reductions in GHG emissions would lead to a discernible slowdown in global warming within approximately two decades, thereby reducing projected losses and damages for humans and ecosystems [1]. On the other hand, overshooting the 1.5°C limit will result in irreversible adverse impacts on ecosystems with low resilience.

> "Every decade from 1960 onwards got warmer and warmer, from year to year. Last year, we had the highest temperature level since 1850"

Within the last 100 years, the global temperature has risen by 1.1°C [2,3]. "Every decade from 1960 onwards got warmer and warmer, from year to year. Last year, we had the highest temperature level since 1850," stated Prof. Mernild. Without strengthened policies, a global warming of 3.2°C is projected by 2100. Climate change will have a profound impact on human health [4]. According to Prof. Mernild, the best estimate of reaching 1.5°C of global warming lies in the first half of the 2030s.

"The good news is that the increase of GHG emissions was not so steep during the previous years, so hopefully a peak will be reached within 1-2 decades. It is a complicated mission, and it will take decades to bring emissions down, but the overall goal should be to rule out fossil resources and we urgently need new green technology," Prof. Mernild concluded.

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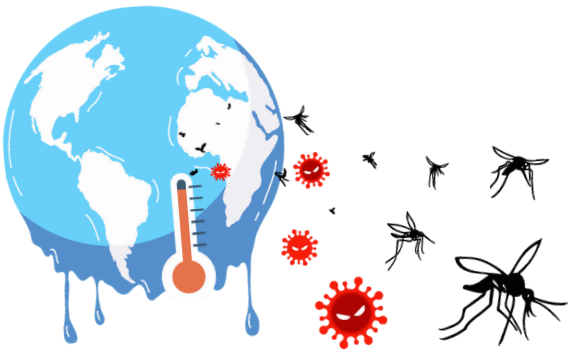
SYMPOSIUM
TRAVEL AND CLIMATE CHANGE

Prof. Sebastian H. Mernild – Head of SDU Climate Cluster, Denmark



NECTM9

9TH CONFERENCE OF THE NORTHERN EUROPEAN CONFERENCE ON TRAVEL MEDICINE

Copenhagen, Denmark , May 22-24, 2024

CLIMATE CHANGE AND ARBOVIRUSES

Climate change is a key factor in the occurrence of mosquito-borne diseases.
Combining climate science with epidemiology might be a promising strategy to identify and fight disease outbreaks.

"Climate change is the main driver of arboviruses," stated Dr. Huits. The Lancet Health and Climate Change report assessed climate suitability for climate-sensitive pathogens and disease vectors [1]. Over the past two decades, the West Nile virus has emerged in the Americas and expanded in Europe. Cases of dengue have doubled every decade since 1990, and almost half of the world population is now at risk of this life-threatening disease [1].

Longer hot seasons will enlarge the seasonal window for the spread of mosquito-borne disease and favour increasingly frequent outbreaks. In total, there are more than 3,500 different mosquito species. *Aedes aegypti* invaded Madeira Island in 2005 and was the vector of the island's first dengue outbreak in 2012. The Asian tiger mosquito (*Aedes albopictus*) carries dengue fever and has become established in 13 European countries as of 2023: Italy, France, Spain, Malta, Monaco, San Marino, Gibraltar, Liechtenstein, Switzerland, Germany, Austria, Greece and Portugal [1].

Mosquitos are dependent on outside temperatures: there is an optimum of the biting rate, and the infection probability [2,3]. "If it gets too hot, mosquitos will die. This might be an advantage of global warming," Dr. Huits said. The lifespan of the vector is a critical component of its ability to transmit pathogens: although *Ae. aegypti* is more potent to transfer arbovirus, *Ae. albopictus* lives longer. A transmission is only possible if the lifespan is longer than the extrinsic incubation period. "Therefore, *Ae. albopictus* is more efficient regarding the transmission of pathogens," Dr. Huits explained.

The extrinsic incubation period is also temperature-dependent. Regarding dengue, extrinsic incubation periods are between 5 and 33 days at 25°C and 2 and 15 days at 30°C [4]. Therefore, an outbreak in the USA in July would have more impact in a moderate climate, e.g. in Philadelphia compared to Texas, where it is too hot.

