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Conference reports

About the Meeting

Deutsche Fachgesellschaft für



REISEMEDIZIN e.V.
German Society for Travel Medicine

This year the Annual Meeting of the German Society of Travel Medicine took place in Bremerhaven, September 16th to 18th. This traditional harbour town where thousands of Germans were embarking hundred years ago facing an uncertain future, the so-called “climate house” (an exhibition about several aspects of the world’s climate) and the Alfred-Wegener Institute for Arctic Research were a fantastic setting for the meeting’s motto “traveling under extreme conditions”. After a brilliant introduction by Stefan Kröpelin about research in the Sahara two weeks away from the next pharmacy and a fascinating lecture by Eberhard Kohlberg how to organize expeditions to Antarctica and how to work and to live there several lecturers illuminated a wide field of travel medicine in more or less extreme conditions.

Keywords

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A medical project in the tropics

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Background: Development aid in tropical countries presents a challenging task to the individual person as well as to the project itself.

Materials and methods: Based on our work experience of nearly two years in South America, we discuss different aspects of skills needed as well as the understanding of how a project in foreign cultures should be structured to succeed.

Results: Living and working in remote areas implies a wide spectrum of patients. The incidence of illnesses correlates with data for low-income countries and their causes of death with pneumonia, diarrhoea and malaria as the most common causes of death. Frequently the broad mass of patients is not able to travel to the next town where specialists are available. Due to limited resources, a health care worker needs to manage the work with only little and basic material. A basic consulting room with the opportunity to perform a sedation is desirable. The communication often takes place with translators who originate from local tribes because indigenous patients do not understand the official language.

Conclusions: The remoteness in the tropics requires a broad range of medical work challenging a physician from abroad who is not experienced in all fields in his home country. Preparation and appropriate equipment are essential for the worker's own safety in terms of tropical diseases. Good knowledge of the region, their people and culture are of great significance when planning a new project. Environmental aspects such as a river altitude determine and limit the time and range of planned work.

Dermatological aspects in travel medicine

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In view of globalization and the associated transport of goods as well as rising travel activity, imported infections with subtropical and tropical pathogens are

increasing in Germany. In returning travelers presenting with fever, general symptoms and skin rash, a number of diseases need to be considered. The clinical appearance of the skin rash, accurate travel history and epidemiological information on country-specific risks are helpful in making the correct diagnosis. In my lecture, I provide an overview of the most common exanthemas in travelers who have returned, associated symptoms, diagnostic methods, therapies, as well as prevention strategies.

Attitudes and practices among German travel health advisors towards influenza vaccination for international travelers and barriers for vaccination: A cross-sectional study

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Background: Seasonal influenza affects up to 15% of the population worldwide annually and is considered one of the most frequent vaccine-preventable infections in international travelers. A variety of travel and patient-related factors may be considered when recommending influenza vaccination (SIV) for travelers, but guidelines are often general in nature. In addition, vaccination coverage may be hampered by limited vaccine availability outside the local influenza season and a lack of awareness in international travelers.

Materials and methods: We aimed to characterize the personal attitudes and practices of German travel health care advisors towards influenza vaccination in international travelers and to identify potential barriers to vaccination. We identified potential German travel health advisors by databases of the German Academic Society for Travel Medicine and the German Society for Tropical Medicine, Travel Medicine and Global Health and asked them to complete an online questionnaire between April and May 2021.

Results: Overall, 248 travel health providers completed the online questionnaire and were further analyzed. More than 75% of respondents recommend SIV for travelers older than 60 years or those with comorbidities

if they are bound for tropical regions, non-tropical regions in the southern hemisphere, travelers on the Hajj pilgrimage, or those traveling on cruise ships regardless of the influenza activity in Germany. However, less than 7% reported that they have regular access to SIV doses during the summer months, and the majority (n = 197; 79%) of travel health advisors stated that they would vaccinate more travelers against influenza if they had SIV doses regularly available outside of the German influenza season. Only eleven respondents (4%) have previously ordered SIV doses produced for the southern hemisphere, and the most frequently stated reason for not ordering those vaccines was organizational barriers. The general risk perception among international travelers toward travel-related influenza was considered too low (n = 124; 50%) or rather too low (n = 101; 41%) by the vast majority of respondents.

