

International Scientific Conference on Cannabis and Health, 20-21 November 2013

The aim of the conference is to accumulate and distribute knowledge between scientists, practitioners and policy-makers. We must build our capacity to take on the challenge of fighting cannabis use and misuse, to sharpen our arguments against the legislation movement and to reach out with the message how hazardous cannabis use is to body, brain and behavior.

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Welcome and introduction

Maria Larsson, Minister of Children and the Elderly, Sweden, is our host of the conference. She is responsible for the drug policy in Sweden. Mrs Larsson sets the agenda and the tone of urgency for the conference in her opening speech:

The fight against illicit drugs is my top priority. Cannabis attracts the young, who consider it to be less dangerous than other drugs. This is a research conference that aims to present, based on evidence and research, solid scientific data, for us politicians to base our decisions on.

We have invited top scientists in three areas – treatment, care and prevention – to present their most recent knowledge. Cannabis is often targeted to be the gateway into other drugs, but it is also hazardous in itself. We need an elaborate drug strategy, new approaches of treatment and effective prevention. We need to keep the vision of a drug free society and have a broad consensus on this, both amongst politicians but also amongst the public. We want a healthy safe society now and in the future.

We will focus on prevention science, cost effective and common sense programs for community use, that focus on brief and early interventions. We will see how important cooperation between different agents of society is, as well as a holistic view on the person abusing drugs. Parental support programs, family oriented therapy is now also important treatment models with good results.

Society should always offer treatment – it is a question of solidarity. A society should always try to protect the children from danger and offer the best living conditions to its members. This is a code of obligation to us all.

We face an increasing diversity in cannabis products. The cannabis of today have much higher concentration, is a much more potent drug now, compared to the hashish of the 70s. It can be organic or synthetic. At the same time it is getting the same status of tolerance as alcohol and tobacco. Fewer have the attitude that the drug is addictive, and causes damages, violence and crime. Cannabis is barely mentioned in this context, and is not on the agenda in governments' efforts in research, in treatment and in legislation. A strong and cunning message of decriminalization is sent from the different legalization forces. We must fight these trends and argue against the key messages in the legalization rhetoric. For a policy to be successful, we need a supporting public opinion. We need to shoulder this obligation together.

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Effects of Marijuana on Brain, Body and Behavior, Nora D Volkow, Director, National Institute on Drug Abuse, National Institutes of Health, USA.

The vivid colors in Dr Nora Volkow's presentation shows different activity centers of cerebral cortex, and opens for us the universe of both the excellence and the vulnerability of our brains. The red dots scattered over different areas show with alarming clarity how the cannabinoids affect the receptors of the synaptic system, and causes damage on vital areas, one by one. The consequences are devastating: movement, sensation, memory, judgment, coordination and our reward system are significantly affected by the drug. Intoxication damages the ability to modulate pain, to remember and learn, to feel satisfaction and meaningfulness in life. The drug gives an instant overproduction of dopamine that gives an intense rush, but leaving the user with remaining severe social and psychological disorders.

The urgency to bring forth a clear message on the dangers of permanent damage of brain, body and behavior due to cannabis, is hammered down on us all by Dr Nora Volkow, using her groundbreaking research, shown in results, digits, graphs. With brilliant pedagogy she transforms the highly scientific findings in her work into apprehensible and pronounced facts.

- We need to get our factual evidence into extremely solid arguments, so that young people trust and understand that the legislation movement is wrong. The message of cannabis as a harmless drug is reaching the young through multiple channels, and we need to take the debate and win it.

But what arguments will affect teenagers? the audience asks.

- Cannabis use damages your ability to succeed in and enjoy life. You will stop caring about the people closest to you, your IQ will decrease and you risk mental illness and infertility, Dr Volkow summarizes .

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Cannabis use in Europe and responses, Dr Gregor Burkhardt, EMCDDA, Portugal

“If you are shy, ugly and boring, and three lovely ladies in a club offer you a pill, you will, as a young male, take it!”

Dr Gregor Burkhardt challenges, engages and jokes in his vivid speech, which takes us on a tour through Europe and its patterns of use of cannabis, and different countries’ attempts to handle the consequences of the drug. At first hand the statistics of a slightly decreasing trend of cannabis use combined with the rising levels of cannabis-related problems seems contradicting, but behind the facts lays a dominant group of frequent and high-risk users of more potent drugs. Several countries fail to make the forceful decisions and take on strong actions to handle the liberal attitudes towards cannabis. There are neglected potentials of drug prevention, the public health level is not engaged in problem solving, and the researchers in the cannabis field have difficulties to raise funding.

