Institut für Nachhaltigkeit im Gesundheitswesen
Institute for Sustainable Healthcare

AKADEMISKA SJUKHUSET

Health Care Without Harm

Report on (Nano-) Silver conference, Vienna, Austria, 9th June, 2011

(Nano-)Silver in Medical and Consumer Products – Miracle Drug Against Germs Or Threat For Our Health and Environment?"

Background information:

There is not only a demand for silver as investment and industrial used metal. Recently another property of silver, known for a long time, has gained interest: Silver is killing bacteria.

The consequence is a silver boom. Silver in cleaning agents keeps your households free from germs. Silver in cosmetic articles serves as a preservative. Silver in textiles promises to prevent odor caused by sweating. Silver in refrigerators protects your food. And even waste bags containing silver are available on the market.

The use of substances killing bacteria and other microorganisms, so called biocides, is not new. The fear of different germs is used by manufacturers as sale promoting argument. With the advantage of silver having an unstained image of sounding valuable, clean, almost "organic".

But silver reacts as most biocides: it is killing various germs – not differentiating between good and bad ones.
Biocides influence our natural skin flora, bacteria cleaning our waste water and useful soil bacteria. Furthermore they are toxic for zooplankton, algae and fish in our rivers and lakes. And biocides are contributing to a high degree in the increasing antibiotic resistance of pathogen germs.

Every year in EU countries estimated about 25.000 people are dying from severe infections caused by resistant bacteria obtained in healthcare facilities. Even so the use of silver and other biocides is increasing more and more.

Also in our health care facilities, where the use is no longer only restricted to reasonable medical treatments.

By now there are hardly any scientific records about the toxicity of silver, the exact mechanisms of action and the clinical value. A comprehensive assessment of social benefits and costs is missing as well as guidelines and regulations for a controlled, valuable use of silver and biocides.

In Sweden the government has taken a set of precautionary measures to avoid the uncontrolled use of silver. The national pharmacy association Apotektet AB has stopped selling silver band aids since 2006. In Stockholm County Council Silver is dealt as a drug: the application is only allowed after prescription by a medical doctor.

Therefore a critical debate is needed and measures on different levels have to be taken also in Austria.
In this meeting experts from Sweden, England and Austria informed about the different aspects of this important issue and about potential measures for a reasonable handling of biocides, especially in healthcare.

The meeting was supported by HCWHE and the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management.

lebensministerium.at

Signatory:
Austrian Federal Ministry of Health.

BUNDESMINISTERIUM FÜR GESUNDHEIT

Programm

9 Uhr – Registrierung / Registration

9 Uhr 30 - Beginn der Tagung / Beginning of conference

- Begrüssung : Dr.**Thomas Jakl**, Lebensministerium, DI **Manfred Mühlberger**/INGES (Moderation)
- **Anja Leetz** (Direktorin HCWHE)/**Hanns Moshammer** (Chairman Board HCWHE, Ärzte für eine Gesunde Umwelt Österreich):
  Health Care Without Harm – das internationale Netzwerk für ein umweltverträgliches Gesundheitswesen / HCWH– the international network for environmentally responsible health care
- **Åsa Melhus** (Department of Clinical Microbiology, University Hospital Uppsala):
  How can biocides like (nano-) silver threaten public health and our environment? /
  Wie können Biozide wie (Nano-) Silber unsere Umwelt- und Gesundheit beeinträchtigen?
- **Jamie Page** (The Cancer Prevention & Education Society):
  Triclosan in consumer and medical products – potential effects on health and environment /
  Triclosan in Medizinprodukten und Konsumgütern – mögliche Umwelt – und Gesundheitsauswirkungen
- **René Fries**, im Auftrag des Gesundheitsministeriums / in the name of the Austrian Federal Ministry of Health:
  Ergebnisse Studie "Nanosilber in Kosmetika, Hygieneartikeln und Lebensmittelkontaktmaterialien: Produkte, gesundheitliche und regulatorische Aspekte"/
  Results of study on nanosilver in cosmetics, sanitary products and materials in contact with food: Products, health and regulatory aspects

