Н. Н. МОИСЕЕВ И ВОЗВРАЩЕНИЕ К ПРИНЦИПАМ ЭПИДЕМИЧЕСКОЙ ГИГИЕНЫ ПРИ ПАНДЕМИЯХ

В.В. Кофлер, доктор медицины, профессор

Международная академия наук (Здоровье и Экология), Инсбрук, Австрия

N. MOISEEV AND THE RETURN TO THE PRINCIPLES OF EPIDEMIC HYGIENE IN PANDEMICS

W. W. Kofler, MD., Professor

International Academy of Science (Health and Ecology), Innsbruck, Austria

Академик Н. Н. Моисеев признавал, что выживание человечества может быть обеспечено только при устойчивом учете биологических принципов поддержания среды обитания. Он выступал за экологическое просвещение как можно большего числа людей в целях организации природосообразного поведения человеческой популяции в любых аспектах социально-экономической деятельности. Из этого следуют два вывода, например, в отношении эпидемий: 1) учитывать корни появления новых патогенов и 2) распространять принципы биологических взаимоотношений живых существ как можно шире. Становится ясно, что необходимо проводить различие между борьбой с эпидемией — а значит, с возбудителем — и борьбой с последствиями проникновения возбудителя в организм, то есть с инфекционным заболеванием и его последствиями. Смена этих двух областей процесса происходит у отдельных людей, поэтому всегда определяется индивидуально. Во время пандемии большое количество людей во всем мире проходят через этот процесс одновременно. Пандемия — не цунами, которое обрушивается на каждого человека только потому, что он там находится. Индивидуальные особенности, которые могут быть усилены и ослаблены различными способами даже в краткосрочной перспективе, имеют решающее значение для того, приведет ли контакт с носителем к заражению слизистых дыхательных путей или нет, будут ли патогены уничтожены благодаря неспецифическому иммунитету или все же смогут проникнуть в организм, и могут ли другие люди заразиться уже на этой фазе. Поэтому даже борьба против контактов между инфицированными и зараженными людьми, независимо от того, насколько она дифференцирована, приводит лишь к временному уменьшению числа новых случаев, но не снижает восприимчивость и не способствует уничтожению возбудителей. Антитела могут действовать только там, где они есть, когда возбудители проникли в организм, но не в экстракорпоральном пространстве респираторного тракта. Лица, вакцинированные внутримышечно, и пациенты, выздоровевшие от COVID-19, могут повторно заразиться, передать возбудителей третьим лицам и, таким образом, способствовать распространению эпидемии. Если мы хотим ограничить распространение возбудителей, мы должны стремиться снизить восприимчивость, например, путем укрепления и поддержки естественной экстракорпоральной защиты, уничтожить возбудителей и тем самым снизить их шанс проникнуть в организм. Это также является методом выбора в борьбе с новыми штаммами/патогенами. Возможности борьбы с распространением патогенов до сих пор в значительной степени игнорировались, поскольку общепринято, что борьба с последствиями эпидемии идентична борьбе с самой эпидемией.

Ключевые слова: пандемия, экологическое образование, патогены, индивидуальная и эпидемическая гигиена

Academician N.Moiseev recognized that the survival of mankind can only be ensured if the biological principles of the habitats necessary for this are sustainably taken into account. Therefore, he promoted the education of as many people as possible, so that each individual is enabled to direct his behavior in such a way that the ecological requirements are not left out for lack of appropriate knowledge. This leads to two conclusions, e. g. for epidemics: To take into account the roots of the emergence of new pathogens and to disseminate the principles of biological relationships as generally as possible. Therefore, the principles of epidemic hygiene and their psycho-socio-cultural interdependencies were presented. It becomes clear that a distinction must be made between the fight against the epidemic — and thus against the pathogen — and the fight against the consequences of the penetration of the pathogen into the organism, i. e. against the infectious disease and its indirect consequences. The transition of these two process areas ALWAYS takes place in individual persons, thus is always decided by the individual process. In a pandemic, a large number of people around the world go through this process individually at the same time. A pandemic is not a tsunami that hits everyone just because he is there. The individual characteristics, which can be strengthened and weakened in a variety of ways, even in the short term, are decisive for whether contact with a carrier leads to contamination of the mucous cells of the respiratory tract or not, whether the pathogens are destroyed thanks to the resistance of the non-specific defenses or can still penetrate the body (infection in the real sense), and whether others can already be infected in this phase. Even a fight against contact between infected and infectious persons, no matter how differentiated, therefore only leads to a temporary reduction in new cases, but neither lowers susceptibility nor contributes to the destruction of the pathogens. Antibodies can only act where they are, i. e., only when the pathogens have entered the organism, but not in the extracorporeal space of the respiratory tract. Therefore, intramuscularly vaccinated persons and persons recovered from COVID-19 can be re-infected, pass the germs on to third parties and thus contribute to the spread of the epidemic. If one wants to limit the spread of the pathogens, one must strive to lower the susceptibility, e.g. by strengthening and supporting the natural extracorporeal defense and to kill

the pathogens and thus to lower their chance to penetrate the organism. This is also the method of choice in the fight against new mutants. The possibilities of fighting against the spread of pathogens have been largely neglected so far. It is pretended that the fight against the consequences of the epidemic is identical to the fight against the epidemic.