The normative beliefs need to be challenged and faced with factual arguments. The strongest prevention is a holistic approach towards people’s physical, economic, social and virtual context in which they make their choices about using a drug or not. The social context of consumption needs to be analyzed, as well as the individual’s drive to either use or not use drugs.

Treatment is given in a wide range of approaches. There are blurred borders between treatment and prevention, but self-checks on internet, brief interventions, family support and therapy are examples of methods used. The determining factors of the individual – capacity, motivation and opportunity – are dimensions that one needs to consider in a variety of actions against drug use. The core of it all is the normative beliefs in a society and in the individual. The young want to be similar to others, and have a strong force in developing norms and habits together. The usual teen is described as impulsive, risk-seeking, affective, peer-oriented and chooses social primacy.

Still, the family, aside with significant others, is the strongest norm-forming group also for teens.

Three main areas of reaction towards the drug are to Educate, to Capacitate and to “Nudge”. Education projects are seldom effective. You need to come down to behavioral reflection and change. But the strongest factor of reducing drug use is to establish a society that cares. If the environment is scaffolding its young, e.g. offering support, guidance with respect, warmth and integrity, you lay a good ground for other targeted interventions, as family therapy and parental monitoring.

But can we nudge people without limiting their freedom and their own judgment? Yes, says Burkhardt, we do it all the time in establishing common sense and norms. Cultural tolerance is a strong factor, as well as a community feeling of responsibility towards each other. But

the strongest of all are warm and supporting parents that show care, boundaries and concern for the kid.

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In a round-table discussion between Minister Maria Larsson of Sweden, Minister Ivi Normet, Estonia, Mme Danièle Jourdain-Menninger, France, Ms Elisabeth Pott, Germany; Mr Gilberto Gerra, UNODC and Mr Paul Griffith, EMCDDA, the participants conclude with the need for consensus and a common approach amongst countries and politicians in Europe, if we should stand a chance in the battle against drug abuse. To educate, legislate and bring researchers, practitioners and politicians together like in this conference is a vital step to both have solid facts as grounds for decision making and sustainable arguments to take on the debate with the liberal drug lobby. We know so much but still there is an information gap in society – between public understanding and research. It takes 20 years for the knowledge retrieved by science to establish in society – 20 years! We need to speed up the efforts and the transformation of complex scientific data to graspable information. The liberalization groups have a very smart propaganda strategy and hit the young with a clear, cunning and romantic message of soft drugs, through a multiple of channels. And where are we with the contradicting message? The media is silent, the web is unused. How many tv-programs speak about the real impairments of the personality as a consequence of drug abuse?

But information is not the way, the audience is told. We need multidimensional approaches, evidence based methods, a holistic view of both user and usage. If we have succeeded in raising tobacco awareness and common sense, we can succeed in cannabis awareness. But the clock is ticking and many countries leave their cannabis abusers without treatment, help and support. Prevention is underestimated by people and politicians in general. People believe in treatment but not in prevention. We need evidence and validity to repeat and repeat the message of cannabis' dangers and damages.

Society needs to mobilize, the parents and authorities need to be targeted with this urgent message. If you are using you are in a situation of suffering, in lack of wellbeing, Mr Gerra states. No, that is not the case in my parts of London, Mr Griffith replies, cannabis is viewed as fun and rebellious, a part of a urban life style. We need to see the complexity and diversity in patterns of usage in different countries and areas.

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Treatment, care and recovery, Dr Thomas Lundqvist, University of Lund, Sweden.

Dr Thomas Lundqvist, clinical psychologist, University of Lund, asks and answers the question of how to treat a person with weaknesses in attention, vocabulary, working memory, ability of elaboration, ability to sustain attention, critical examination of self and past, due to the brain's adaptation to drug abuse?

The path on finding a functional therapeutical treatment for addicts started when Dr Lundqvist practically found out that nothing he said to a cannabis user caught on – not in the immediate session, and not in the person's memory. The typical brain damage and disharmony in the neurological network of a cannabis user started off the research in tailored treatment programs for this group of patients. When you have been using a drug regularly for 6 months, the brain's adaptation to the intoxication starts. The key in treatment must be to stop adaptation and start the process for the brain to relearn normality, to behave in sobriety.

For adolescence the therapy focuses on brief intervention and motivational interviewing and relapse prevention. You also need to address underlying psychological problems. The adaptation and assessment of the individual's unique situation is vital. The causes that lie behind the use must be known, and the motivation and willingness to quit must be stated. The family-oriented therapy is an additional important focus. Problem-solving in life, to strengthen the ability to say no, is resilience factors that are needed, in order to change the way of living as a drug user to a life without drugs. The self-knowledge has to be regained, as well as a self-esteem that is not based on drug use.