Kaffeepause / Coffee Break

- **Michaela Truppe** (INGES- Institut für Nachhaltigkeit im Gesundheitsweisen):
  (Nano)Silber in Konsumgütern und Krankenhausprodukten: Beispiele aus Ö / (Nano-) silver in consumer products and hospital goods: Austrian examples
- **Åsa Melhus** (Department of Clinical Microbiology, University Hospital Uppsala):
  Good practice examples from Swedish hospitals on restricted usage of silver and triclosan /
  Schwedische Krankenhäuser zeigen es vor: Praxisbeispiele für den eingeschränkten Einsatz von Silber und Triclosan.
- **Podiumsdiskussion** „Schritte zum sozial und ökologisch verträglichen Einsatz von Silber und Bioziden" mit MD, PhD, Associate professor **Åsa Melhus**/Department of Clinical Microbiology, University Hospital Uppsala, Dr. **Martin Paparella**/Umweltbundesamt im Auftrag des Lebensministeriums, Dr. **Karin Gromann**/Bundesministerium für Gesundheit, Dr. **Susanne Stark**/Verein für Konsumenteninformation, Dr. **Magda Diab-Elschahawi**/Klinisches Institut für Krankenhaushygiene am AKH Wien, MBA **Gerhard Kammerlander**/Fa. Systagenix

Ausklang der Veranstaltung mit einem Networking Buffet
Social get together – buffet

The conference was arranged by the Institute of Sustainable Healthcare as a follow up meeting of the Workshop "Biocides and increased silver usage in Health Care "held in November 2009 in Uppsala, organised by the Department of Clinical Microbiology, University Hospital Uppsala. Both institutes have been cooperating on this issue for several years within the network of HCWHE, which has supported the conference.
The conference was held in the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management.

More than 50 persons participated in the conference, among them important stakeholders from the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, Environmental Agency Austria, Austrian Consumer Protection Agency, Austrian Agency for Health and Food Safety (AGES), NGO´s like Doctors for a Healthy Environment, Greenpeace, Umweltberatung, governmental institutions, healthcare workers like hygienic doctors, wound managers, nurses, and environmental coordinators.

Participants of the conference

The meeting was opened by ***Dr Thomas Jakl*****,** Head of the Department of product-related environmental protection chemicals policy, risk assessment and risk management, who hosted the meeting together with the Department of Biocide products, quality assurance.

Dr. Jakl welcomed the participants and thanked all involved national and international organisations for the organisation and cooperation. Dr. Jakl pointed out that through the diffuse entry of silver and biocides into the environment no recycling is possible. This is already the case by the uncontrolled use of (nano-) silver and other biocides in consumer products. Therefore it is important to monitor, whether the currently used precautionary instruments are suitable to deal with the problem and to serve the purpose they are supposed to.

Dr. Thomas Jakl, Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management

The Facilitator ***Manfred Mühlberger***, Institute for Sustainable Healthcare, thanked Dr.Jakl for hosting the conference, HCWHE for supporting the conference and Eva Haxton and Prof. Dr. Åsa Melhus for the cooperation in this project. He introduced the first Speaker, ***Anja Leetz***, who has been director of Health Care Without Harm (HCWH) Europe (Brussels) since 2009.

Anja Leetz, Director of HCWHE

Anja Leetz has experience in EU chemical legislation REACH and is tacking the UN climate and UN mercury negotions and the revision of the EU green purchasing guideline. She has been contributing to reports eg. Mercury in European healthcare (2009), Healthy People

(cooperation between WHO-HCWH 2009), Nano & Biocidal silver (for Friends of the Earth Australia 2009), towards the Tipping Point (cooperation between WHO-HCWH concerning elimination of mercury in healthcare, 2010). Anja Leetz introduced the network HCWHE and issues worked on to the participants.

Anja Leetz was followed by ***Dr. Hanns Moshammer.*** Hanns Moshammer is a medical doctor, who has worked for several years in the public healthcare of the city of Vienna, amoungst that in the information center for environmental medicine.

He is an internationally demanded expert, doing research and publishing studies in the field of out- and indoor air pollution, human biomonitoring and climate change and environmental and children´s health. Hanns Moshammer is the chairman of the association for "doctors for a healthy environment" and the international umbrella association of the international society of doctors for the environment. He is board member of Health Care Without Harm Europe.