Conclusions: We demonstrate that while the awareness about the importance of travel-related influenza is high among German health care advisors, year-round availability and easy access to influenza vaccines are needed to lower the burden of influenza among international travelers. Furthermore, the risk perception towards seasonal influenza needs to be improved among international travelers to increase vaccination coverage.

Chagas disease

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Chagas disease is a parasitic infection transmitted by triatomine ectoparasites. It is endemic in several Latin American countries, but due to migration the infection is also prevalent outside the endemic regions. In endemic populations the illness brings along issues of stigmatization and inequity. Potentially endemic regions are also frequent travel destinations, however, infections in travellers are very rare. Courses of illness include an acute phase, but most critical are organ damages in the chronic phase. Diagnosis is challenging, and in addition outside endemic regions physicians are not aware of the disease. Treatment is hampered by side effects and limitations in outcomes in chronic cases. Germany is still lacking established guidelines, which are, however, currently being developed by an interdisciplinary working group.

Health hazards facing adventure tourists in volcanic environments

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Travel to volcanic and similar geothermal destinations is increasingly popular globally. While the attractions to such environments for adventure travelers, the experience is not without high potential risks to the health of the traveler. In fact, if such endeavors are to be a sustainable sector of the tourism industry, tourists and travel medicine practitioners must be made aware of the potential health hazards in volcanic environments. Using case study examples from Hawaii Volcanoes National Park, the second most popular travel destinations in the Pacific Island U.S. State of Hawaii, the aim of this study is to review the potential influences and effects of volcanic gases such as carbon dioxide (CO₂), hydrogen sulfide (H₂S), sulfur dioxide (SO₂), and hydrogen chloride / hydrochloric acid (HCl) on adventure travelers. It also reviews the negative health impacts of contact with active lava flows, tephra and ash, landslides, and mudflows.

Research in Antarctica: A logistical, medical and psychological challenge

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Antarctica is said to be the stormiest, coldest, and most hostile continent on earth without natural resources which would allow normal settlements. Therefore a year-around active research base is a special challenge. For most months the continent is completely isolated. A hibernation causes extraordinary stress to humans and to any equipment.

Logistical requirements can be handled with forward-looking planning. However, planning of transport is vague because of weather and ice conditions and their consequences for air and sea transport.

To estimate medical problems is much more difficult. Although a detailed check-up of all participants before departure to any mission accidents and acute diseases cannot be foreseen. Modern satellite technology there is a permanent telemedical support by a German hospital. This provides a maximum of safety for the expedition doctor as well as for the participants.

A special challenge is the winter season when 9 to 10 persons provide permanent scientific work at the research camp. The idea to be isolated from the rest of the world for 9 months and the only way to communicate is internet or phone needs psychic and social well stabilized persons. Many aspects of such a situation may be compared with space missions. Therefore both situations are often compared in scientific studies.

Aspects of health insurance of travelers

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Background: From an insurance law perspective of international travel it is important to distinguish whether a trip takes place for private or professional reasons and in which destination country. While private travelers are usually responsible for their own insurance coverage, a business traveler is not automatically fully insured by the company.

Consequences: For business travelers sending in (“Einstrahlung”) must be differentiated from sending out (“Ausstrahlung”) and from cross-border travel (Grenzgänger). In addition, it is important in which country the deployment takes place. It is shown what aA1 certificate is, who needs it and where and how to apply and who issues it. The terms “deployment”, withholding (“Aussetzung”) or interruption (“Unterbrechung”) of a deployment as well as termination of a sending out will be explained, all with examples. After explaining the contracts between nations concerning health insurance coverage, nursing care insurance, pension and accident insurance and employment promotion the peculiarities of these topics will be discussed with the background of occupational deployment. Duration of deployment and extension of this period and the certificates to be carried along must be included in the advice. It will be explained when a provisional replacement certificate, EHIC, or the electronic health card with special attribute must be carried to obtain

reimbursement in case of an occupational accident or disease. The EHIC does not necessarily cover all health costs abroad. Pitfalls of insurances will be mentioned as well as specific features for accompanying family members or friends.

