HIV therapy and prevention

Position paper by Deutsche AIDS-Hilfe e. V. (DAH)
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1. HIV therapy is an important constituent of risk management and can help to destigmatise people with HIV

Antiretroviral therapy (ART) has considerably extended the life expectation of people with HIV and fundamentally improved the quality of life for many diagnosed as HIV positive. In addition, it has an important primary preventive side effect: the risk of infection is clearly reduced.

Transmission during sexual contact without a condom is improbable[1] when the following conditions are met:

- the viral load of the HIV positive partner has been under the detection limit for at least six months,
- antiretroviral medication has been taken consistently,
- the sexual partners have no mucosal defects, e.g. as a consequence of sexually transmitted infections.

In other words, under the above conditions the risk of HIV transmission is as low as the risk during sex with condoms.

This statement is a meaningful and effective supplement to our safer sex messages to date and introduces new possibilities for prevention.

1.1 Information as the basis of communication and of self-determined and responsible action

That the transmission of HIV during sexual contact with HIV positive partners is improbable under the above conditions is not only important for risk management (and therefore primary prevention), but can also mean for people with HIV or AIDS an alleviation and improvement to their life situation and prospects because it helps to dispel irrational fears, as the DAH Delegate Council and Board emphasised in a declaration in early March 2008.[2] This also applies to HIV negative and untested persons, e.g. partners in serodifferent relationships,[3] (other) sexual partners, and members of the same family.

As a self-help organisation for those particularly threatened or affected by HIV or AIDS Deutsche AIDS-Hilfe therefore welcomes the Swiss National AIDS Commission's (EKAF) publication of the position paper "HIV-infizierte Menschen ohne andere STD sind unter wirksamer antiretroviraler Therapie sexuell nicht infektiös" ["HIV infected persons without other STDs are not sexually infectious under effective antiretroviral therapy"] on 30 January 2008. The EKAF has made this information, which had previously been communicated "under the counter" (above all during counselling), the object of public discussion and communication between (sexual) partners and a subject for education.

By publishing now its own position paper DAH is pursuing the objective formulated in its

[1] See here the explanations under 3.
[2] Paper "Neue Wege sehen – neue Wege gehen!" ["Seeing new ways – going new ways!"] passed jointly by the DAH Delegate Council and Board at a meeting on 7–9 March 2008
[3] Here: one partner is tested HIV positive, the other HIV negative.

mission statement "that society as a whole and each and every individual should be able to make informed, self-determined and responsible choices on how to deal with the risks of HIV and AIDS […]".[4]

1.2 How safe is safe enough?

DAH is pursuing an approach of health promotion and HIV prevention oriented to the ways of living of its target groups. This means among other things that prevention messages must be as sound and easily realisable as possible. In the early days of HIV prevention DAH therefore decided to propagate safer sex. In this context "safer" means that following the recommended safer sex rules[5] makes the transmission of HIV improbable and in this respect is "safer" than unprotected sex, but does not provide completely reliable protection against infection (that would be provided with abstinence only). On the other hand, the concept of "safe sex" through abstinence or the avoidance of all contact with body fluids[6], particularly prevalent in the Anglo Saxon area, we considered and still consider to be unrealistic and ineffective because it ignores sexual needs and desire.

Safer sex therefore means that there is a residual risk (see 3) that DAH considers important enough to be named. Whether the individual accepts it or not is his or her own decision. The task of prevention is to provide the information needed to communicate this risk and for individual risk management in a format suitable for the target groups and oriented to their interests. This applies analogously to other strategies of risk minimisation or reduction on whose (also erroneously assumed) effectiveness and weaknesses DAH likewise provides extensive information – even when they provide less protection and safety than the classical safer sex rules or a viral load consistently under the detection limit with the absence of mucosal defects: our opinion is that also "better than nothing" strategies are useful arrows in the quiver of prevention. In particular from a population based viewpoint a very safe strategy (e.g. safer sex) can become very unsafe when the application is not a consistent success. (On the other hand, a protective strategy with limited effectiveness but consistent application can help to reduce the number of HIV transmissions).[7] Furthermore, we know (and advocate) that the maximum of preventive behaviour is not always the objective of individual risk management, but that depending on situation and disposition persons weigh e.g. the experience of sexual pleasure against the consequences of a possible infection.[8]

1.2.1 Neutral information or recommendations?

Deutsche AIDS-Hilfe moves in the conflict area between prevention organisation with a public mission and an organisation for self-help and representation of interests. Whereas self-help and the representation of interests focus on the capability of dealing self-responsibly with the risks and on the consolidation and protection of personal autonomy the primary objective