Hanns Moshammer stressed, that when he studied medicine and started working in hospitals, antibiotics were still "miracle drugs" and resistant germs only mentioned in schoolbooks as side-remarks, not so much felt in reality. These times seem like a golden era – compared to nowadays, when antibiotic resistance has become a severe problem hospitals have to deal with. Making hygienic standards even more necessary and also the search for new disinfection agents. But we have to learn from our lessons with antibiotics and take care making our new and old tools not stump. Therefore the uncontrolled use of disinfectants and antibiotics in households but also in healthcare facilities has to be seen from a very critical point of view. Hanns Moshammer said that against this background he is very delighted that this conference takes place with the support of HCWHE and the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management.
The next speaker **was *Prof. Dr. Åsa Melhus*** from the University Uppsala. She works at Uppsala University Hospital in Sweden and leads the research group at the Department for Clinical Microbiology, which has worked for several years with antimicrobial substances, including antibiotic drugs and biocides.
She is a member of the Swedish Reference Group for Antibiotics, the Swedish Strategic Program for Rational Antibiotic Use and Surveillance of Resistance and the Danish Council for Strategic Research. The last five years she has been scientific advisor to the National Board of Health and Welfare.
Her first talk was about "Biocides – an alternative to antibiotics or an emerging threat to public health and our environment?"

Prof. Dr. Åsa Melhus, University Hospital Uppsala

Prof. Dr. Åsa Melhus described that the number/volume of biocides used is increasing. In contrast to antibiotics, biocides are not regularly monitored and there are no demands to document the effects on the environment. Antibiotic resistance has increased worldwide leading to treatment failures in human and animal infections
There is convincing evidence that antibiotics and biocides share resistance mechanisms developed by bacteria. The possible consequence is the selection and dissemination of antibiotic resistant bacteria by biocide use. In healthcare biocides are the cornerstone of any effective program of prevention and control of health care associated infections.

Also silver in it´s different forms (ions or nanoform) is moving forward in healthcare but also many consumer products. Nanosilver can be found in almost any type of product – even when its biocidal effects are not needed,"just in case".
Studies carried out at Uppsala University Hospital with isolates from patients treated with different silver wound dressings for different time periods showed that common gram positive bacteria demanded extremely high silver concentration to be killed; the silver could not kill them, just inhibit their growth. The gram-negative bacteria were relatively easy to kill. However, one of them was still able to avoid the biocidal effects of silver. Further invitro studies revealed that Silver exposure mediated increased resistance to beta-lactams, the most important class of antibiotics. Most worrying was that 1 strain developed resistance to carbapenems, the last resort for patients with life-threatening infections.
This was due to changes of the cell wall permeability (= direct selection).
The problem is that the awareness of the risk of antibiotic cross-resistance is quite limited. The seriousness is pointed out by WHO and also by the Scientific Committee on Emerging and Newly Identified Health Risks 2009.

Jamie Page from the Cancer Prevention & Education Society, UK, was the next speaker.
He studied Chemistry at Imperial College in London, worked as a medical researcher and continued his education at one of Europe's leading business school INSEAD.
Afterwards Jamie Page worked for a number of well-known companies including ICI, Biogen, Serono and Hoffmann-La Roche, mainly in the development and commercialization of therapeutic proteins.
In the late 1990s he left the private sector and founded the Cancer Prevention and Education Society (CPES), a UK-based charity working to reduce the incidence of cancer and other diseases by raising awareness of the connection between diseases and exposure to chemicals.