Keywords: pandemic, environmental education, pathogens, individual and epidemic hygiene

Academician N. Moiseev would also take the position today: Regardless of religious beliefs, economic positions, the way of implementing political goals, the question of distribution of wealth and poverty, beyond all differences in attitudes to gender, race, etc., especially in a globalized world, there is a need for everyone's willingness to consider the ecological principles. They are the prerequisite for eco-socio-cultural sustainability. And one is well advised to recall the principles of natural law especially when a worldwide biologically caused catastrophe like the SARS-CoV-2 caused pandemic threatens to turn into a permanent state contrary to all earlier prognoses: There has never been such a massive effort of scientists of countless specialties with one topic. It has so far resulted in much more than 500,000 scientific publications [1]. The economic consequences of the epidemic have been compared with those of the Second World War. Of the well over 500 million proven COVID-19 cases to date, 6.3 million have died, despite the fact that nearly 12 billion doses have been inoculated worldwide [2]. A really relevant pandemic!

After all, COVID-19 is just one example of how a first-ever pathogen can lead to a pandemic. IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) lists some 800,000 viruses, bacteria, fungi, and protozoa as possible candidates for the next pandemic [3]. All of them would be caused by the inappropriate handling of nature. Natural system processes occur whether one takes them into account or leaves them out. The behavior currently arising from the social process references leads to the fact that, for example, the habitat of wild animals is too strongly restricted as a result of the excessive consumption of meat, energy and other resources. Therefore, their contact with humans inevitably increases. As new pathogens jump to humans, a cascade of biological processes is set in motion. Although these could be specifically influenced in a preventive manner, this is only done to a rudimentary extent. Therefore, new pandemic pathogens will always appear and many people will be at risk of being contaminated with them. If the mucosa cells of this person do not succeed in destroying the pathogens, the typical disease with its diverse courses will occur: From asymptomatic course to death. This leads to countless secondary intermediate and immediate adverse health effects in the form of contributing tertiary effects on virtually all sectors of society.

Two challenges

Thus, individuals seeking to protect themselves from harm, as well as society to support individuals in doing so, face two challenges:

(1) addressing the cause of the epidemic or pandemic, i.e., the fight against the pathogen, its distribution and its penetration into the body

(2) the consequences that the pathogen triggers if it cannot be destroyed in a timely manner: The fight against the disease and its indirect and immediate consequences.

This paper focuses only on the fight against the epidemic, i.e., against the pathogen. The consequences of the disease are therefore relevant to this paper only to the extent that the diseased, cured or vaccinated can influence the spread of the pathogens.

An infectious disease is not a tsunami. This threatens everyone who happens to be there — old or young, healthy or sick, poor or rich, regardless of their gender, regardless of their specific defenses. An infection, on the other hand, is an individual process and highly dependent on individual characteristics, although society can make one sick or healthy. Therefore, if a single person has been contaminated and also falls ill, then on the one hand the protective measures must have failed in his specific case. On the other hand, the individual's non-specific defense must not have been powerful enough or not sufficiently supported. Only if this last, decisive barrier also fails can the pathogen enter the body of this person, so that he or she becomes ill. The disease is also an individual process, even if very many people fall ill at the same time in an epidemic. This is also to be considered when it comes to the question whether a person can kill all germs

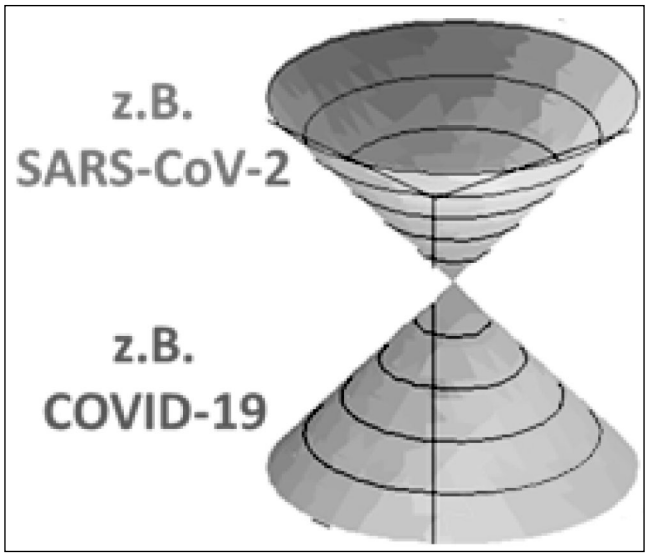

Fig. 1. Double cone to represent the two problem areas: Fighting the (cause of the) epidemic (SARS-CoV-2) and fighting the consequences of the epidemic (disease and its indirect consequences) [mod. info.mathematik.uni-stuttgart.de).