Zika and Chikungunya in Europe 2100: A GIS based model for risk estimation

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Background: The spread of vector-borne infectious diseases is determined by temperature, among other factors, so that climate change is expected to influence their global distribution. In the future, Europe will approach the temperature optimum for the transmission of malaria, ZIKV and CHIKV. Using climate scenarios and climate models, future climatic changes can be depicted, and conclusions drawn about the future risk areas for vector-borne infectious diseases.

Materials and methods: Based on the RCP 4.5 and RCP 8.5 scenarios, an analysis was carried out for the future temperature suitability of malaria, ZIKV and CHIKV in Europe. The results were presented in maps, compared with possible breeding sites and expected rainfall values and their percentages of area were calculated.

Results: Due to increasing temperatures, risk areas for malaria, ZIKV and CHIKV transmission spread. On an annual average, mainly Spain, Portugal, the Mediterranean coasts and areas near the Black Sea are affected, while in summer large areas all over Europe are at risk. The hibernation areas for Anopheles and Aedes albopictus are also spreading. However, reduced precipitation makes the spread of breeding sites more difficult.

Conclusions: Temperature is only one of many factors influencing the spread of vector-borne infectious diseases. Nevertheless, the assessment of risk areas based on climate scenarios enables an estimation of future risk. Monitoring and adaptation strategies are indispensable for coping autochthonous transmissions and epidemics in Europe in future.

Two weeks to the next pharmacy: Geoarchaeological field research in the Deep Sahara

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The almost deserted Eastern Sahara, about seven times the size of Germany, is one of the least known regions on earth and a key area for the reconstruction of the climatic history of Africa. On more than 50 expeditions to the Mars-like landscapes, Stefan Kröpelin has explored the “green” past of today’s largest hot desert and its prehistoric settlement.

The lecture will present spectacular landscapes like the volcanic Tibesti Mountains, the unique oasis lakes of Ounianga or the Ennedi Plateau, the “Garden of Eden of the Sahara” and focus on medical aspects during the months-long fieldwork in most remote areas without a doctor or any hope of rescue in case of emergency.

Cardiovascular risk factors of employees deployed to low income countries. Part 1: Collective and incidence of smoking, hypertension, and diabetes

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Background: Employees who work e.g. as construction or maintenance workers are presumed to be a high risk collective for cardiocirculatory and metabolic diseases. **Material and methods:** 177/185 employees (10 females / 167 males) were included (response rate 95.7%). were regularly deployed for weeks to months to Pakistan, Bangladesh, India, China, Indonesia, Brasil, Mexico, and Burkina Faso. Clinical history was taken with special regard to cardio-metabolic problems and lifestyle factors. Pack years of non-cigarette smokers were calculated with the calculator of the Royal College of

General Physicians (www.smokingpackyears.com). HbA1c was analyzed from venous whole blood samples by ion exchange chromatography and HPLC in our hospital’s routine lab. The results were interpreted according to the new (5/2021) DDG recommendations.

Results: Only 43 persons (24.7%) had a systolic blood pressure within normal range while 131 (75.3%) showed 140 mmHg or more, 16 of them (9.2%) higher than 160 mmHg. 91(%) were non-smokers, 37(%) stopped smoking more or less long ago and 28 were active smoker. Most smoker or ex-smoker reported about 25 pack years while some – also some young persons – reported extreme numbers of pack years (mean 20.6; Sx 28.3; range 1-160; N = 70). 129/162 (80.1%) were non-diabetics, but 8 (5.0%) had a manifest diabetes (at least one completely out of control!) with another 24 (14.9%) where prediabetes must be assumed and a glucose stress test should be recommended according to actual DDG guidelines.

Conclusions: A significant portion of the collective is at risk and should be focused by preventive advices and medical surveillance.

Cardiovascular risk factors of employees deployed to low income countries. Part 2: Lipid profiles

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Background: Employees who work e.g. as construction or maintenance workers are presumed to be a high risk collective for cardiocirculatory and metabolic diseases. **Material and methods:** 177/185 employees (10 females / 167 males) were included (response rate 95.7%). were regularly deployed for weeks to months to Pakistan, Bangladesh, India, China, Indonesia, Brasil, Mexico, and Burkina Faso.