After the introduction of mosquitos in Europe, there were only small-scale outbreaks of dengue in contrast to larger chikungunya outbreaks. This might be because the incubation period in chikungunya is a lot shorter than in dengue, which facilitates transmission [5].

All in all, there are too many climate-independent factors to conclude how climate change will ultimately influence dengue outbreaks. "A promising strategy might be to combine climate science with epidemiology, to identify and combat disease outbreaks," Dr. Huits concluded.

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Dr. Ralph Huits – Clinical Research Associate at IRCCS Ospedale Sacro Cuore Don Calabria, Italy

NECTM9
9TH CONFERENCE OF THE NORTHERN EUROPEAN CONFERENCE ON TRAVEL MEDICINE
Copenhagen, Denmark , May 22-24, 2024

TRAVELLER'S DIARRHOEA: ANTIBIOTICS ARE USED TOO LIBERAL

Traveller's diarrhoea (TD) is by far the most common health problem in travellers.Most cases resolve spontaneously and current recommendations for antibiotic use are too liberal in the light of increasing resistance.

Every year, more than 500 million travellers visit tropical regions, and between 20–56% of them contract TD [1]. In general, bacterial causes of TD are more frequent in lower- and middle-income countries. According to a study in Benin (Africa) including 210 travellers, enteropathogenic E. coli and enteroaggregative E. coli are the most frequent bacterial pathogens, found in 73% and 72% of cases [2]. In this study, viral infections were rare, with Norovirus G2 and G1 the leading cause in 6% and 5% of patients, respectively.

"In Southeast Asia, 20–35% of TD cases are caused by Campylobacter, probably due to close contact between poultry and humans," Prof. Kantele said. The clinical picture is mild or moderate in most cases. After the first days, it gets easier, and a spontaneous recovery is often observed after 3–5 days [1]. "TD does not kill people, the death rate is <1%," Prof. Kantele said.

The most frequent consequence of TD is irritable bowel syndrome, concurring in about 5–10% of cases, followed by urinary tract infection in 3% [3,4]. The source of TD is usually food and drinks contaminated by stool pathogens. Rehydration and salt are the cornerstone of TD treatment. Antidiarrheal medications like loperamide can also be administered. Vaccines against enterotoxigenic E. coli are being developed.

Antibiotic therapy in TD should only be used in severe cases. According to a Cochrane review, antibiotic therapy reduces the duration of TD by 1.5 days and leads to a quicker recovery [5]. The flip side of the coin is the increasing development of resistance among TD pathogens [6]. "According to newer studies, antibiotics do not prevent irritable bowel syndrome or other TD complications," stated Prof. Kantele. Moreover, travellers to lower- and middle-income countries become colonised by multidrug-resistant intestinal bacteria [7]. According to current guidelines, there is only strong evidence for antibiotic use in severe cases. "The current recommendations regarding antibiotic use are still far too liberal. Travellers act as vectors, spreading antibiotic resistance across the globe," concluded Prof. Kantele.

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SYMPOSIUM
SHIT HAPPENS

Prof. Anu Kantele – Head of Meilahti Vaccination Research Center (MeVac), Finland

NECTM9

9TH CONFERENCE OF THE NORTHERN EUROPEAN CONFERENCE ON TRAVEL MEDICINE

Copenhagen, Denmark , May 22-24, 2024

TICKS ON THE MOVE: A GROWING PUBLIC HEALTH CONCERN

Due to global warming, ticks are moving further north each year, followed by an increasing number of tick-borne diseases. To fight this health threat, a multidisciplinary approach will be most effective.

"Climate change affects many factors, making it difficult to predict precisely its effect on ticks and their migration," stated Prof. Skarphedinsson. But as he pointed out, an increase in tick-borne diseases can be expected. Due to climate change, tick distribution will spread further north and to higher altitudes, increasing the occurrence of tick-borne diseases in these areas. Ticks are resilient to various temperatures and can survive in temperatures as low as -18°C.