[4] This is done in the following above all with a view to those individuals and groups whom we represent and with and for whom we work: people living with HIV/AIDS and those particularly threatened or affected by HIV, AIDS, hepatitis, and other diseases transmitted sexually or when using drugs.
[5] In the stricter sense the safer sex rules are: use condoms for anal and vaginal intercourse, do not let sperm or blood enter the mouth during oral sex (for the target group of men having sex with men, worded e.g. as "Fuck with condoms. On a blow job get it out before it comes."). In the wider sense "safer sex" can be understood as a set of measures preventing HIV from entering the body or contacting mucous membranes in a quantity adequate for infection.
[6] by using condoms when having anal, vaginal or oral sex and by avoiding French kissing
[7] Cf AIDS-Hilfe Schweiz: outline and position paper: "Sexuelles Risikomanagement" ["Sexual Risk Management"] – April 2007/January 2008; passed and declared binding by the Board at its meeting on 24 April 2007; updated on 30 January 2008; Bern: AIDS-Hilfe Schweiz 2008
[8] Cf ibid

from the viewpoint of New Public Health is the prevention of HIV transmission to the greatest possible extent.

On the side of the public (as well as from the target groups of our work) many persons are therefore expecting from DAH not only neutral information, but also recommendations. Such an approach also complies with our self-conception as a national network of competences for structural prevention and health promotion in the context of HIV and AIDS – in this role we see it as our task to evaluate information in the light of structural prevention and oriented to the interests and the ways of living of people of our target groups. What is decisive here though is that also recommendations may not violate the autonomy of the individual.

Nevertheless, all recommendations can only be of a general nature. Besides the preparation and communication of information the offer of indepth communication and individual counselling is therefore of central importance to us.

1.3 Self-determination means voluntary and without compulsion!

Respect for the autonomous decision of the individual demands not only the propagation of available information on risk management, unabridged and in a form suitable for the target group, but also opposition to attempts to coerce the individual into a “maximum of preventive behaviour”. In definite terms this means that just as the decision to use or not use a condom lies with the individual, also the decision whether and when to begin an antiretroviral therapy lies with the HIV positive person. There must be no pressure or coercion exercised here (e.g. to start treatment for primary preventive reasons).

1.4 Self-responsibility, joint responsibility, and responsibility for others

The decision in favour of individual risk management (and therefore utilisation of the offered information or the implementation of recommendations) lies with the individual. In this respect though we do not see the individual alone with this responsibility, but always see the joint responsibility of others – particularly when the partners are not on an equal footing with respect to their knowledge, intentions, feelings, and abilities.

If the individual is to decide with self-determination and act with responsibility, he or she though also needs – besides adequate information – corresponding competences and resources as well as acceptance and solidarity. DAH calls on politics, administration, the economy, and society to create structures and conditions that allow the acquisition of such competences and the provision of such resources. This also applies to acceptance and solidarity: if these are to be promoted, the so called general population must also be informed of the present level of knowledge for risk management strategies.

2. Messages

The central message:

The transmission of HIV during sexual contacts with an HIV positive partner without a condom is improbable when the following conditions are fulfilled:

- **the viral load of the HIV positive partner has been under the detection limit for at least six months,**
- **antiretroviral medication has been taken consistently,**
- **the sexual partners have no mucosal defects, e.g. as a consequence of sexually transmitted infections.**

2.1 (Further) messages and explanations for HIV positives with undetectable viral load

In the following we understand under “HIV positives with undetectable viral load” people with HIV who are undergoing an effective ART and whose viral load has been below the detection limit for at least six months. An effective therapy causes the viral load in blood, sperm, and mucous membranes to fall below the detection limit, making infection for the sexual partner improbable.

Ulcers or inflammation of the mucous membranes on the penis, in the intestine, or in the vagina of the sexual partner – above all as a consequence of sexually transmitted diseases like syphilis and herpes – again raises this risk because HIV accumulates in damaged mucous membrane, which in addition is more permeable to HIV. The risk to the HIV negative partner becomes incalculable. Until this damage has healed completely sex should again be practised with a condom (or HIV prevented from entering the body or contacting mucous membranes).

The general rule is that in the event of conspicuous physical changes that could indicate sexually transmitted disease a doctor should examine and if necessary treat the symptoms. Also the partners should be informed so that they can be examined and if necessary treated by a doctor.

Until the successful conclusion of STD treatment the recommendation is “sex with a condom”.