Results: 104/171 (60.8%) showed total cholesterol (TCL) levels above 200 mg/dl. TCL increased significantly with age. While 36/62 people up to 40 years were below this recommended limit (58.1%), 61/86 (70.9%) older than 50 yrs showed increased levels ($P < 0.001$). With age TCL and LDL increases significantly while HDL decreases. This increases the total risk. Triglycerides (TRI) were available for some participants only so far. Data indicate that there are persons with very high TRI

levels. With regard to the PROCAM score further studies are necessary. Some probands may have had breakfast before blood samples were taken. This may have increased the results in some cases.

Conclusions: A significant portion of the collective is potentially at risk concerning their blood lipid levels and should be focused by preventive advices and medical surveillance.

Cardiovascular risk factors of employees deployed to low income countries. Part 3: Risk scores

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Background: Employees who are regularly deployed are presumed to be a high risk collective for cardiocirculatory and metabolic diseases. These may decrease life expectancy by cardiac incidences.

Material and methods: 177/185 employees (10 females / 167 males) were included (response rate 95.7%). They were regularly deployed to Pakistan, Bangladesh, India, China, Indonesia, Brasil, Mexico, and Burkina Faso. Data necessary to calculate ESC, Framingham, and PROCAM scores were obtained. The ESC score calculates the risk for fatal cardiocirculatory incidences for the next 10 years in %. It is defined for persons older than 40 years. The Framingham score calculates the risk for myocardial infarction for the next 10 years in % (U.S. data based) and is defined for the age group from 20 to 79 years. The PROCAM score calculates the risk for myocardial infarction for the next 10 years in % but adopted to European population. It is defined for the age group from 35 to 65 years.

Results: ESC risk score increases exponentially with age ($P < 0.01$). For only 7 (6.6%) of the 106 datasets the risk to die by a cardiocirculatory incidence within 10 years was rated as “low”. For 80 (75.5%) it was “moderate”, for 10 (9.4%) it was “high”, and for 9 (8.5%) “very high”. The Framingham score showed a linear increase with age but this should not camouflage the risk which showed also an exponential increase. While 87/157

(55.4%) showed a low risk for myocardial infarction for the next 10 years, 44 (28.0%) had a moderate and 26 (16.6%) a high risk. Results of the PROCAM score should be interpreted carefully due to the currently low number of data sets ($N = 13$). However, it should be noted that 6 had a low risk (46.2%), but 4 (30.7%) a “significant increased” one, and 3 others (23.1%) were rated as “high risk patients”.

Conclusions: Employees regularly deployed to low income countries are a high risk collective for cardiocirculatory and metabolic incidences – some of them will be fatal. This is of special importance with regard to the low medical infrastructure in most of the countries. Occupational health management should be increased for this specific target group. A good cooperation between family physicians and those for occupational health is mandatory.

First Aid en route: By whom? Where? How?

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Travelers are often far away from medical infrastructure and therefore must be able to perform First Aid (FA) without assistance by professionals. Several studies prove that FA skills of travelers do not fit with the demands of the respective tour. Because activities change much faster than data about accidents and risks are published it is difficult to give those who are interested reliable advice what to learn, what to carry along and what to do in case of emergency. Another problem is that travelers do not join FA trainings and if they do the knowledge has a limited half life time of several months or some years only. Therefore a modular system of FA training will be suggested to better address the individual traveler and his activities. Such modular training consists of a basic training combined with a specific training. Examples for the different disciplines of alpinism will be given.

First experiences in mountaineers prove that a modular FH training is well accepted. Most of such trainings need 2 sessions of 2.5 hours each and a training how to check a patient.

Medical climatology for travelers with preexisting conditions

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Several factors which all together form what we call "climate" are of significant influence on the traveler, especially of those with preexisting diseases. An overview over these factors and the consequences with relevance for travelers and advice by travel medicine will be given. Therefore the following climates were differentiated: dry hot, humid-hot, cold-dry, altitude, humid-cool (coast / sea). The most often ignored topics are: The test systems of diabetics give false-low readings in very cold weather or when the strips were exposed to UV light. In hot climate they give false-high readings. Diabetics are less heat tolerant. Cardiac patients should take into account that cold and (even more) hot climate causes an additional cardiac load of about +15% just for heat management of the body. Hypertensive or heart patients may reduce diuretics in hot climate. Adequate fluid and electrolyte balance is a must especially for patients (several diagnoses). Heart patients tolerate altitude exposure much better than expected but the focus of physicians on the heart causes ignorance of a real problem which may be avoided in almost every case: altitude sickness (up to 60% of all problems at altitude).