Jamie Page from the Cancer Prevention & Education Society, UK

He gave a lecture on the potential effects on health and environment of another common used biocide, triclosan.
Triclosan has structural similarity with other bi-phenyls such as thyroxine. It is used a huge amount in consumer products such as personal care products-where it acts as preservative in cosmetics, soaps, toothpaste, sunscreens etc, plastic products-due to its stability up to 200°C e.g. hairbrushes, chopping boards, children's toys, Trade name Microban.(name of US corporation) and in textiles, sports clothing . Trade name BioFresh.
Eg. in US it is present in 75% of liquid soaps.
In healthcare it is commonly used in healthcare products such as surgical scrubs, surgical drapes, sutures, urinary catheters.
Pharmacology data show that triclosan is present in human urine, blood plasma and breast milk and several studies show that there are concerns about endocrine effects and toxicity (particularly to aquatic organisms).
Triclosan is found in the environment in sewage sludge, agricultural land (from use of sewage sludge on land), waste water, rivers & lakes – high concentrations in Switzerland, aquatic sediments, marine sediments, household dust, and fish. Under certain circumstances (eg.UV light) triclosan is converted into dioxine congeners. It has been reported that it might have the ability to select for anti-bacterial resistance. i.e.
resistance to other related or unrelated antibacterial agents. For example, a study has demonstrated multidrug resistance (MDR) conveyed by triclosan to Pseudomonas aeruginosa (Chuanchuen et al. 2004),
which is a cause of death in many hospital-acquired infections due to its intrinsic resistance to many antibiotics.

The widespread use of triclosan may represent a potential public health risk in regard to development of concomitant resistance to clinically important antimicrobials. (The Norwegian Scientific
Committee for Food Safety 2006).
Some companies like Unilever and Sarah Lee have phased out triclosan in some of their products, and Denmark, Finland, Sweden and Norway have issued consumer advisories related to triclosan.
The question was asked whether triclosan should be used in consumer products because of its potential health and environmental risks. In particular the problem of bacterial resistance is so serious that should triclosan and other biocides only be used in special medical situations and not in consumer products unless absolutely necessary?
Hospitals fighting already with severe problems of antibiotic resistent germs cannot be viewed in isolation.
Hospitals could be key in bringing in legislation to reduce bacterial resistance caused outside of hospitals e.g in agriculture and consumer products.

The next speaker was ***Dr. Rene Fries,*** talking about nanosilver in cosmetics, sanitary products and materials in contact with food: Products, health and regulatory aspects.

René Fries and Sabine Gressler are working for the Nanotrust-Project in the field of Nanotechnology. In the year 2010, they carried out a research project on the uses on Nanosilver on behalf of the Austrian Federal Ministry of Health.

René Fries studied experimental physics in Hamburg, worked as scientist at several universities and scientific centers in the United States and Paris, as well as at CERN in Geneva. Since 1985 he has been working in Vienna, starting as consultant, then as scientific officer in the ministry for science and research, recently in the Federal Ministry for Transport, Innovation and Technology.

He has been active in the scientific field and as consultant also when retired, amongst others within 'NanoTrust', a scientific project on potential health and environmental risks of nanotechnology at the Institute for Technology Assessment of Austrias Academy of Sciences. Nanotrust is financed by public funds until spring 2013.

Rene Fries, in the name of the Austrian Federal Ministry of Health

René Fries mentioned that Nanosilver is a widely used Nanomaterial in consumer products. In the field of healthcare nanosilver is used in medical products such as wound dressing, catheters, and implants, due to its bactericidal properties.

The benefits are not always evident: problematic side effects such as agyria – a permanent bluish discoloration of the skin - and the development of resistant germs following applications of silver in low concentrations have been observed. It is assumed that nanosilver is used in more than 250 consumer products worldwide, such as e.g. food packaging, kitchen devices, dietary supplement, cleaners, disinfectants, house hold products, cosmetic and hygiene products, products for babies, suitcases, shoes, door handles, colors and vanishes, products for animals and plants, sanitary ceramics…

The uncontrolled use of biocides leads to potential risk for the environment, the development of antibiotic resistance, the promotion of allergies and disturbance our natural microbiological balance.

Through the use of cosmetics and hygiene products, particles of nanosilver could enter the body (through skin, mucosa, lung, digestive system), and as the fate of these particles is barely known, a reliable risk assessment is not possible. Furthermore it is not clear how the natural skin flora is affected.

The number of nanosilver products used for food contact materials is increasing (e.g. Food storage devices, cutting boards, bottles, coatings of refrigerators).
However, the possibility of migration of silver-particles into the food exists, and data for toxicological assessment are insufficient.

No reliable data on production amounts and environmental effects are existing. (Nano-Silver: between 2.8 t/a and20 t/a USA only)

Silver is known to be a toxic metal, it is accumulated during the whole life and it can cause stomach and liver damage as well as neurotoxic effects.