Ticks are reservoirs of all kinds of possible pathogens. In Europe, the *Ixodes* species serves as a vector for Borrelia and tick-borne encephalitis (TBE). Dermacentor species are also prevalent across Europe and act as vectors for various pathogens, including *Babesia*. The *Ixodes* species began to move further north starting in the early 1980s [1]. According to data of the Public Health Agency of Sweden, TBE cases increased from less than 50 cases in 1989 to almost 600 cases in 2023. A similar development could be seen in Norway: Before the 1990s, TBE was not even known, after which the *Ixodes* ricinus species migrated further north due to climate change; though current absolute case numbers are still low [2].

An important factor contributing to the spread of ticks is migrating birds, the so-called "bird airline", which is also influenced by climate change. Ticks are now regularly observed outside their typical habitats. For instance, the tick species Hyalomma, mainly present in the Afrotropical Region, can nowadays be found in Southern Europe and sporadically in Germany [3]. They carry the virus that causes Crimean-Congo Haemorrhagic fever, with 88% of cases being asymptomatic, but the fatality rate can be as high as 40%. Another Asian tick that could spread due to climate change is Haemaphysalis longicornis, also known as the Asian long-horned tick. Among the diseases this tick can transmit is Severe Fever with Thrombocytopenia Syndrome Virus (SFTSV), with a 6-30% fatality rate. This tick has rapidly spread across the northeastern and southeastern regions of the United States since it was first reported in 2017 [4]. It is now present in 20 different states and has the potential to act as a vector for a range of human and veterinary pathogens.

"Ticks move from country to country, and we need a one-health Prof. multidisciplinary approach to solve this challenge."Skarphedinesson concluded.

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Prof. Sigurdur Skarphedinsson – Senior consultant at Clinical Center for Emerging and Vector-borne Infections (CCEVI), Denmark

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Copenhagen, Denmark , May 22-24, 2024

TICK-BORNE ENCEPHALITIS IN EUROPE:
EPIDEMIOLOGY DEPENDS ON REGIONAL FACTORS

All over Europe, the occurrence of human cases of tick-borne encephalitis (TBE) has spread from East to West. Globally, the incidence of all tick-borne diseases is slowly but steadily increasing, culminating in a new silent pandemic.

In recent years, an overall rise in the incidence of TBE has been observed. The disease is caused by the tick-borne encephalitis virus (TBEV), which is found in most of Europe and northern Asia and belongs to the genus Flavivirus. Today, 6 subtypes of the virus are known.

TBE is notable for its unstable dynamics with profound fluctuations in annual case numbers [1]. From 2012 to 2020, 19 countries reported a total of 29,974 TBE cases (range 1,857–3,604 cases/year) [2]. In 2021, there were 3,027 TBE cases reported from 25 EU/EEA countries [3]. In Central Europe, there is an unusual cyclicity, with simultaneous increases observed in Germany, Austria, Switzerland, and Slovenia, indicating a regional phenomenon [4]. “Austria is special because, despite a vaccination rate of 85% of the population, you see the same dynamics,” noted Dr. Dobler. A similar phenomenon was seen in Scandinavia, although the increase there began in 2000, unlike Central Europe where the rise started in 2015. In the Baltics, there is a different pattern: TBE numbers are either stable or even decreasing, as seen in Estonia. “Thus, the epidemiology of TBE is completely different in different regions,” remarked Dr. Dobler.

Not only are ticks in Europe moving further north, but the occurrence of human TBE cases is also expanding from east to west, for example seen in Sweden. “What we see now in Sweden happened 20 years ago in Central Europe. So clearly this virus has the tendency to migrate from east to west,” said Dr. Dobler.

In Central Europe there is a transition of endemic to hyperendemic status. “In Bavaria, we see many small focal areas with different viruses, which we call hyperendemic. This is in contrast to Northern Germany where we have a single large TBEV focus with one single virus, which we call endemic,” explained Dr. Dobler. On a global basis, not only TBE but also other tick-borne diseases are becoming more prevalent. In Saxony (a state in Germany), up to 96% of all vector-borne diseases are tick-borne diseases. Similarly, in the USA, the incidence of tick-borne diseases more than doubled from 2004 to 2016, while mosquito-borne diseases were marked by virus epidemics [5]. “We are entering a silent tick-borne disease pandemic,” concluded Dr. Dobler.