While infections and vaccinations is a minor topic for most travelers with preexisting diseases all of them need specific advice which balances the risk factors with the needs of the planned travel. In most cases such a compromise will be possible, but a cooperative patient is a precondition.

Cognitive and psychomotor effects of acute exposure to moderate (3,000 m) and high altitude (4,560 m)

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Background: Health problems and neurophysiological impairment at altitude has been documented at least since 220 B.C. Nowadays billions of people are exposed to acute hypoxia by airplanes, cars, cablecars etc. and more and more people work in isobaric hypoxia used for fire protection. We investigated the cognitive and psychomotor effects of such conditions as a possible risk factor for accidents.

Material and methods: 16 healthy, non-acclimatized volunteers were exposed to moderate altitude (3,000 m, MA) and high altitude (4,560 m, HA) after initial measurements at sea level (SL). Directly after arriving at the respective altitude (transport by helicopter) a computerized neuropsychological test battery with 5 tests was performed [complex reactions (Wiener Determinationsgerät), addition test, complex span test, sequence encoding, fine motor skills (wire maze task)].

Results: Mean addition time at MA was 5.905" with a pairwise difference at HA of 0.513" indicating a lower mean time at HA in solving an addition ($p < 0.001$). Association time and sequence time showed no difference. In sequence tests HA significantly elevates the time needed ($p < 0.05$). At HA the number of faults increases slightly in the fine motor test compared to MA ($p = 0.061$) but not at HA vs. SL. Time needed to complete the test does not differ with altitude. Mean total reaction time was lower at HA compared to MA ($p < 0.001$) while there is no change of decision making time and motor reaction time.

Conclusions: Although several differences were found at altitude, they are of minor extent and do not cause risk for travelers, hikers, climbers, or employees at altitude or in hypoxia. Most factors indicate a higher alertness, probably caused by the sympathetic activity in the early phase of exposure. This may be different later on. However, except for high demanding tasks (e.g. fighter pilots) this should not cause risk for the people mentioned above.

The effectiveness of vaccinations

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The efficacy of vaccines can be shown and tested in many ways. In the best case, a homogenous group of volunteers is randomized in a double-blind manner to receive placebo or verum and subsequently infected with the pathogen in question applying a Controlled Human Infection Model (CHIM). However, this is not always possible. In this lecture, we will take a critical look at the various methods used to prove the effectiveness of vaccines from historical smallpox vaccines to most recent vaccines against Covid-19.

A physiological device to measure human performance during environmental parachute jumping with and without oxygen supplementation

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Introduction: Present standard surface parachutes allow jumps from the height of more than 30,000 ft. These possibilities expose jumpers to extreme environment. Therefore, portable oxygen apparatus and protection against cold were created. The laboratory results were transferred into the real environment.

Materials and methods: Based on the developed mobPhysioLab[®], data were recorded in a real setting. After adaption for parachutists, it was feasible to test oxygen equipment for high altitude jumps in its extreme conditions.

Results: Volunteers were included for several jumps (up to 25,000 ft) with and without oxygen supply (up to 12,000 ft). The results show that an oxygen supply could be already necessary for a height of 12,000 ft. The

offered oxygen was always sufficient for the higher altitudes, and the saturation never went in a critical value. The body surface temperatures showed a significant cooling of the extremities during freefall. The time of rewarming was much longer. A lower peripheral temperature of the extremities limits the ability to operate due to reduced motor skills during the jump and exposes skydivers to increased danger after landing.

Conclusions: The results revealed that a high-quality continuous acquisition of physiological data is difficult. Further technical development is necessary. Nevertheless, a supply of oxygen for every jumper should already be provided at altitudes of 12,000 ft. An innovative development of clothing is required to counteract cooling more effectively because cooling down hampers oxygen transport into cells due to the left shift of the acid-base-curve. The mobPhysioLab[®] is an appropriate device with which such questions could be answered.