by healing or not. Thus, it becomes necessary to deal, at least in principle, with both problem areas — the fight against the pathogen and the fight against the effects caused by it, directly and indirectly. These two problem areas and their connection can be symbolized by a double cone, whose point of contact is the penetration of the pathogen through the protective mucosa of the outer boundary of the organism into the interior. This process of penetration is thus INFECTION in the true sense of the word: the transition of unsuccessful resistance in the incubation period to the phase of infectious DISEASE.

The fight against each of the two challenges must be carried out with different methods according to the course of the spread of the germ or the development of the disease. In doing so, they only partially attack the person and his or her health directly. Many measures appear to have primarily nothing to do with an epidemic, but are nevertheless crucial. This applies, for example, to the area of sustainable management of nature specifically addressed by Moiseev, and therefore, for example, to necessary measures in land use planning or against climate change, in order to achieve sustainable interstitial space between animals and humans. Their success would prevent the transfer of new pathogens from animals to humans.

Moiseev would therefore probably point out that also the first passage of a pathogen from the animal to the human being could be represented with the help of a comparable double cone. Thereby the diverse influences which would lead to the formation of the mutants in the animal kingdom as a result of the inappropriate use of the nature, which would lead in the concrete case then to the crossing over with the very first germ carrier 0, would be grasped in the upper cone. The manifold consequences with him and the many others, which are affected by the very first spill over from the animals, would then be representable in the second cone. To this end, the IPBES has presented comprehensive principles[3]. But the present paper addresses the situation that while the pathogen first appears in individuals who no longer come to the pathogens directly via, for example, bats.

Whether or not an infection occurs at all in the presence of an identical germ load in the nose depends not only on genetic and other biological conditions, but to a large extent on adequate nutrition, living and working conditions, social security and education. That is why, for example, tuberculosis and COVID-19 belong to the so-called syndemics [4]. These are epidemics that can only be adequately understood (and fought) if these socio-eco-cultural aspects are taken into account.

These specifications, which are not directly biological, also determine the course of the disease and the status that diseased individuals might have as potential vectors.

This leads to the fact that the graphic 1 can be extended in order to be able to represent the measures and influences directly directed to the infection reference of the person from the others. Thus, the double cone can be understood as the «hourglass of survival in an epidemic.» The clock runs as long and as hard as the influx remains open (incidence), can be slowed down or ultimately stopped altogether. If the infection is severely curtailed in the narrow sense, the epidemic turns into an endemic. It can only be permanently finished if the germs are destroyed.

In the acute phase, preventive measures against the occurrence of this pathogen (Moiseev, IPBES, WHO, against syndemic) had been obviously insufficient. This is probably also true for various non-specific measures of contact restriction and disinfection. However, they can be used in a targeted manner. Here also possibilities of the pur-

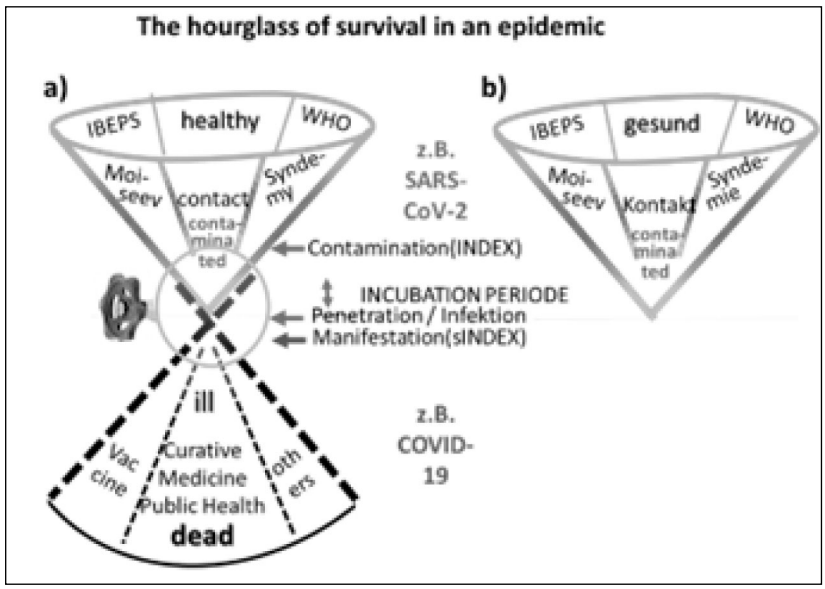

Fig 2. The hourglass of survival in an epidemic with e.g. a pathogen appearing for the first time.