To succeed as a therapist, Dr Lundqvist summarizes, you must first of all care for the patient. You are as a person and a professional the tool for recovery. To recover means to increase ability to comprehend, to manage and to feel that life is meaningful – otherwise the treatment is not effective enough.

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The second day of the conference starts with parallel seminars on the themes Prevention, Treatment and Cannabis and Driving.

Prevention

Moderator Dr Fred Nyberg, U-FOLD, Sweden

A review of interventions to prevent cannabis use and modeling the cost-effectivity of cannabis prevention. Dr Pi Högberg, Mational Institute of Pubic Health, Sweden, and Anna Månsdotter, Karolinska Institutet and National Institute of Public Health, Sweden.

The Swedish National Institute of Public Health got the assignment from the Government to review and spread scientific evidence regarding prevention of illicit drugs, mainly focusing on cannabis. Research and evaluation of implemented methods against drug abuse were collected through databases and PICO-questions. The reviews included were from no later than 2005 and must include randomized controlled trials.

The preliminary results show that a majority of the interventions were made in the age group 7-15 years, and in the age group 19-25. The majority of the interventions were not cannabis/narcotic specific and the most frequent used settings were family, school and community.

Health economic aspects were added to the cannabis prevention activities, and aimed to show how cannabis use affects health and the economy of the individual as well as the society. The analysis show that the school-based preventions, including active parents support, were the most cost-effective interventions, with savings up to 4,8 times higher than the costs.

- Has this lead to the notion in the communities that prevention activities bring down the costs of treatment?

Unfortunately we see that the communities are down-prioritizing the drug prevention but we believe it is an educational problem. We need to reach out to the public with this knowledge, to strengthen and educate people.

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Universal prevention, Dr Harry Sumnall, John Moores University, United Kingdom

The best data about substance use epidemiology in young people in EU comes from the European School survey project on alcohol and other drugs called ESPAD. This data include 100 000 students from 36 different countries. About 25 percent of the students claim that they have had access to cannabis without using it. In the countries with a higher prevalence of cannabis use there have also been a higher number of opportunities to use. In general males are more likely than females to be offered cannabis, and they are more likely to use it the younger they are.

Risk factors of using are being a young male, with a family history of use of drugs, externalizing behaviors and being in an environment with pro-substance norms. Being in a family home, being employed, married are instead protective factors. Societal norms, laws, alcohol taxes and so forth seem to have moderate effects.

The main reasons for prevention of cannabis use are the severe effects it has on the individual's quality of life, the indcreased risk of disorders, of poorer education outcomes

and reduced economic performance, as well as impaired cognitive functions and years of ill health.

The most effective program targets early adolescents aged between 11-13; has a multi-component focus and many different facilitators.

- The promotion of cannabis use is connected with big business. Increased availability is connected with increased use, Dr Sumnall concludes.

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Active implementation for successful service delivery, Dr Allison Metz, National Implementation Research Network, University of North Carolina at Chapel Hill, USA.

The Active Implementation frameworks include conducting stage-based implementation activities, building sustainable infrastructure for change, and using data to guide decision-making.

-Society has now shown a bigger interest in evidence-based methods over the last ten years, and we need to deliver results that prove positive outcomes for the consumers.

There are four criteria that define a successful intervention program – it needs to have a clear description, be defined by clear essential functions, contain operational definitions and practical performance. Beyond the criteria there are frameworks that should be used during the implementation process. You need to use a stage-matched implementation approach, develop an implementation infrastructure that is sustainable and you need to integrate an improvement process that runs alongside the project.

Implementation requires the defining of local needs and conditions. You also have to involve stakeholders and develop an operationalized model. The project needs implementation support and the possibility of making structural and instrumental changes when they are necessary. All along you need to collect data to pursue decision-making and nonstop improvement. The outcome of the project amongst children and families is the strongest factor of success. This includes stabilized families, children that no longer need out-of-home placements, improved knowledge and skills amongst parents and reduced externalizing behaviors amongst the children.

- The intervention has to be purposeful, effective and feasible to the settings, in order to work over time.

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Communities that care, Dr Harry Jonkman, Verwey-Jonker Institute, Utrecht, The Netherlands

“Communities that care” focus on problem behavior amongst adolescents such as violence, substance abuse and delinquency, through an environmental prevention strategy. Communities care when protective factors in all societal units are enhanced, when people working with children or affecting them in any way are all engaged. Community, schools and families are partners in reaching results.