Electronic waste disposal and associated lead exposure at Agbogbloshie in Ghana

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Background: Agbogbloshie is one of the world's biggest dumpsites of informal recycling of electronic waste. Therefore it had become one of the most toxic places worldwide.

Materials and methods: Full blood samples were analyzed on blood lead levels and creatinine levels. 327 participants of both sexes and in age between 12 and 68 years took part in this study.

Results: Thus the effect of lead poisoning was shown by 14% of the participants. 6.5% suffering severe and 39% intermediate renal disorder, which is a problem because 75% of the lead will be eliminated through urine. More than half of the workers in the chain of recycling electronic waste do have blood lead levels

above the German reference value for people who do not work with lead (63.69%) and 5.9% of all workers tested, achieved values above 150µg/l which is the German limit of BLL while working with lead.

Conclusions: People at and around Agbogbloshie are a high risk group for toxic effects caused by lead, especially the kids of the schools near-by. Improvement of work conditions by adequate concepts which take the local conditions into account is strictly recommended.

The travelling athlete

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The life of elite athletes involves not only an extremely high amount of training but also long stays abroad with very long travel times, often across several time zones. The effects of jet lag, vaccination guidelines and the special conditions of the respective country influence the mental and physical performance of the athletes and must absolutely be integrated into the competition preparation when achieving top performances. This lecture is intended to sensitise travel medicine professionals to give the right travel medicine advice, to explain the effects of long-distance flights and stays abroad on athletic performance and to present preventive strategies to reduce / shorten the effects of jet lag.

Malaria prophylaxis today

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Based on the WHO World Malaria Report (WMR) the current estimates of malaria incidence amount to 229 mio clinical cases and 409.000 fatalities, respectively, in 2019. Fatalities keep falling in recent years, while the downward trend of case figures has stopped – or even reverted as in the case of 2019. Only some 2.5% of cases are non-falciparum malaria, termed vivax for simplification in the WMR. Travellers play a minor role, only, although health systems in non-endemic regions of the world are often faced with challenges in diagnosing and managing malaria.

Methods for malaria prophylaxis differ widely between

different patterns of malaria endemicity and travellers from industrialized countries. A short review of methods recommended for populations in malaria prone areas is given, including insecticide treated nets (ITN), intermittent treatment for pregnant women and seasonal chemoprophylaxis for children.

For non-immune travellers, methods of exposure prophylaxis like repellents, bed net or air condition use are to be applied for each night in a malaria area. Beyond that, chemoprophylaxis is being recommended for those exposed to falciparum malaria, with threshold incidences being debated between different national committees. Currently, there is also a tendency to consider chemoprophylaxis for vivax areas like in South America or India, although this, ideally, requires different antimalarials than those for falciparum malaria. Tafenoquine shows some promise, as it acts on hepatic schizonts of both.

Stresses and strains of the flight crew during ultra-long-range flights

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Background: Regard to technical developments, modern aircrafts are able to reach every destination on the globe by a non-stop flight. However, scientific studies which are dealing with the stress for the flight crew are limited. Aim of this study was to evaluate sleepiness fatigue, visual attention and ability to react of the flight crew on two ultra-long-range flights (ULRF).

Material and methods: For this purpose, the flight crew (n = 25) was examined several times during two ULRF and on one long-range flight with a validated test for attentiveness and with questionnaires, rated by visual analogue scales. In addition, activity behaviour and sleep quality were recorded using an actimeter.

Results: There was an increase in subjective fatigue as well as a decrease in the ability to react and visual attention with the duration of the flights. Strong association with the local time at the home airport emerged. On average, 4007 ± 2331 steps were taken per day. The

sleep analysis showed clear shifts in the sleep phases. **Conclusions:** ULRF are associated with a high level of stress for the flight crew, particularly in terms of attentiveness and fatigue. This must be taken into account while planning rest periods and duty time especially during periods with flight safety issues.

Are sightseeing or training flights safe in the Coronavirus Era?

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Background: Aerosols are generally accepted as the most important way to transmit COVID-19 virus. Social distancing is one of the most important safety procedures. However this is not always possible. While the risk of transmission in commercial aircrafts has been investigated, no data exist on small planes in general aviation which are commonly used for training or sightseeing flights, or probably even more important, for private piloting. We therefore investigated the cabin airflow regarding the distribution of the exhaled air between crew members and passengers.