a) The situation of a currently ongoing epidemic. b) After successful control of the pathogen and its eradication. The upper cone symbolizes the confrontation with the occurrence and spread of the pathogen: In the upper, green area, healthy, non-threatened persons also in institutions (e.g. WHO) make efforts to prevent the occurrence and spread. The personal threat to healthy individuals increases in the middle, blue area, e.g. through contacts, until, in the case of the acute state of the epidemic (yellow area), healthy individuals are in danger of coming into contact with germ carriers. This can occur, for example, through the germ-contaminated breathing air of infected, symptomatically inconspicuous persons (red overlapping area of the two cones) and diseased persons (red area of the lower cone). Measures against the disease may be successful or may not prevent death (black bottom area of the red-black cone). In the center the adjusting screw, with which the inflow of contaminated into the cone of the diseased, but also the frequency of the contamination of still healthy by diseased, recovered and vaccinated, as well as the relevance of the processes for the own survival and the spread of the germs, can be influenced.

poseful education (Moiseev) set in. This is to prevent the pathogens from coming into contact with the cells, which should protect the organism from infection. However, the decisive factor in determining whether a person becomes ill after contact with a germ carrier is the individual biological struggle against contamination and penetration at the cellular level. It occurs extracorporeally: just as a fjord is part of the ocean and not the mainland, the respiratory tract (and the digestive tract) are parts of the outside world. The interaction is non-specific, since antibodies are only available in the organism in practice. The non-specific extracorporeal defense will be strengthened and inhibited in many ways. Therefore, this decisive adjusting screw is turned, whether we want it or not and whether we use it or not.

It is significant whether — as in the case of COVID-19 — persons can contaminate (infect) others without showing symptoms themselves. Therefore, the number of patients (prevalence, which can only be determined on a mathematically representative collective) of the red-black cone influences the process flow of the green-blue-yellow cone. The more successfully the inflow into the lower cone can be restricted, the lower the effects can be expected at all levels of the lower cone. If fully successful, the germ is destroyed and the red-black cone is omitted. This, of course, also affects the other, non-health-related areas: The economic, cultural, educational, intergovernmental consequences and also the intra-societal tensions.

Education as a Prerequisite for Successful Struggle

Personal behavior — whether as a threatened citizen or as a decision-maker or as his or her advisor — depends on individual decisions. These are not made in everyday life according to a simple yes — no logic. Otherwise, all less important aspects would be neglected and all energy would be put into the most important. It is about weighting and evaluating, in which many individual wishes, needs, fears, etc. are taken into account consciously and unconsciously at the same time. Therefore, one should not be surprised when measures are taken that are incomprehensible when viewed objectively.

In order for individual behavior, as well as decisions, to be appropriate, everyone should be able to understand the processes in principle. Then the specific arguments can be appropriately placed in the overall context. That is why N. Moiseev put so much emphasis on school and extracurricular education. Therefore, it is not enough to recognize graph 2 as insightful. Everyone should be enabled to understand the principles of the processes behind it. This article is intended to help with that. Those interested in more in-depth information are referred, first, to the article by W. Kofler, O. Glazachev et al. (2021) in the Herald, published in several languages [5], and to the three articles in the Special Edition currently in press. The first is devoted to the question of why public activities have increasingly shifted from fighting the cause of the epidemic, i. e., SARS-CoV-2, to fighting the intermediate and immediate health effects of COVID-19 and its secondary effects [6]. The inherent systemic biological and sociocultural processes and their interconnections play a key role. Again, regardless of whether they are taken into account or left out. The second shows that crucial knowledge must necessarily be missing when a pathogen appears for the first time [7]. The paper presents an epistemologically correct solution, how one can proceed nevertheless on basis of the state of the knowledge. Both contributions are used to present in the third contribution, considerations on a comprehensive strategy also against the threat to social peace [8].