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Dr. Gerhard Dobler – National Reference Laboratory for TBEV, Germany

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Copenhagen, Denmark , May 22-24, 2024

FROM HARMLESS TO HARMFUL: TICK-BORNE RICKETTSIOSES IN TRAVELLERS

Many rickettsioses, e.g. spotted fever cases, have been considered relatively harmless in the past. However, several complications have been observed in a subset of patients, particularly in the elderly.

In the past 25 years, the scope and importance of tick-associated rickettsial pathogens have increased dramatically [1]. Several species of tick-borne Rickettsia that were considered non-pathogenic for decades are now associated with human infections. Novel Rickettsia species of undetermined pathogenicity continue to be detected, supported by novel molecular techniques. Rickettsioses in travellers are subdivided into three groups: 1) the spotted fever group (with African tick bite fever and Mediterranean spotted fever being the most frequent), 2) the typhus group, and 3) a group caused by the reclassified *Orientia.* Prof. Parola highlighted that there are now 15 tick-borne rickettsioses worldwide, with half of them described in the past 20 years.

According to a study examining 17,353 ill-returned travellers, rickettsioses were identified as the fourth most frequent aetiology for systemic febrile illness, following malaria, dengue, and mononucleosis [2]. After a trip to Sub-Saharan Africa, they were even the second most common cause, occurring more frequently than typhoid or dengue. Another study explored risk factors associated with spotted fever group rickettsiosis in international travellers [3]. Travel to southern Africa (odds ratio [OR] 34.5), travel for tourism (OR 6.35), and travel from March to May (OR 1.3) were independently associated with spotted fever group rickettsiosis.

Many cases of African tick bite fever have been found in travellers, with >350 cases reported from Europe, North and South America, Asia, and Oceania [4]. Mediterranean spotted fever is one of the oldest recognized vector-borne infectious diseases. It has been identified in >35 travellers from northern Europe and North America, with most individuals infected in southern France, Portugal, and Spain [4].

While the presentation of both spotted fevers is typically benign, cardiac and neurological complications due to African tick bite fever have been reported, and Mediterranean spotted fever has been complicated by multi-organ failure and death in a few cases [7]. Complications are often seen in the elderly [3,5], and warmer weather is linked to more tick attacks and emergence of severe rickettsioses [6].

A non-invasive way to confirm the diagnosis of rickettsial infection is the use of cutaneous swabs from patients: After removing the crust, the sterile swab should be directed to the base of the wound. Results show a comparable sensitivity to skin biopsies [8]. When faced with a suspected case, early empirical antibiotic therapy with doxycycline should be prescribed [7].

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Prof. Philippe Parola – Director of Vectors – Tropical and Mediterranean Infections (VITROME) Research Unit

GLOBAL SURGE IN DENGUE AND CHIKUNGUNYA: VACCINATION EFFORTS TAKE THE CENTER STAGE

Cases of dengue and chikungunya are globally on the rise. This alarming increase highlights the urgent need for effective vaccines and underscores the significant risks faced by travellers. There is a good, but imperfect, dengue vaccine, and in 2023, the first chikungunya vaccine was approved by American authorities and will soon be available in Europe.

A rapid increase in dengue cases is seen globally: According to annual reports of the WHO, 5.2 million dengue cases were reported in 2019, a more than two-fold increase compared with 2018 [1]. "There are many travellers in countries with a high risk of acquiring the disease, such as Thailand," said Prof. Jelinek. According to data from the Mahidol University in Thailand, approximately 1 in 3 travellers admitted to a hospital with a dengue infection developed severe dengue (dengue haemorrhagic fever or shock syndrome) [2]. "These numbers are much higher than seen in Europe and those with a second infection have the highest risk," Prof. Jelinek explained. During a first infection, the host develops antibodies to the virus. When there is a second infection, the virus binds with the remaining antibodies; this antibody-virus complex leads to an enhanced virus response, which results in worse outcomes for second infections [3].

It is difficult to develop a dengue vaccine, as it should protect against all four subtypes. After dengue infection with one serotype, there is usually a lifelong protection against this serotype. However, a second infection with a different serotype poses the risk of severe dengue, presumably also due to antibody-dependent enhancement [3].