Material and methods: An externally connected ventilation system was used to simulate the cockpit in-flight airflow for a 4-seater general aviation aircraft (Morane Saulnier MS893E). The airstream was marked with smoke for visualization, and the airflow velocity was measured with a thermal anemometer using three axes at various

points. To evaluate the air exchange rate, the circulation coefficient was calculated using the velocities measured. Laboratory results were validated in identical conditions during in-flight measurements without smoke.

Results: Airflow velocity was 8.5 m/s at the nozzle outlet during ground tests, and 10.0 m/s in-flight. The calculated cabin air exchange rates were 0.5/min and 0.6/min. The visualized airstream in the cockpit demonstrated no cross flows which indicates that there is no significant aerosol transport between the two pilots. This was further confirmed by the measurements between the test pilots which showed an insignificant air velocity component along the axis connecting the two heads.

Conclusions: Since there is no reason for any face-to-face contact during a flight, the risk of virus transmission when a person coughs or sneezes in a well-ventilated cockpit should be very low.

The travelling heart patient

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Cardiovascular patients are a relevant target group of travelers. In addition to the general ability to travel, the assessment of patients focuses on the assessment of risks according to the condition of the patient and the nature of the journey. Thereby, patient's history, medication, necessary diagnostics and particularly their planning are important. Key diagnoses include CAD, arterial hypertension, patients with heart rhythm disorders and ICD or pacemaker carriers.

Of all the diseases mentioned, special attention should be paid to the physiology of aviation medicine with the criteria of unfit for flight, the effects of climate such as tropical or cold conditions and the presence at altitude. Furthermore, sports activities such as diving must also be taken into account with their limits. Detailed advice depends on a structured anamnesis of illness, destination and type of journey and the diagnosis needed. The expected environmental incentives and planned activities should be estimated. However, the positive aspects of travelling should not be forgotten.

Acute and chronic overstrain injuries of World Cup ice climbers

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Background: While rock climbing injuries have been well investigated this is not the case for ice climbing and its various disciplines. Since extreme body positions are normal in extreme ice climbing specific injury patterns may be expected.

Material and methods: Participants of the Saas Fee Worldcup volunteered (73/105, response rate 69.5%) to complete a questionnaire about acute or overuse injuries, training intensity, and activities in other climbing disciplines. Data evaluation was descriptive.

Results: Mean climbing experience was 5.9 years. 67% reported 10 to 15 hours of training per week. Mean age was 25.1 years, however there were some participants at the age of 40. Mean BMI was 21.6 (4/73 > 25). Compared to rock climbers the collective is significantly older, trains less in the specific discipline, shows a quite short experience in the discipline and has a significant higher BMI. Most perform other climbing disciplines, too, and do so at a high level (often up to UIAA grade 9 and more!). 23.5% reported an accident with an acute injury, 38.6% any kind of overuse injury. In contrast to acute injuries (lower leg!) no body region was prioritized here. Nearly all injuries were NACA 1 or 2, only one NACA 3.

Conclusions: Probably because training intensity is low there are few overuse injuries and only some

acute injuries, most of them of minor consequences. Although spectacular, competition ice climbing is a very safe sport. This differs significantly from other disciplines, especially “alpine” ones. Because the participants performed several other climbing disciplines it was not possible to link any injury pattern with competition ice climbing.

Covid-19 and other travel vaccines in the Year of the Ox

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The SARS-CoV-2 pandemic originated in the Year of the Pig – much worse than the swine flu pandemic 2009 – brought international travel to a standstill in the Year of the Rat, but as a result of widespread availability of effective Covid-19 vaccines the services of travel health physicians increasingly get under demand in the Year of the Ox.