Introduction to Key Concepts of Epidemic Hygiene

For this purpose, it is necessary to know key concepts of epidemic hygiene and to grasp their dynamics. They have stood the test of time for more than 100 years, but seem to have been virtually forgotten in the present. They include virulence and pathogenicity (of the pathogen), susceptibility, tolerance, nonspecific and specific defense, in particular antibodies and their formation (of the host), and the microbiome including the virobiome, i.e. the colonization of the respiratory tract by other germs. Virulence determines how easy it is for the pathogen to adhere to and penetrate the cell of the mucous membrane, e.g. of the respiratory tract (contamination), and how successfully the pathogens thus multiplied can overcome the external cell barrier and penetrate the organism (infection in the real sense). The mucosa cells resist this process, for example, by releasing an oxidizing agent (N-chlorotaurine) into the volume of the respiratory tract. Given sufficient exposure time, this can destroy the structures of very many bacteria, viruses (such as SARS-CoV-2), fungi, and protozoa without damaging the mucosa cells[9] (The well-tolerated NCT can also be produced artificially [10]). How the microbiome, along with the virobiome, intervenes in the mucosa cells' fight against the onrushing pathogens is still largely unknown. This process is mostly (e.g., in the case of SARS-CoV-2) independent of specific immunity, since only the so-called secretory IgA is released into the respiratory tract. Intramuscular vaccination and disease, however, result (in the case of COVID-19) in virtually no sIgA formation whereas intranasally administered vaccination would. A surprising and strategically significant result for many, but one that is supported by the current literature in leading journals [e. g. 18, 19]. The process that occurs following contact of an infectious person with a germ carrier is characterized in disease hygiene by the terms — contagion index and manifestation index. The contagion index indicates the proportion of unvaccinated persons who come into contact with the pathogen for the first time, where the pathogen can adhere/contaminate. The manifestation index indicates how many become demonstrably ill after passing through the incubation period. The manifestation index is therefore always smaller than the contagion index: The people whose non-specific defenses were able to destroy the pathogens despite contamination («inactivation period») are omitted.

Without non-specific defenses, mankind would therefore have died out long ago.

Virulence — i. e. the degree of infectivity — is decisive for the contagion index, but not for the pathogenicity of a pathogen. For example, the contagion index for relatively harmless influenza infections in rich countries can be 40% (but is significantly higher in low & middle income countries (LMIC) and in marginalized groups of rich countries). For polio, the contagion index is around 1% and below. However, this disease is much more dangerous than a flu-like infection.

The comparison with the different contact indices between marginalized groups and the standard population shows how significant syndemic, non-therapeutic influences on defense are. This is why, for example, tuberculosis and COVID-19 are also considered syndemics, epidemics that can only be adequately understood and permanently controlled if social, economic, cultural and educational influences are taken into account [4]. Graph 3 illustrates this using the example of the transition from the dominance of infectious diseases to (behavioral) civilization diseases as the determining causes of death in Austria between 1900 and 2000 (epidemiological shift).

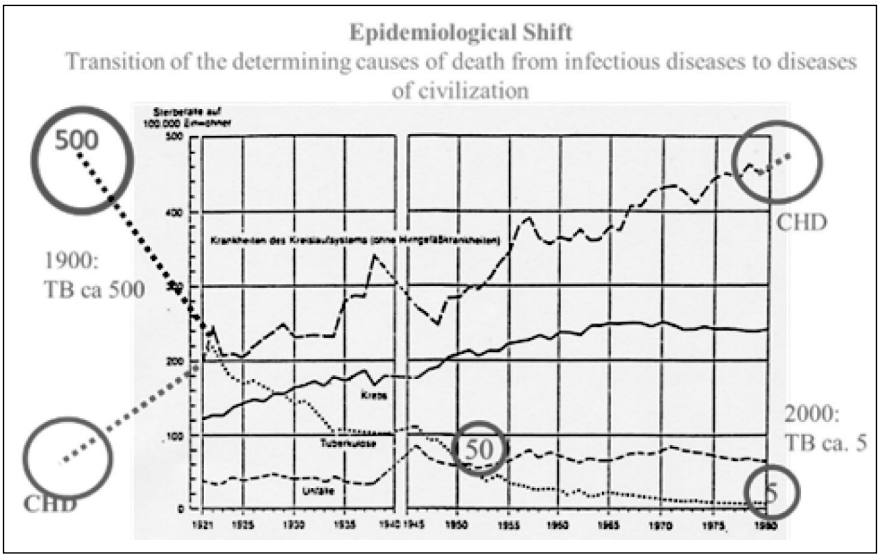

Fig. 3. Epidemiological shift in Austria: deaths from tuberculosis, cancer, CHD and accidents, Data: 1921—90 (Central Statistical Office, Vienna), supplemented by data from Mosse-Tugendreich (1913 [11]) for 1900 and our (now confirmed) forecast for 2000. (Kofler W., Lercher P. et al., 1995 [12]).