At present, there are two vaccines commercially available against dengue [4]. The first one, CYD-TDV, is a live vaccine against all four serotypes with a 3-shot schedule with a 6-month interval. It offers 20% protection for non-immune people, which increases to approximately 60% after a dengue episode. However, in seronegative people, there is a risk of developing dengue haemorrhagic fever on contact with the wild virus, similar to the risk seen at secondary infection. Thus, the vaccine is only approved for patients already infected once with dengue. Pre-vaccination screening is thus required, causing the vaccine not to be widely used. The EMA recommends it for people living in non-endemic countries who have previously been infected and for frequent or long-term travellers. However, all travellers are at risk. "I do not understand why we withhold this vaccine. We do not have a perfect vaccine but it is a good one," said Prof. Jelinek.

The second vaccine, TAK-003, is also a live vaccine against all 4 serotypes with a 2-shot schedule at 0 and 3 months. After the first vaccination, the protective effectiveness is already 81.1%. Importantly, it offers 90.4% protection against hospitalization, but there appears to be no significant protection against dengue 3 and 4 subtypes.

Reassuringly, there is no signal for dengue haemorrhagic fever when in contact with the wild virus and the side effects are at a placebo level.

A third live attenuated dengue vaccine is currently being assessed in a phase 3 study [5]. "With this vaccine, we will need only one shot, which is nice in travel medicine," Prof. Jelinek said.

Chikungunya: high risk of chronic symptoms in older adults
Chikungunya is caused by a single-stranded RNA alphavirus spread by the same mosquitoes that transmit dengue and Zika viruses. There are 2 disease phases, an acute phase with symptoms that resolve in 7–10 days and a chronic phase in up to 78% of patients with a pattern similar to rheumatoid arthritis [6,7]. Patients can also develop fatigue that can last for months to years. Older age and a high viral load are risk factors for developing chronic symptoms. There are 2 vaccines in the pipeline with an attenuated live vaccine by Valneva (VLA1553) leading the race with a positive phase 3 trial [8].

"Luckily, this is a single-shot vaccine that is recommended for those travelling in a country with an outbreak, which can be difficult to predict," Prof. Jelinek said. He pointed out that a decision tree for a chikungunya vaccination by the Centers for Disease Control and Prevention (CDC) is more practical regarding the decision of who should be vaccinated [9].

The Zika virus causes by far the mildest symptoms (e.g. skin rash and fever). However, viremia during pregnancy can lead to brain damage and microcephaly in newborns. "Therefore, couples really want to have a vaccination," Prof. Jelinek concluded. Unfortunately, there is no vaccine in sight: Moderna announced this year not to advance the Zika vaccine without more outside funding.

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9TH CONFERENCE OF THE NORTHERN EUROPEAN CONFERENCE ON TRAVEL MEDICINE

Copenhagen, Denmark , May 22-24, 2024

ENHANCING TRAVEL HEALTH: STRATEGIES FOR EFFECTIVE RISK COMMUNICATION AND HEALTH LITERACY

Clear risk communication helps travellers make informed decisions, for example regarding vaccines. Time constraint is a major barrier to effective risk communication.

"In many areas of travel medicine, it is difficult to communicate the probability of risk," said Ms. Chiodini. Risk communication in travel medicine involves an open, two-way exchange of information and opinions about the harms and benefits associated with travel-related health risks [1]. The goal is to improve the understanding of these risks and to promote better clinical decision-making.

Risk information should promote patient involvement. Effective communication can change travellers' beliefs and behaviours. For example, encouraging the use of helmets when riding bikes or mopeds abroad can significantly reduce the risk of injury.

The way information is presented is critical for effective communication. The method is important and influences the degree to which perceived risk will affect behavioural change [1,2]. Successful campaigns, like the one that reduced sudden infant death syndrome (SIDS) by providing clear guidance on sleeping positions, demonstrate the impact of effective risk communication.