To implement Communities that care you need key leaders and boards that receive training in CTC that can in the second phase build a community coalition. Risk and protective factors are collected and investigate what community resources are accessible. When you have done the local adaptation, you select effective interventions and create an evaluation plan.

Task forces and implementers need to be engaged and trained. It is vital for the program process to maintain the collaborated relationships, and to evaluate and adjust the outcome along the way.

This strategy is at the moment used in six cities in Niedersachsen, Germany and will be implemented in Malmö, Sweden. It has shown good results in the US but not in the Netherlands, so the result is strongly dependent on the methods used.

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Trestad2 – The work against cannabis in Stockholm, Gothenburg and Malmö, Sweden. Mats Glans, project Coordinator, Malmö, Anders Eriksson, Project Coordinator, Stockholm, Mikael Dahlberg and Mats Anderberg, Researchers, Linnéuniversitetet, Växjö.

Trestad2 is a program that runs in the three largest cities in Sweden over 2013-2014 and involves action on three different levels – prevention, training and information to professionals, and treatment and care. The project aims to address problem behavior amongst adolescents. Mats Glans presents the implementation of the CTC-model in Malmö. Earlier prevention work in Malmö showed little or no effect. The conclusion was that the work lacked theory of change, lacked efficiency and had weak implementation. The project group had to come up with a totally new approach.

The three city projects experienced the same frustration, and teamed up together. With funding from the government the Trestad cooperation was formed.

Trestad is a complex project that includes not only three cities but also three different levels of prevention – universal, selective and inductive prevention. A steering committee connects the project over city boundaries, and one work group operates in each city. A central research group is connected with researchers in 14 different jointed sub projects. To connect science with the practical level was one key goal in the project.

Anders Eriksson concludes that prevention gets more and more complex the more you work with it. One person alone cannot implement effective prevention work, a lot of different

people with different expertise need to work together. It is important to include and draw knowledge from people who work with adolescents every day and use them as sources of experience and as messengers. It is vital that the person that approaches the teen does that with respect and the willingness to talk, not just to inform.

Trestad² has included another project that works with CTC – EDPQS, European Drug Prevention Quality Standards – that brings the most needed tool to structure the prevention work. The first Swedish version will be ready in 2014.

Stakeholders, focus groups, tailor made seminars for different profession groups, evaluations forms – all are collected to be used in developing local prevention work.

- The whole picture of functional prevention need to be seen. This time it is of utmost importance to collect the effective components in prevention and learn more about how they interact with each other, Mikael Dahlberg and Mats Anderberg conclude.

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Treatment and Care

The Treatment and care seminar where moderated by Dr Anders Tengström, offering the handpicked top researchers with ground-breaking new findings.

Cannabis use and associated disorders: treatment needs and responses. Dr Vladimir Poznyak, WHO, Switzerland

Dr Vladimir Poznyak focused on cannabis use disorders and the most common co-morbid conditions and the different needs of treatment that are rising in different parts of the world. The highest prevalence of cannabis is found in the Australasia region, and it is getting alarmingly higher in Africa. At the same time we see increased cannabis consumption amongst young population with money – the drugs always follow the money.

The damage the drug-abuse does is not just limited to the user's brain, cannabis use increases traffic accidents and injuries, affects the user's respiratory system and causes mental disorders. An increasing risk of traffic accidents and injuries, neurocognitive impairments, low birth weight and reduced reproductive function spreads the damage also to the society around the abuser, not to mention violence and crime due to addiction.

Yet there is no pharmacological treatment for cannabis misuse, but the health system is eager to prescribe medicine – mood stabilizers and anticonvulsants – and some symptoms are improving, but others get worse. The cannabinoid system is complex, so you can basically try anything to target some part of the problem, but not all.

The recommendation from WHO is for supportive environment, psychosocial support and motivational principle, but no specific medication is recommendable.

The main pathways into treatment are positive drug testing, acute health conditions, self-referral due to personality change or pressure from family; referrals from the legal or the health system. Open access internet-based services, self-help-oriented provide new promising entries. Efforts in screening all pregnant women and a broad effort in educating social workers, common health workers, teachers and workers in the correctional treatment to know how to perform brief interventions would give high results and effects.