For tuberculosis the rule of thumb is: 500 — 50 — 5. In 1900 about 500 of 100,000 Austrians died per year, in 1950 only 50 and in 2000 5 (mortality). The decrease from 500 to 50 was — contrary to the widespread opinion even in medical circles — neither due to vaccination nor due to antibiotics. For political reasons, the (French) vaccine was not used in Germany (and thus in Austria until 1945). Streptomycin was too expensive to have an impact on mortality (Mortality related to a mathematically precisely defined collective). The decrease is due to improved living, nutritional, and working conditions, social security, and education. None of these influencing variables changes specific immunity. Therefore, mortality increases among marginalized groups, migrants, and the immunocompromised (HIV). Lethality (fatality) refers to the risk to the diseased, not to the population (mortality).

It is therefore essential to distinguish between contact with an infectious agent, contamination, of the incubation period, infection in the actual sense (=penetration of the pathogen into the organism) and infectious disease. Unfortunately, the same term is currently often used for these five different stages. As a result, decisive possibilities in the fight against the pathogen remain unnoticed.

The number of newly infected persons in relation to a mathematically defined representative collective (incidence) therefore depends not only on the different influences on the relevance of contacts (distance, duration, intensity of speaking, mask, etc.) and thus on lock downs, school closures, testing, segregation, etc., and also not only from the effects of a protection against the infection DISEASE (vaccination, recovery). A multitude of additional promoting and inhibiting influences are also decisive. Without taking ALL influencing variables into account, a scientifically correct prognosis of the jointly caused result, but also the prognosis of the effectiveness of a special measure is not possible.

In the case of diseases in which contaminated persons can infect others even though they themselves do not (yet) have any symptoms, as is the case for COVID-19 patients, it must therefore be expected that recovered persons can also become contaminated and infect others. As early as 2020, it was demonstrated in WUHAN that about 50% of infections of third parties occur in the phase before the onset of symptom [13]. Contrary to the view held at the time, symptom-free germ carriers are potential vectors from the first day of infection, not just two days before the onset of their own symptoms [14, 15]. This is decisive for the meaningfulness of systematic testing and segregation of even the still symptom-free germ carriers [16]. If one were to systematically combine repeated testing of symptom-free individuals with antiseptic measures, a significant increase in effectiveness in the fight against the pathogen could be expected.

It is important to distinguish between individual hygiene and epidemic hygiene. The aim of individual hygiene is to avoid the individual risk of falling ill. Epidemic hygiene is aimed at reducing the risk to the community. However, a measure that makes sense in terms of individual hygiene can be counterproductive in terms of epidemic hygiene. For example, vaccination against

cholera makes sense in terms of individual hygiene, but is highly problematic in terms of epidemic hygiene. This is because infection with cholera vibrions has different subjective courses, ranging from practically symptom-free to mild diarrhea to the characteristic rice-water-like diarrhea and death. However, the excretions of all ill persons are highly infectious. Inconspicuous ill persons remain undetected, while conspicuous ones are quarantined. Their excretions are disinfected, thus destroying the pathogens and stopping their spread. The cholera vaccination has no significant influence on the susceptibility = infectability, only on the course of the disease. Therefore, vaccinated individuals can become infected and pass on the germs. Cholera vaccination radically reduces the lethality (frequency of fatal outcome in patients) and the severe forms of the disease. Inconspicuous forms of progression increase sharply. Therefore, the regulation at the time that vaccinated persons were allowed to visit areas cordoned off because of cholera led to the spread of cholera.

The formation of the specific defense, i.e. one that is directed at the immunological characteristics of the specific pathogen, begins AFTER the pathogen enters the organism through special cells. The specific defense therefore takes place — apart from sIgA and IgM — ONLY in the body. Therefore, the level of the specific immunity does not affect whether the person can be contaminated and infected again, but it does affect the course of the disease.

It takes several days before the first antibodies can be detected. Until then, the intracorporeal nonspecific defense determines the course of the process and thus also the importance of the infected person for the spread of the disease. Therefore, it would also be important for the spread of the disease to support this defense. In this regard, the preventive and rehabilitative use of hypoxic - hyperoxic inhalations techniques gives hope. In this way, the person acquires the ability to absorb and use oxygen more efficiently and, as a result, to increase overall adaptive potential, antioxidant defense, nonspecific immunity, metabolic efficiency [17].

The (specific) antibodies play a crucial role in the destruction of the pathogens in the organism.

Whether her/his vaccination not only reduces the risk of severe disease progression, but also to a relevant extent the risk of transmission to third parties and the risk of renewed contamination of the vaccinated person depends on the type of vaccination. The decisive factor is whether or not the vaccination also leads to the formation of secretory IgA against the pathogen. In the case of intranasally administered vaccines, this has been used against influenza for many years. Intranasal vaccines against SARS-CoV-2 also form sIgA, but the intramuscularly administered vaccines currently in use do not [18]. To date, no intranasal vaccine against SARS-CoV-2 is on the market. The disease also does not lead to relevant sIgA formation [19.]