Barriers to effective risk communication include widespread statistical illiteracy and basic numeracy. Clinicians must be skilled at interpreting numerical data and explaining it in a way that patients can understand [1]. Many people, including educated adults, struggle to understand health statistics. Visual aids, such as pictographs, can greatly enhance comprehension. For instance, explaining that an 80% efficacy rate means that 80% of a vaccinated population will be protected, rather than the misconception that the vaccine works only 80% of the time, helps travellers better understand their risk. However, beware of information overload. "I have always practised or taught to focus on two or three items of greatest risk to your traveller," Ms. Chiodini suggested.

Health literacy, or the ability to understand health information, is crucial for effective communication. Studies show that 80% of healthcare information is forgotten immediately and 50% of information recalled is incorrect [3]. The teach-back method, where patients repeat information in their own words, ensures understanding. Similarly, the chunk and check method, which involves breaking down complex information into manageable parts and checking the understanding at each stage, can enhance clarity.

Time constraints during consultations and travellers' reluctance to pay for vaccines present significant challenges to effective communication. Additionally, healthcare professionals require more education and practice in risk communication and health literacy to enhance their communication strategies.

In conclusion, changing traveller behaviour through effective risk communication and shared decision-making is fundamental in travel medicine. Continuous education, practice, and the development of additional resources are essential to enhance risk communication in travel medicine.

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Further information on risk communication in travel medicine can be found online through the provided web link and QR code.
https: //bit.ly/3UXarXO

SYMPOSIUM
SYMPOSIUM FOR NURSES II

Ms. Jane Chiodini – Founder and director of Travel Health Training Ltd.

NECTM9
9TH CONFERENCE OF THE NORTHERN EUROPEAN CONFERENCE ON TRAVEL MEDICINE
Copenhagen, Denmark , May 22-24, 2024

BEST 10 PAPERS
IN TRAVEL MEDICINE: AN OVERVIEW

Numerous publications of high interest in travel medicine were published during the previous year. While various topics were covered, it's evident that novel vaccines are a major focus of research.

The first study discussed assessed the capability of the AI tool ChatGPT to provide travel consultations [1]. The authors asked ChatGPT to provide free travel advice by presenting a series of common queries on food and water safety, traveller's diarrhoea, vaccinations, and malaria prophylaxis. In general, answers were accurate but generic, lacking contextualization. For instance, ChatGPT did not recognise Kilimanjaro as a high-altitude risk and comorbidities or prior immunizations were not considered. Thus, while AI chatbots may offer travel advice, travellers should still consult human travel medicine experts for an individualized approach.

Steffen R, et al. assessed the epidemiology of travel-related vaccine-preventable diseases [2]. In this latest update, COVID-19 and influenza were top-ranked vaccine-preventable diseases with an estimated incidence of 1% per month in international travellers, followed by dengue fever (0.5–0.8% per month). The authors conclude that this data provides a tool for travel health professionals to prioritise prevention strategies.

Another paper assessed the safety and immunogenicity of a single-shot, live-attenuated chikungunya vaccine (VLA1553) for up to 180 days [3]. In this phase 3 study, 3,000 adult participants received the vaccine and more than 1,000 received a placebo. The immunogenicity analysis was based on a subset of 362 participants. A single dose induced neutralizing antibody levels in 99% of patients and a 96.3% seroprotection on day 180.

Serious adverse events were uncommon. "Thus, the single dose strategy is very promising, especially in travel medicine," Prof. Chen emphasized. According to recommendations from the Centers for Disease Control and Prevention (CDC), which are set to be published soon, the vaccine will be recommended for adults travelling to a country or territory experiencing a chikungunya outbreak. Additionally, it may be considered for travellers over 65 years old (particularly those with comorbidities), long-term travellers, and travellers visiting countries with evidence of chikungunya virus transmission among humans within the last five years.

In May 2024, the WHO published a position paper on dengue vaccines [4]. TAK-003 is a tetravalent, live-attenuated dengue vaccine, administered in a 2-shot schedule on day 0 and 3 months later. The position paper also addresses travellers. The WHO recommends vaccinating those with previous dengue infection, frequent travellers, long-term travellers, migrants, and expats aged 6–60 years.