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Multidimensional Family Therapy for Adolescents Substance Abuse: Outcomes, Interventions and Implementation. Dr Howard Liddle, Center of Treatment Research on Adolescent Drug Abuse, University of Miami School of Medicine, USA

“Do not pathologize the teenager!” With that point of view Dr Howard Liddle opens up a most engaging, humorous and exciting lecture about the teens, their needs and deeds, strengths and weaknesses, under the headline “Multidimensional Family Therapy”.

Dr Liddle shows photos, cartoons, quotes and films to bring to life his work in mobilizing the social context around the adolescent abuser in order to reach recovery from drug abuse. He explores myths about expressions like peer pressure as something negative, which on the other hand can be something extremely positive and crucial for a young misuser’s therapy. The core values, the role of relationships, the network of significant people, the critical role of nurturing – all systems of emotional bonds and links that need to be recognized and used in order to make changes for the better possible.

“In therapy, you need to listen to the inner voices of the abuser. Be interested in the person inside, curious of his or her life and dreams.” But at the same time have a holistic and systemic view of a person. Reductionist trends and individualistic focus are now shifting into a complex and contextual understanding of the importance of relationships, networks, family. When we educate therapists we give lectures and power-points, but we fail to teach them how to talk to a kid, to a parent, the complexity of the work.

The strongest factors of health for a teen is a high level of connectedness to the family, family bonding with parents expressing interest in the kid’s life and well-being; parental monitoring, high level of emotional support and good school attainment. All treatment models targeting teens need to be developed with the knowledge of teenage development and anti-social behavior.

We also need to get out of our offices in order to get where the people are. We need to work with the family, but also target the craving of the drug. The whole system around the kid needs to work together, and target all problems in order to maintain the gain of the progress.

“I have my name on a program but science work is a team sport. I have had the fortune to contribute to something that is good, that respects and honors families and the kid! This is

actually an amazing experience, and I hope I have shared the excitement!” are Dr Liddle’s final words, and yes, he really has.

brain, which blocks the cannabinoids effect and rei--

The discovery of a built in anti-cannabis mechanism in the brain open new approaches for the treatment of cannabis abuse. Dr Pier Vincenzo Piazza, Neurocentre Magendie, Bordeaux, France

Dr Pier Vincenzo Piazza takes us on a journey with a fascinating and surprising end – from years of research on opiates and cannabis, he has discovered an endogenous hormone produced in the nforces the properties of the drug. This is most exciting findings, which, if possible to cultivate and refine, could revolutionize pharmacological treatment of cannabis abuse.

- “After several years of research and publication in medical journals but not really finding anything significant, I guess I deserved to finally find something!” Dr Vicenzo Piazza says with a humble laugh.

And what a finding! If this can become applicable on humans it would offer a potent medical treatment that in combination with therapy will significantly reduce the negative effects of cannabis misuse.

The steroid works as a roadblock and cuts off the pathway for the THC-component of cannabinoids to pass through the receptors of the brain.

Classical antagonist medicine is not designed to function on this type of drug abuse. Earlier substitutes of THC blocked everything, causing very strong side-effects. This steroid has a more specific function and does not block the useful patterns of behavior. The laboratory study on mice that were given the steroid resulted in better eating, memory, lower sedation and vegetative effect on the cannabis intoxicated individual. It also leads to a lower motivation of taking the drug, since the dopamine release got significantly lower.

But good things seldom last. There are severe remaining problems with this steroid that need to be tackled. If you should take this hormone continually it would increase everything in the hormone system, leading men to grow breasts and women to grow beards. The only way forward is to keep on developing a more stable drug of the steroid, which must be well tolerated by the system. The goal is to have a new medical effective treatment for cannabis abuse in 2018.

- But a drug must always be combined with psychotherapy. Drug use is always a symptom of a bigger and deeper problem in the individual’s life, Dr Vicenzo Piazza concludes.

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Quit the Shit – Dr Peter Tossman, Psychologist and Senior Scientist, Delphi-Gesellschaft für Forschung, Beratung und Projektenwicklung mbH, Germany.

“Quit the Shit” is a 50-days intervention program on the web for young adults that by their own free will and motivation seek help and support on the web in order to reduce or stop using cannabis. Quit the Shit provides support by trained psychotherapists and consists of on-line diary and various tutorials. Through an information website on drugs and health effects of drug abuse, the visitor can find the link to the Quit the Shit program. Since the start of the program Quit the Shit has reached 2500 visitors per day. With a free, available, counseling service on an online chat the visitor can get support and motivation to proceed and enter the program.