Obviously we need to be aware of the characteristics, advantages and disadvantages of the novel mRNA and viral vector vaccines. With respect to mRNA, the various manufacturers have other vaccines in their respective pipelines, including such against HIV, influenza, tuberculosis, chikungunya, Zika of particular interest in travel health. Particular attention will be paid to adverse events (AEs). We have learned that the second dose of mRNA results in a higher incidence of AEs, but we have not yet experienced the effect of more doses of e.g. lipid nanoparticles. Also there is concern about repeatedly using the same vector. Universally accepted documentation of Covid-19 vaccination is a challenge. However, we will continue to use traditional travel vaccines and also in this domain there is news particularly relating to the duration of protection e.g. by tetanus and tick-borne encephalitis vaccines. We continue to learn on rabies vaccines – will a single dose be sufficient for pre-exposure prophylaxis soon? And finally there are new dengue, pentavalent meningococcal disease and possibly Lyme vaccines on the horizon.

The correct measurement of oxygen saturation at high altitude

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Background: Compared to measurements at sea level, measurement of oxygen saturation by pulse oximetry (SpO_2) at altitude differs fundamentally because of the cyclical course of SpO_2 , caused by periodic breathing. Therefore, the determination of a representative SpO_2 value is difficult. In the literature, recommendations for a standardized measurement procedure are missing; different studies measure SpO_2 in different ways.

Key question: Does the visually determined SpO_2 value correlate with the actual average of the measurement interval?

Materials and methods: Four participants of an expedition (6013 m; Pakistan), familiar with pulse oximetry at altitude, wrote down the representative value of the measurement interval of 3 min ($\text{SpO}_{2\text{visual}}$) according to their individual observation. The used pulse oximeter saved the value for SpO_2 every 4 s. Based on this, the calculated mean ($\text{SpO}_{2\text{memory}}$) was compared to $\text{SpO}_{2\text{visual}}$ after finishing the expedition (128 measurements > 2500 m).

Results: The spread of the single values within the measurement interval is high (in single cases up to 17%-points) in case of insufficient acclimatization. With increasing acclimatization, the measured values stabilize. $\text{SpO}_{2\text{visual}}$ differs only marginally (-0.4% -points; ± 0.8) compared to $\text{SpO}_{2\text{memory}}$.

Conclusions: The correct pulse oximetric determination of SpO_2 at high altitude requires a standardized measurement procedure; the investigator is familiar and trained. Anyway, the measurements have to be done in the continuous mode of the pulse oximeter over a sufficient time frame (3 SpO_2 -fluctuation cycles; 2-3 min). We recommend to record the maximum and the minimum value of the measurement interval and to use a pulse oximeter device with memory function.

Keywords: pulse oximetry, oxygen saturation, high altitude, acclimatization, high altitude illness, AMS.

Short term high resolution compared to ambulatory blood pressure measurement in hypertension

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Background: Earlier studies showed a very reliable and stable result of arterial blood pressure measurement corresponding well with ambulatory values thus improving the diagnosis of arterial hypertension especially in patients with suspected for mild to unstable hypertension. Therefore, we started a comparison of 5 minutes' beat to beat measurement of blood pressure (BP) with ambulatory, 24 hours measurement (AM). This was conceived as a primary or pilot study.

Material and methods: 38 patients with hypertension were studied under strictly standardized conditions. Blood pressure at rest was measured using the task force monitor (TFM) (MedX5 program, CN Systems, Graz, Austria). For ambulatory blood pressure analysis, a commercially available system was used (Spacelabs, CO).

Results: Mean heart rate of the measurements (BP, AM) correlated significantly between the methods ($r = 0.85$; $p < 0.01$). Mean arterial BP measured with TFM was closely related to AM results: $r = 0.57$ ($p < 0.05$). Mean differences between the two measurements was 1.9 mmHg (insignificant difference). Mean systolic and diastolic blood pressure values demonstrated a significant relationship between BP and AM: $r = 0.56$ ($p < 0.05$) for systolic and $r = 0.65$ ($p < 0.01$) for diastolic blood pressure values. Mean values for systolic data differed 1.7 mmHG and for diastolic data 8.9 mmHg between BP and AM.

Conclusion: Beat to beat measurement of blood pressure during 5 minutes (i.e. 300 values or more) predicted reliable results of 24 hours measurement. Therefore, with respect to strictly standardized conditions, short-term measurement with the TFM system may replace ambulatory measurement. TFM systems are widely in use for diagnosis of syncope. This system then may simplify diagnosis of hypertension and control of therapy.