Butantan-DV is an investigational, live-attenuated, single-dose, tetravalent dengue vaccine. An ongoing phase 3 study, including more than 10,000 patients in the intervention group, is being conducted in Brazil. This year, the 2-year data were published [5]. "The vaccine's efficacy is estimated to be about 80% against biologically confirmed dengue and 90% against hospitalization for dengue," stated Prof. Chen. The efficacy varies according to age: From 2–6 years it is 80%, from 7–17 years 77.8%, and from 18–59 years 90%.

When researchers examined the serotypes, the protection was quite robust for DENV-1 (89.5%) and DENV-2 (69.6%). "But there is no data on dengue 3 and 4, because they detected no viruses of these subtypes," Prof. Chen said. Adverse events within 21 days were reported in 58% of the vaccine arm and 45.6% of the placebo arm, with the most common being headache, fatigue, and rash [5].

Several other papers were discussed regarding research into rabies, tick-borne encephalitis, yellow fever, malaria, and post-infectious irritable bowel syndrome:

- A single intramuscular rabies vaccination can effectively prime travellers (aged 18–50 years) and could replace the current standard two-visit rabies vaccination as pre-exposure prophylaxis [6].
- Recommendations for US-based practitioners were published regarding vaccination to prevent tick-borne encephalitis. In total, only 12 civilian cases in US travellers were confirmed from 1979–2021 [7].
- A single dose of yellow fever vaccination has been confirmed to provide lifelong protection for most travellers [8].
- A publication on malaria deals with the emergence of artemisinin partial resistance in Africa, particularly in Rwanda, Uganda, Ethiopia, Eritrea, and Sudan [9].
- Post-infectious irritable bowel syndrome was observed in 10% of patients after contracting travellers' diarrhoea. Parasitic infections, mainly giardiasis, seem to be an independent risk factor [10].

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NECTM9
9TH CONFERENCE OF THE NORTHERN EUROPEAN CONFERENCE ON TRAVEL MEDICINE
Copenhagen, Denmark , May 22-24, 2024

NEW DATA CONFIRM VLA1553 EFFICACY OVER 2 YEARS

Chikungunya virus has spread globally in the last 20 years and can lead to debilitating arthralgia. No treatments or preventive vaccines are currently licensed, but promising vaccine candidates are under development, such as the VLA1553 vaccine.

The VLA1553 live-attenuated vaccine, targeting the chikungunya virus, was shown to induce a strong immune response and the generation of seroprotective titres in nearly all vaccinated participants, after a 1-shot administration [1].

A subset of participants (n=363) was investigated further on the antibody persistence and long-term safety of VLA1553 (NCT04838444). The main objective of the long-term study is to assess annually the proportion of patients with a seroresponse, from year 1 to year 5 after single immunization. At the NECTM meeting, the 24-month results of this ongoing study were presented.

Twenty-four months after the single-dose vaccination, 97% of participants retained neutralizing antibody titers above the seroresponse threshold of 150. Day 29 geometric antibody titers (GMT) for the long-term follow-up cohort were 3,542, and GMT remained high with 785 at year 2. In addition, the persistence of antibodies in older adults (≥65 years) was as good as in younger adults, with GMTs slightly higher in older individuals. Reassuringly, no safety concerns were identified for the duration of the follow-up trial; 10 serious adverse events were reported, all assessed as unrelated to the vaccine. Moreover, no persistent adverse events of special interest were identified.

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Dr. Natascha Sattler – Clinical Strategy Manager at Valneva

WARMING PLANET, RISING RISKS:
ESCALATING THREATS OF ARBOVIRUSES IN EUROPE

Arboviruses are an increasing public health concern, as global warming expands potential vector habitats. During a discussion with travel medicine experts, strategies to prevent infections were discussed.

Japanese encephalitis (JE) is a risk in 24 countries, mostly in Asia. Each year there are about 100,000 cases and 25,000 deaths globally [1]. "Travelers are relatively unlikely to come in contact with the virus and fewer than 1% become infected. But for those who get it, it can be devastating," Dr. McGuiness explained. There is no specific treatment, only a vaccination. The disease can lead to permanent neurologic long-lasting damage.