Whether a person becomes ill with the same pathogen at the same time as many others (epidemic), whether this occurs simultaneously worldwide (pandemic), whether he or she is one of the few who fall ill all the time because of this pathogen (endemic) or a sporadic isolated case is irrelevant to her/his biological processes. The distinction between pandemic, epidemic, endemic and sporadic occurrence is therefore essential for the necessary organizational measures, but not, for example, for therapy. With each infection, one must reckon with the different courses that have occurred in the past. This also concerns the question of whether and for how long how many of the diseased can continue to excrete germs. One and the same pathogen can trigger quite different courses. For example, some people can destroy all pathogens in the course of the healing process. Then they cannot infect anyone else after recovery. Others develop a tolerance to the pathogen. Then the persons with a good immune system can permanently spread germs without any symptoms, as in the case of so-called «infectious hospitalism». In this case, the healthy hospital staff transmit the germs to the immunocompromised patients, who can become seriously ill. Or the pathogens may also remain in a symptom-free person for a very long time without being able to be spread. Who does not know this from the fever blister as a result of an infection years in the past, which suddenly reappears after a disgusting event, a heavy other load or a recalcitrant beard hair irritating the lip? It is impossible to trace the starting point of the infection chain by retracing contacts.

So if there are people who never show symptoms but can pass on pathogens, they can also transmit the germs to people who do not fall ill themselves but pass on the germs, and so on, until finally a person is infected who becomes classically ill or who does show symptoms after an additional stress, such as stress in the family. Thus a «viral dark net» can develop, whose carrier 0/patient 0 (= the initial person of the infection chain) can no longer be determined. No wonder, then, when an epidemic turns into an endemic.

Limits of Calculability

Average values are worthless when it comes to individual cases such as the triggering of an epidemic by the carrier 0. In individual cases, infectivity can begin on the day of one's own contamination and can also be present months later, regardless of whether person 0 himself is symptomatically conspicuous or not and whether new mutants have formed in him or not.

Neither persons, nor mucosa cells, nor pathogens are machines. The use of machine models may therefore reach its limits in reality faster than we would like. Therefore, there is a demand to develop more meaningful simulation models. Currently, models of the so-called Kermack & McKendrick family are of great practical importance. In 1927, Kermack & McKendrick significantly expanded the range of measures that can be used during an epidemic. [20] The number of new cases decreases not only by making the germ more harmless or by causing

all infectious individuals to die, but also by limiting contact between individuals in a threatened collective.

But measures that only delay contact between germ carriers and infectibles do not kill germs or create specific immunity or unspecific defense. They do, however, flatten the curve of new cases so that hospitals are not overburdened. Therefore, they should actually be counted among the measures against the consequences of the disease and not among those against the spread of the pathogens.

Forecasts are necessary for decision-making processes. However, the considerable differences that have emerged in simulation models using the same baseline data have led to the call for the establishment of a new federal facility in the U.S., which should be associated with a fundamental rethinking of strategy [21].

Precautionary Principle and the Creation of Evidence

Which course forms a pathogen appearing for the first time — like SARS-CoV-2 — in the course of an epidemic and thus the biological «learning processes» of the cells and the organism as well as the pathogen, cannot be known at the beginning of the epidemic. Nevertheless, for legal and ethical reasons, physicians and responsible politicians are entitled and obliged to avert damage to health. In accordance with the precautionary principle, he or she must be able to justify his inaction just as conclusively as his action [22.] However, at the beginning of an epidemic of a newly emerging pathogen, no one can know what forms of progression, etc., will occur currently and in the course of the epidemic. So-called «evidence» must first be created, i.e. a proven procedure that does not even have to be able to be causally justified. Ignaz Semmelweis, who introduced disinfection in 1847 and thus also antiseptics against childbed fever, and Dr. Snow, who stopped the cholera epidemic in London in 1852 by shutting down the Broad Street pump, could not yet have known about the existence of pathogens. Pasteur and Koch did not prove it until the 1870s.

But we are in a more favorable situation today. We accept the unique, not predetermined evolutionary process. This has practically limited the theoretical possibilities that were given in a prior state. We also accept that all pathogens must have appeared for the first time at some point. The possibility that one and the same pathogen can lead to different courses, which can have different consequences with regard to the spread of the pathogen, indicates what one has to take into account as a precaution until there is evidence that certain courses do not have to be taken into account. This can be used to proceed in a scientifically justified manner even in the case of an emerging pathogen. Details will appear in the Herald in the near future [7].