4000 users, 45-50 per month, that are cannabis addicted persons who want to change their life and behavior. The program is successful because it can start to help and support now, immediately when the person is motivated and logs in. Once in, the user can get weekly feedback on the progression or support in handling obstacles, answer questions and motivation to keep struggling. This is the main intervention phase. The feedback is very individual, and based on the person’s diary and goals for the changing process. The intervention focuses also on a future perspective: will the person need additional support, be recommended to a treatment center and more in-depth counseling over a longer period of time?

The evaluation of Quit the Shit project shows that the test group attending the program estimated reduced use of the drug, lower abstinence, reduced anxiety and depressions, and over- all an increased feeling of satisfaction in life.

-“You can open a window for those who want to reduce or quit the drug abuse. The feeling of a relation and interaction with a person is vital for the success of a web based intervention program. A fully automated program will never reach the same effects. And on the question on how we can develop the program to attract those who do not want to get into the program – well, we don’t want to! We want to expand the program for all of those that we now are forced to put on a waiting list, this is our large and important focus group, Dr Tossman states.

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CANDIS treatment program, Dr. Eva Hoch, clinical psychologist and senior scientist, Central Institute of Mental Health, Germany.

Dr. Eva Hoch shares her knowledge in a highly energetic and committed presentation of the fully manualized cognitive behavioral treatment program CANDIS for older adolescents (>= 16 years) and adults. The cannabis treatment research program was developed at Technical University of Dresden. It was tested and transferred into clinical practice through large clinical studies for over ten years.

The need for treatment and help for a high number of cannabis abusers were not at all met in the health system of Germany until 2004/2005. The aim of the project was therefore to develop a cannabis-specific treatment program that was based on the most effective treatment strategies: motivational enhancement therapy, cognitive behavioral therapy and psychosocial problem solving. The project group consisted of behavioral therapists, who invited all individuals with cannabis use disorders for participation at the program. Patients with co-morbid DSM-IV mental disorders and other legal or illegal drug use were allowed to enter the program. CANDIS treatment is based on a bio-psycho-social model of etiology. The program's aim is to help the individual to enhance motivation for treatment, to understand and change problematic cannabis use patterns and to establish new strategies to solve problems. At the beginning and during therapy many patients with chronic cannabis dependence have cognitive deficits. Therefore it is important to set up a special pedagogy to improve the learning process: Patients benefit very well from a clear structure and regular repetition of content in therapy sessions. The CANDIS manual provides information on cannabis use disorders, describes the content of each therapy session as well as typical obstacles in the therapy progress. It includes worksheets and a CD-ROM for the patient to work with, in and between sessions.

The program's good results have encouraged the research team to transfer the model to outpatient treatment centers and group therapy, and now there are therapy centers in different areas of Germany working with the manual. In a multi-centered trial the study group assessed barriers to translation of the program in clinical practice. Most frequent obstacles were "heavy workload at the treatment centers" and "high comorbidity of patients (especially personality disorders)". But the excellent and convincing results are the strongest argument, and the manualized treatment program CANDIS is now being taught and adapted in other countries.

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Cannabis and Driving

Moderator Marilyn A Huestis, NIDA, USA

Chronic Daily Cannabis Smoking; Neuroadaptation, residual Cannabinoid Excretion and Psychomotor Impairment, Dr Marilyn Huestis, senior investigator and Chief, Chemistry and Drug Metabolism Section, IRP, National Institute on Drug Abuse, USA

The Chemistry and Drug Metabolism Research Program at NIDA utilizes pharmacological and toxicological tools to address mechanisms underlying human drug abuse and addiction, to investigate behavioral and physiological drug toxicities, and to develop new prevention strategies and treatment medications. The Program also conducts controlled drug administration studies in humans to determine onset, peak and duration of drug effects and time course of markers in biological matrices.

Data obtained within the program provide a framework for understanding mechanisms of drug action and toxicity, and for predicting drug effects in individual patients. The program seeks to gain further understanding of the circumstances of drug use, i.e. how the drug is taken (orally, intravenously or by smoking), the metabolic process or how it is stored within the body. The research conducted within the program directly impacts public health & safety in the following manner:

- The research conducted within the program directly impacts public health and safety in the following manner: Data for evidence-based drug policy & legislation
- Identify new metabolic pathways and metabolites (designer drugs)
- Improve monitoring tools to deter and identify drug use
- Document medication efficacy when assessing new pharmacological or behavioral drug treatments
- Create new tools for drug abuse practitioners

The program strives to be relevant in issues of public health and safety and it ultimately seeks to provide a foundation for evidence based drug policy in legislation.