The JE virus can only be transmitted by mosquitoes, and humans are a dead-end host. It's naturally transmitted in a cycle between mosquitoes and waterbirds, while pigs serve as amplifying hosts [2]. Case reports of human-to-human transmissions exist via blood transfusions and organ transplantations. Prior to 2022, only sporadic reports of locally acquired human JE virus infections had been reported in Australia.

A new virus genotype (IV JEV) led to an outbreak in South-Eastern Australia from 2021 to 2022. The outbreak may have been caused by an increase of waterbirds due to heavy rainfall and the close proximity of Australian inhabitants to piggeries. All in all, 46 human cases have been reported, most of them being older adults [3].

As most JE cases are asymptomatic, diagnosis can be challenging. PCR is the most specific test. "Where the disease is endemic, it is more of a childhood disease, and adults are typically immune. However, since 1973, over 90% of published cases have been in adults, and in Australia, primarily in older adults," Dr. McGuinness noted. The only way to prevent JE is by avoiding mosquito bites or getting vaccinated.

Chikungunya now present in more than 100 countries

"Previously, chikungunya was a disease encountered in Africa and Asia. But since 2014, it has spread to more than 100 countries," Dr. Norman said. Endemic areas are expanding and vectors are *Aedes aegypti* and *Aedes albopictus.*

The acute stage of the disease lasts less than three weeks, with predominant symptoms including fever (in 85% of patients) and neurological or ocular symptoms such as conjunctivitis [4,5]. Risk factors for complications include older age (>65 years), comorbidities, and pregnancy [4]. The post-acute stage lasts three weeks to less than three months, during which arthralgias are frequently observed [4–6]. Some patients suffer from a chronic stage (lasting more than three months), most frequently experiencing chronic arthralgia [5,6]. Risk factors for developing a chronic stage include age >40 years, severe acute disease, and underlying osteoarthritis.

Rash and fever can be symptoms of chikungunya during the acute stage, but they are also seen with measles, rickettsial diseases, or Zika infection. Therefore, diagnosing chikungunya clinically can be difficult. Importantly, not only infectious disease specialists but also general practitioners should be aware of chikungunya and be able to identify its risk factors [7].

In the acute phase, a PCR test for chikungunya virus RNA is recommended within the first five days [7]. Serologic testing can be performed at least seven days after symptom onset.

In the chronic phase, chikungunya virus antibodies can be detected; otherwise it is only possible to exclude other causes of arthritis [7].

"The vast majority of cases are transmitted by vectors (mosquitos)," Dr. Norman highlighted. Mother-to-child transmissions can happen in outbreaks with a frequency of 15% (but up to 50% if intrapartum viremia exists) [8]. Moreover, transmissions are possibly by blood transfusions. A prevalence of up to 2% of chikungunya RNA has been found in asymptomatic donors [9].

Recently, the Committee for Medicinal Products for Human Use (CHMP) of the EMA adopted a positive opinion recommending the authorization of the first single-dose chikungunya vaccine. This development offers hope that the risk of the disease can soon be diminished.

Climate change fuels arbovirus infections

Different arbovirus transmission cycles exist: an enzootic cycle involves direct spillover from wildlife to mosquitoes and humans, an epizootic cycle amplifies viruses in domesticated animals, infecting humans via mosquitoes, and an urban epidemic cycle involves direct transmission between humans and the vector.

Dr. Huits emphasized the increasing suitability of the climate in Europe, expanding potential vector habitats. "By 2030, 2040, and 2050, the range of vectors could extend up to southern Sweden, due to global warming trends."

Temperature significantly influences insect life. It boosts host-seeking behavior and blood meal intake, as well as pathogen development and transmission [10]. "This is directly related to vector abundance and affects the mosquito-to-human ratio, with a higher chance of getting bitten," Dr Huits stated.

Travelling facilitates the movement of humans and vectors, thus also causing the establishment of novel pathogen transmission cycles. Therefore, it is imperative to adopt a one-health approach, focusing not only on human health but also on mosquito ecology and the influence of animal health.

All speakers agreed that arboviruses are an emerging public health concern. Physicians must be aware of formerly "tropic infections" and be able to diagnose them.

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VALVENA LUNCH SYMPOSIUM
WARMING PLANET, RISING RISKS: ESCALATING THREATS OF ARBOVIRUSES IN EUROPE
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