Levels of uptake are already higher than the boundary value of 0.3 mg/d for adults determined by the USA FDA.

WHO has declared silver as a toxic substance, US-EPA that silver as a pesticide is harmful for soil organisms and aquatic systems.

Nanosilver – particles can pass blood-brain barrier and placenta barrier

Concerning regulation „nanosilver is a problem that fits poorly in the old boxes of the existing regulatory system“[EPA, 2011, Nanosilver]

By now in the EU no specific regulations for nanosilver or other nano-materials are existing. There are only regulations for specific areas like biocides, pesticides, medical products, food contact materials.

The framework within REACH is quite comprehensive and should cover all chemicals, but several studies (such as the work of the german UBA-ReNaTe, the british BRASS-Group, and the french agency AFSSET-Agentur) have pointed out deficiencies, such as the high production threshold, the absence of labeling requirements, etc..

The EU parliament has voted for stricter rules in this respect – in the context of the cosmetics directive, and the discussion of the regulation of ‚novel-food‘ and biocides.

The EU Commission attempts to complete the 2nd Regulatory Nano-Review later this year, and at the national level – in Germany and in France - parliamentary queries and legal initiatives are under way to require nano-labels, especially with respect to “the use of nano-silver in consumer products” (the german Bundestag debated this topic quite recently, on 12th May).

A satisfying solution will ultimately have to be found within the context of the European REACH-Directive.

A study by Australian scientists (Th. Faunce, A. Watal : 'Nanosilver and global public health – international regulatory issues’) concluded that a stricter regulation and mandatory reporting schemes for the use of nanosilver would be advisable :

« .. given the extensive use of nanosilver and the ongoing controversy about whether its toxicity exceeds that of bulk silver, it conforms to the precautionary principle for government agencies to treat nano-silver as a new chemical (and require detailed safety data sets from manufacturers), until it is certain that nanosilver does not possess unique toxicological properties. Regulators should then, for example, provide clear guidance as to the circumstances in which nanoscale silver may be classified as "new" for legal, regulatory and safety purposes. »

***Michaela Truppe*,** the next speaker, from INGES gave a presentation on “(Nano-) silver in consumer products and hospital goods: Austrian examples “

She studied microbiology at the University of Vienna and completed a post graduate study on environmental technologies at the Technical University of Vienna and University of Natural Resources and Applied Life Sciences, Vienna. Michaela Truppe was a researcher at the University of Vienna, General Hospital of Vienna and the Institute of Microbiology and Genetics, University of Vienna. Since 2003 she has been working as a consultant at ETA Environmental Management with focus in environmental mangagement systems in healthcare, consulting numerous hospitals.

She made studies on single use-multiple use medical devices, reprocessing of single-use medical devices and PVC avoidance in hospital

and has been cooperating with the university clinic Uppsala on nanosilver since 2009.

Michaela Truppe, INGES, Austria

Michaela Truppe showed by the examples of Bees how vulnerable biological systems are towards unnatural stress factors. Like the varoa mite and other stress factors for bees such as agricultural chemicals can bring a whole, very import biological system into trouble with huge impact for the whole human population silver can also stress biological systems. Because silver does not make a difference between good and bad bacteria. Already in the past several examples have shown that we impair our systems too quickly without knowing the consequences. Although there have been already early warnings. Eg. Asbestos, for which already since 1900 evidence existed to cause severe illnesses such as lung diseases and lung cancer. It took more than 90 years until the use of asbestos was forbidden and we still have to fight with the consequences.
EHEC is another example of ignoring early warnings – that the overuse of antibiotics (eg. in extensive mass animal farming) can cause antibacterial resistance with great impact.

Michaela Truppe asked the question, learning from lessons in the past, whether we could take the responsibility for uncontrolled use of silver although potential risks for health and environment have been documented by various scientific literature. We rather should ask reverse - is the added value really high enough to take the rest risk?
Furthermore -silver is a very seldom nobel metal. With the use of (nano-) silver valuable resources leave our cycle and cannot be recycled again.

Silver is almost a temporary fashion. Nescience and omnipresence are causing uncontrolled use.