How do the drugs affect the brain? In the brain and body two different cannabinoid receptors exist – CB1 and CB2. These constitute important parts of the endocannabinoid system. The endogenous cannabinoids are important for controlling the release of other transmitters. The CB1 receptor is present within the central nervous system, the cardiovascular system and the reproductive system. The presence of CB1 receptors within the amygdala explains why people want to take cannabis as it alters the mood and emotions. Cannabis effects on the hippocampus affect memory and learning. Of special interest for the topic of cannabis and driving is the effects cannabis produce on the cerebellum and the executive functions in the brain. Motor planning, reaction times and motor control are negatively affected.

In the 2007 US national roadside study cannabinoids were detected in 8.6% of nighttime drivers. It was found that more drivers were tested positive for drugs than for alcohol and that cannabis was the primary drug in drugged driving cases and fatal motor vehicle accidents. There is however a shortage of data and a possible dark figure since police officers regularly check for drunk driving but exclude searching for other drugs.

In one study THC was detected in brains of drivers even when it was no longer detectable in blood. The question arose how law enforcement could determine that a suspect is driving under the influence of cannabis when the effects of the drugs could persist for such a very long time.

In 2010, 10.6 M Americans drove under the influence of illicit drugs, primarily cannabis. The conclusion is that chronic daily cannabis smoking is an important public health and safety problem, and as drunk driving decreases, drugged driving has increased.

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Cannabis impairment as assessed during On-the-road driving and neurocognitive task performance, Jan Ramaekers at the department for Neuropsychology & Psychopharmacology, Faculty of Psychology & Neuroscience, Maastricht University in the Netherlands.

Jan Ramaekers asks rhetorically two main questions in his workshop

- Do combined effects of cannabis and alcohol on driving performance differ from those of either drug alone?
- Does cannabis impair psychomotor, cognitive and actual driving performance and increase the risk of becoming involved in traffic accidents?

To answer these questions two types of data sets were used: Epidemiological surveys and experimental studies. **Epidemiological surveys** were carried out with the intention to determine the involvement of THC users in traffic crashes, prevalence, culpability, and case control data. According to the cited epidemiological surveys THC is detected in between 4-12 % of drivers involved in traffic accidents. Alcohol is also present in 50-80% of these THC positive drivers and the prevalence of THC in general driving population is unknown (no control group). The likelihood of causing an accident when driving under the influence of cannabis is greatest if it is also combined with alcohol.

In order to study the psychomotor function and cognition of driving under the influence of cannabis **experimental studies** were carried out that consisted of laboratory tests of isolated psychological functions related to driving, driving simulators, and actual driving tests in a specially built car. The abilities determined by the tests were memory, attention, reaction time, tracking performance and motor control. The effects of cannabis on actual driving were most prominent in tests measuring road tracking precision as compared to tests measuring more complex driving tasks. THC has been shown to impair cognition, psychomotor function and actual driving performance in a dose related manner.

The dangers of driving under influence of drugs are clear. Further, when police officers check for THC in suspected drugged drivers a couple of hours have passed and the result will be less severe because of that. We need sharper measurement tools that can detect THC levels immediately.

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Analytical challenges and possibilities in measuring cannabis exposure, Olof Beck at Karolinska University Laboratory in Stockholm, Sweden.

Olof Becks discuss different methods to measure THC and its different metabolites (especially the THCCOOH metabolite). THC can be tested through urine, hair, blood, saliva and breath. Tests of urine, blood and breath are the most effective.

Testing for THC in the urine is a very common and cost effective investigation method. It is done through repetitive sampling and has a rather long detection time. The method monitors cannabis elimination by creatinine ratio and it is the forensic standard of drug tests. Measuring THC in the blood allows for more sophisticated techniques and has a short detection time. It is however expensive. Measuring THC levels in the breath is the most recent possibility in drug testing. Exhaled breath contains micro particles which can be collected in an electrostatic filter. The air is then stored in a container.

Rapid advances in mass spectrometry will offer increased possibilities for drug testing in the future. Regardless of method - any test that is developed must take the need for reliability, detection time, false negatives and positives, in account.

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The Norwegian Road Traffic Act – driving under the influence of drugs or alcohol, Olav M. Markussen, Assistant Chief of Police, Norwegian National Mobile Police Service

Olav M Markussen's presentation is a review of the recent change in Norwegian legislation regarding drugged driving. The previous system rested on an assessment of impairment from drugs as a base for the offence drugged driving. The new system puts use of narcotic drugs equivalent to the 0.02 % base line of alcohol as drugged driving – regardless of actual impairment. The reason behind the policy change is to reduce the need for expert opinions in court cases and to extend the low tolerance procedure of alcohol in traffic to other drugs – sending the message that drugs and driving don't go together.