Mutants

Not only can the characteristics of the individual change in a beneficial or adverse way from an epidemic hygiene perspective, but so can the pathogen. It is nice when it loses its virulence and pathogenicity and therefore there is an end to an epidemic. But unfortunately, it is much more common that mutations and recombinations of the genetic material lead to adverse consequences and thus to more dangerous mutants. In the case of viruses, it should be noted that they cannot reproduce themselves. To do so, they must invade cells and force them to produce them. Therefore, the formation of mutants is possible only in the phase when viruses are in cells. The best protection against the formation of mutants is therefore to prevent viruses from entering cells. Therefore, the longer a person has been a germ carrier, the more likely mutant formation is. A study is available of a person who shed SARS-CoV-2 virus for 8 months]23]. During this time, the emergence of 11 epidemic-hygienically relevant mutants was detected. The number of germ carriers is also significant. Therefore, the fight against a pandemic is not successful until it is over worldwide, i.e. also in the Low and Medium Income Countries (LMIC).

Primary, Secondary, Tertiary Prevention, Health Promotion and the Fight Against the Emergence of New Pathogens

The sword of Damocles of the consequences of infections is not eliminated until the pathogen that can trigger an epidemic is eradicated. It would be even more forward-looking to inhibit that such germs emerge. The IPBES has proposed extensive measures against new formation. Preventive action can be taken against the spread of a pathogen. Measures that are intended to prevent people from becoming contaminated or, in the case of contamination, to prevent penetration and thus infection in the true sense, fall into the so-called «primary prevention» category. Measures aimed at early detection of the disease and measures against the occurrence of serious consequences fall under secondary prevention

This therefore includes, for example, testing and intramuscular immunization. Rehabilitation after successful therapy is tertiary prevention. Secondary and tertiary prevention are thus directed against the consequences of the disease and less against the spread of the pathogens. Health promotion aims to improve the performance of the organism as a whole and the well-being of the individual. This includes all measures against the syndemic aspects of an infectious disease. It promotes the non-specific extracorporeal and intracorporeal defenses.

Conclusions

A distinction must be made between cause and effect: The cause of a pandemic is the worldwide spread of a pathogen, the effect is the worldwide occurrence of the consequences of the disease triggered by it and its secondary and tertiary consequences.

The epidemic hygiene goal of epidemic control is to prevent the emergence of new pathogens, prevent the

formation of mutants, and ultimately to eradicate the pathogen.

Measures that do not lead to the destruction of the pathogens can lead to relief for hospitals (flattening of the curve), but only temporarily reduce the incidence of new cases. Therefore, if possible, they should be combined with measures that lead to the destruction of the pathogens. This is most easily achieved in the acute phase of an epidemic by strengthening extracorporeal nonspecific defenses, e.g., administration of natural NCT and other antiseptics, and intranasally administered vaccines.

Possibly because of the misleading multiplicity of meanings of the term «infection» as a synonym for (a) contamination with a pathogen, (b) infection (occurring after the incubation period) in the true sense (penetration of the pathogen into the organism), and (c) infectious disease, these possibilities have been neglected until now. (d) In simulation models, contact with an infected person is sometimes equated with the (probability of an) infectious disease. As a result, decisive influences of the «adjusting screw» are overlooked

Only vaccinations that lead to the formation of secretory IgA (respiratory, digestive tract) or to the formation of IgM (also in digestive tract) can be expected to have a significant impact on the spread of the pathogens.

Therefore, one should not assume that healthy persons and (intramuscularly) vaccinated persons acquire «sterile immunity», i.e., can never be infected again, do not become ill again, and can be neglected as carriers. A «herd immunity», by which non-vaccinated individuals are protected thanks to the high percentage of immune individuals in the collective, is therefore not to be expected, especially in the case of mutants that can escape the antibodies of previous infections.

For precautionary reasons, one should expect a «viral dark net» as long as it cannot be excluded that all carriers must become conspicuous.

Scientific interest in the phase between contamination and infection should become a focus in order to better exploit the interrelationships according to social physiology and social medicine. This would raise the proportion of those who succeed in inactivating pathogens, even by iatrogenic means.

Irrespective of the indispensable measures against the consequences of the diseases and their medium and immediate effects on health and the overall social situation, the fight against the spread of the pathogens, their destruction and against the re-emergence of the pathogens should be or become a priority again.

If this does not succeed, at least in the future, we must expect a new era in which infectious diseases, endemic and epidemic, regain a prominence that we had hoped to have overcome in the 20th century.

To this end, it will also be necessary to address N. Moiseev's principles, which will make it possible to reduce the emergence and spread of human pathogens in the animal world. IPBES has identified the relationships to be taken into account and has derived important possibilities for prevention.

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