Michaela Truppe showed some examples of (Nano-) silver consumer products which can be found on the Austrian market.

Diverse cosmetic articles with (nano-) silver promise inhibiting odor produced by sweat degrading bacteria or keeping our skin healthy. But via this path silver ions get into our waste water and there can harm useful bacteria, furthermore what is happening to the good bacteria on our skin we need for a healthy immune system?

Cleaning devices for the household with(nano-) silver promise to keep your household free from germs. But also affecting our good germs, which we need to keep up a healthy immune system. Normal cleaning in households is in most of the cases sufficient. Also washing devices and washing machines available on the market promise to clean your laundry already at low temperatures and therefore saving energy, washing agent and keeping the laundry fresh for many days. Silver ions released by the washing process can harm our good bacteria in waste water and soil.

Therefore in Sweden silver washing machines are not allowed to be promoted by the companies any more.

The problem is that on the one hand consumers are not aware of potential health and environmental risks of (nano-) silver in consumer products, but additionally often do not have the chance to identify a (nano-) silver product as the declaration is mostly insufficient. (Nano-) silver is very often hidden by the wordings like “fresh effects (Frischeeffekt)”, odor killing (Geruchskiller) or antibac.

Also in healthcare facilities more and more (nano-)silver products can be found, not only restricted to reasonable medical treatments. Added value, frequency and duration of use have to be critically questioned also in our heathcare facilities. Hospitals fighting already with severe problems of antibiotic resistant germs cannot be viewed in isolation.
On the Austrian market hospital goods like curtains with silver, water disinfection systems

or medical products such as different kind of wound dressings, vascular drafts, continuous catheters, central venous catheters, implanted heart valves, bone cement can be found.

Michaela Truppe closed her presentation stressing that history showed us several times, that we undervalue the rest risk.
If we can´t assess the rest risk, the reversal of the burden of proof is valid.
Therefore we should prove for each critical product at a definite level of discussion that the value is that high that we can accept the rest risk.

The last lecture hold by ***Prof. Dr. Åsa Melhus*** was about "Good practice examples from Swedish hospitals on restricted usage of silver and triclosan".

The Silver work started in 2000 when nurses were calling what to do about the silver products. They bought silver products for several hundred thousand euros but did not know-how to handle or use them. Checklists for silver based dressings were worked out.

Checklist contains information

- on the form of silver (metal, ion, nanoparticle)
- The amount of silver in the product (mg/cm2)
- The amount of other toxic heavy metals (often remnants of lead and mercury from the manufacturing process)
- if and how much silver is released into the wound(no release, no biocidal effect in the wound)
- The minimum inhibitory concentrations for the bacteria the product is targeting, and a 3-log killing, at least, should be reported
- If there is a time limit for the use of the product (2-3 weeks)
- The clinical effects of the product have to be documented in randomized controlled studies (in vitro experiments or case reports are not enough)
- Recommendations about how to take care of the waste products

The checklist was flatly refused by the manufacturers – the demands were "unrealistic".

Nationwide lectures were hold to stop or restrict use, only after prescription.
Results of a regional tour to four hospitals was that approximately 50,000 euros/year could be saved.
Repeated contacts with Apoteksbolaget AB (earlier state-owned drug stores) resulted in the withdrawal of all silver-based band-aids.
The issue was spread by mass media (Interviews in TV, radio, newspapers, scientific conferences and papers, report from the Swedish Council on Technology Assessment in Health Care: no evidence of the usefulness of silver-based wound dressings on chronic leg ulcers).
Prof. Dr. Åsa Melhus stressed that information is crucial. The market plays on our fears for bacteria, but the fears are misdirected, making bad worse. We should not fight bacteria but learn how to interact
with them. And keep your homes free from biocides. (It is easier to select the bad bugs than the good ones) If a solution appears too simple, it usually is.
Do not stop asking questions

At the end a **panel discussion** was held, following people participating:

From left to the right side:

- Dr. **Magda Diab-Elschahawi**/ Institute for hospital hygiene at University Hospital Vienna
  Assistant head of the institute of hospital hygiene at the Medical University of Vienna, specialist for hygiene and microbiology, also temporary employment abroad. Her recent work involves also the evaluation of medical products with (nano-) silver.
- Dr. **Karin Gromann**/ Austrian Federal Ministry of Health
  Studied on the University for Veterinary Medicine in Vienna. After working as a veterinary she has started to work in the departure of food, special goods and international affairs in the Federal Ministry of Health. This department has comissioned the study presented by. Dr. Rene Fries and is involved in the Austrian Action Plan for Nanotechnology and implementation of the nanotechnology information Platform. Dr. Gromann is responsible for the issue nanotechnology.
- Dr. **Martin Paparella**/ Environmental Agency Austria in the name of Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management
  He studied Food Sciences and Biotechnology at the University of Natural Resources and Applied Life Sciences und toxicology at the Medical University of Vienna.
  He is working in the field of toxicology at the Environmental Agency Austria with the focus on human-toxicological risk assessment for biocides in the framework of the European and national biocide regulations. He is the national coordinator for the approval of eco-/toxicological monitoring methods.
- Dr. **Susanne Stark**/ Austrian Consumer Protection Agency (VKI)
  She studied chemistry at the University of Vienna. She was working at the department of chemistry at the Environmental Agency Austria and at the NGO "Die Umweltberatung" Currently she is working as chemist in team "Umweltzeichen (Austrian Eco label)" for consumer information with focus on risk assessment of chemicals, chemical legislation and policy, nanotechnology and – materials.
- DI **Manfred Mühlberger**/INGES (Facilitator)
- MBA **Gerhard Kammerlander**/ Wound competence center and academy ZWM in the name of Systagenix Wound Management GmbH
  He is a graduated hospital nurse, has a MBA in Business organisation. Since the 1990´s he is specialized in wound management, carried out studies and trainings; Managing director of the wound competence center and

academy ZWM. He is also working on clinical monitoring of (nano-) silver products.

- MD, PhD, Associate professor **Åsa Melhus**/Department of Clinical Microbiology, University Hospital Uppsala: Works at Uppsala University Hospital in Sweden. Leads the research group at the Department for Clinical Microbiology, which worked for several years with antimicrobial substances, including antibiotic drugs and biocides.
  She is a member of the Swedish Reference Group for Antibiotics, the Swedish Strategic Program for Rational Antibiotic Use and Surveillance of Resistance and the Danish Council for Strategic Research. The last five years she has been scientific advisor to the National Board of Health and Welfare.

Summary of Panel Discussion

(Nano-) silver can be a useful weapon against germs in restricted cases. In order not to lose this additional weapon and not to make our problem of fighting against antibacterial resistances in healthcare even worse, use of (nano-) silver and other biocides in healthcare should be restricted to absolutely necessary applications. We should learn from the mistakes we have made by the uncontrolled use of antibiotics.

Therefore the wide spread, uncontrolled use of biocides has to be avoided, both in consumer products but also in healthcare products.

There are enough hints on potential risks for health and environment, therefore precautious measures are urgently necessary. We have to balance between benefit and rest risk, to ask ourselves is the benefit of using (nano-)silver or other biocides that high that we can accept the rest risk. If necessary to use such a product, we have to take care that it is used in a correct way.

There is a high demand on information and awareness raising in both the community and healthcare facilities about potential risks for health and environment of (nano-) silver containing products. Therefore a critical debate is needed and measures on different levels have to be taken also in Austria to avoid the uncontrolled use of biocide containing products such as (nano-) silver and triclosan.

It is important to build up alliances, to inform and create awareness among multipliers.

The public has to be informed and awareness has to be raised that normal hygiene in households is sufficient, and helps to avoid allergies and to keep up a healthy immune system.

A nano information platform (NIP) is built up by the Austrian Federal Ministry of Health, Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, Environmental Agency Austria, Austrian Agency for Health and Food Safety (AGES), Institute for Technology Assessment (ITA), and other scientific institutions. The aim of this platform is to link the knowledge of various stakeholders about nanotechnology and to create an interface to the public. Therefore information about application and potential risks will be available and direct inquiries of the public should be answered.

The results of both WS hold in Uppsala November 2009 and in Vienna June 2011 give direction to healthcare facilities and to the community in Europe for a critical, controlled use of (nano-) silver containing products and other biocides such as triclosan.