It is forbidden to drive, or attempt to drive a motor vehicle when the driver has such concentrations of intoxicating or narcotic substance in the blood that this low limits are exceeded. The legal limits do not take individual tolerance into account.

The low (basic) limits should exclude cases where it is no theoretical possibility for reducing the ability to drive. Norway is the first country to implement legislative limits for graded sanctions for non-alcohol drugs comparable to impairment seen at BACs of 0.05 % and 0.12.

Drink and drug driving penalties and driving licences suspension

>0,02 a fine; a criminal record. No driving ban, except; Novice drivers/or special conditions a minimum 6 months driving ban

>0,05 a minimum 1 year driving ban; a fine of 1,5 monthly (gross) salary and a conditional sentence of imprisonment; a criminal record

>0,12 a minimum 2 year driving ban; a fine of 1,5 monthly (gross) salary and a unconditional sentence of imprisonment (21 days); a criminal record.

So what are the experiences so far in Norway? Since these base lines do not require as many expert opinions about impairment a reduction of 50 % in the number of expert statement has been observed. These cases will now have an easier and faster handling in the courts – based solely on the reported drug concentration. The new legislation have improved road safety, facilitated a more effective use of resources and made the rules addressing drug-driving more similar to the legislation on drunk-driving. Uniform low legal limits of both alcohol and illicitly drugs will increase public acceptance and awareness on the fact that neither alcohol nor drugs go well with driving.

But there are currently no reliable rapid tests that can be used to indicate the influence of drugs other than alcohol at the roadside. To gain full benefit of the amendment a testing device to reveal lower impairments would be needed.

But if you are affected by drugs but still below the accepted level in Norway – can you be convicted?

- Yes – you can be convicted for drug offence but not for drugged driving. The illegality of drugs is one thing and driving under the influence of drugs is another, answers Mr Markussen.

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Cannabis and Driving - an overview of Swedish legislation, Mattias Larsson, Senior advisor at the Ministry of Justice in Sweden.

In Sweden prior to 1999, legislation on drunken and drugged driving read “*a sentence for driving under the influence shall be imposed on a person who drives a motor-driven vehicle or a tram while so under the influence of alcohol or other substances that it can be reasonably assumed that his driving ability is impaired.*”

This was changed in 1999 to a zero tolerance approach - driving under the influence of drugs is an offence even if driving itself is not impaired. Driving under the influence of prescription medicine is allowed with permission from a doctor even if driving is impaired.

The government reasoned that the aim of using illegal substances is to intoxicate yourself and thus make yourself unsuitable for driving and that introducing a system of impairment did not yet enjoyed scientific support. Introducing statutory impairment levels for other substances than alcohol was not feasible and therefore a solution based on a zero-tolerance principle for illegal drugs was chosen.

This approach was evaluated in 2006 and impairment limits were again discarded as an option.

What will the future hold in this matter? Drugged driving laws might be changed in the future and be based on facts of levels of impairment rather than an absence of facts.

- Sweden having a zero tolerance makes a lot of sense. Since everything else is illegal it would not make sense to enforce a tolerable level of drug use in the traffic. Society have decided that drugs are unwanted and that's the base line for the zero tolerance in the traffic, comments a listener after the workshop.

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The closing of the conference – Ulrik Lindgren and Maria Renström of the Ministry of Health and Social Affairs, Sweden.

We have reached, over these days, the goals of the conference: To increase and spread knowledge between scientists, practitioners and policy makers, in order to fight the increased use of cannabis. There is no doubt that the cannabis of today is much stronger, has much more severe harmful effects on body, brain and behavior. To legalize is not an option at all, it will drastically increase the use and spread to other groups in society. We need to work with prevention, treatment and medical care in a holistic and systematic way. We need to build a society that cares, that enhances the protective factors school, social life, strong family bonds, a sense of meaning and hope in young people's lives. We need to have a holistic approach on abuse, on the individual, and on the different models of treatment and care.

We need to reach further consensus and overcome the gap between scientific results and the general opinion. Take on the debate with the arguments, the knowledge we have learned together and make use of the conference! There is just no alternative than keep on learning, developing, researching, trying, in order to fight cannabis use in the world.

-“ I have heard a lot of new facts and arguments, some things I already knew but that strengthened me still, and all in all, the knowledge and presentations put together, interlinked to each other and put in a new context – I will go back to my every day work feeling educated, motivated and challenged to keep on struggling”, one participant of the conference comments as we hurry out in the cold and rainy Stockholm.