2.1.1 Messages for steady partnerships with HIV negative or untested partners

When the question “Sex without condoms?” arises in steady partnerships between a HIV positive partner with undetectable viral load and an HIV negative or untested partner we recommend the following procedure:

- study of the pertinent information (support and counselling are provided e.g. by local AIDS service organizations [Aidshilfen], but also by treating doctors and staff at other counselling centres) for providing a sound basis for informed decisions,
- communication of this information,
- a joint decision that both partners can live with,
- the regular ingestion of HIV medication and regular visits to the doctor for verifying the efficacy of medication and the absence of mucosal defects.

2.1.2 Messages for casual contacts

For sex with casual partners the unchanging recommendation is to use condoms because the conditions of regular STD checks (for verifying the absence of mucosal defects on both partners), communication between partners, and joint decisions generally cannot be maintained here.

For HIV positive people with casual sexual contacts in addition to their regular partner we recommend regular checks for sexually transmitted diseases because these often develop without conspicuous symptoms (or because the symptoms often go unnoticed) and can often be established only after a medical examination or at the laboratory.

2.2 Message for HIV positives with detectable viral load, for untested, and for HIV

negative people

In the case of HIV positives with detectable viral load, untested and HIV negative people we continue recommending – in particular for casual sexual contacts – that they observe the rules “Use a condom for anal and vaginal intercourse” and “Prevent blood and sperm from entering the body or contacting mucous membranes”.

The statements under 2.1 and 2.1.1 apply to partnerships between HIV negative/untested and HIV positive persons with undetectable viral load.

When the question “Sex without condoms?” arises in steady partnerships between a HIV negative partner and/or untested partner the previous recommendations apply.[9]

2.3 Excursus: messages for HIV positives with HIV positive sexual partners

In the case of sex between HIV positive partners the possible transmission of other STDs or hepatitis C is at the focus of preventive action. Seeing that a number of STDs and hepatitis C can develop faster and more seriously in persons with HIV we recommend that they undergo a medical examination for these diseases at least twice a year.

As a means to prevent superinfection, i.e. the transmission of a viral variant to the partner or infection by a viral variant from the partner, the effective therapy of one partner is adequate. Superinfection is possible (but irrelevant epidemiologically) when both partners are untreated or undergoing a break in treatment. Superinfection can be a disadvantage when drug resistant viruses are transmitted.

2.4 Special considerations for drug users

The extended prevention messages that of course also apply to drug users refer exclusively to the sexual transmission of HIV. Drug users still run the risk of infection when they jointly use syringes and needles. Although it may be assumed that here, too, the risk is reduced when the viral load is below the detection limit, the findings of the studies on the sexual transmission of HIV cannot be transferred to transmissions occurring when using drugs: the intact mucous membrane presents a barrier against HIV transmission during sex, whereas this barrier does not exist for intravenous drug use. Accordingly, the prevention messages (safer use recommendations) continue to apply unchanged in this field, since safer use also minimises the risk of transmitting other infectious diseases like e.g. hepatitis B and C.

Nevertheless, also drug users can benefit from the above facts that can be an alleviation above all to HIV serodifferent couples taking substitute drugs. Even though the prevention messages remain unchanged for drug use the changes resulting in the field of sexuality should be discussed: like all others, too, people who use drugs or participate in substitution maintenance therapy need this information if they are to pursue a risk management tailored to their lives.

[9] Both partners should consistently use condoms during anal and vaginal intercourse for three months, prevent blood and sperm from entering the body and contacting mucous membranes, and afterwards undergo tests for HIV. Until the test results have been announced both partners should continue practising consistent safer sex. When the HIV tests prove negative the partners need no longer use condoms provided that the above protective measures are implemented during sexual contacts outside of the partnership. This though requires great trust and openness: following unprotected contacts outside of the partnership both partners must talk and again protect themselves during sex until they have finished repeating the above procedure.

2.5 Special considerations for prison inmates

The special consideration with prisons is that inmates hardly have access to preventive means (condoms, lubricant gel, syringes, hypodermic needles, or substitution maintenance therapy). Their risk of infection during sex or drug use in prison is high. Moreover, the determination of the viral load needed every three months for the procedure described under 2.1.1 is often not conducted or conducted at much longer intervals than outside. We must therefore continue to advocate for adequate health care of HIV positive inmates that corresponds to the health care outside of the prison walls and to integrate the above arguments (better health care = more safety in prisons) in discussions with the resident doctors.

Information on sexual transmission should be communicated to prisoners wherever possible in informative talks or counselling interviews so that this also at least partially covers the informative role usually adopted by doctors from specialised HIV practices. (Unfortunately, it may not be assumed that the information communicated by resident doctors is comparable with that from specialised HIV practices.) If practical risk management is to be pursued in prisons, informative talk or counselling must stronger focus on the everyday situation at the prison (e.g. the subject of sexual relations at prisons, risks of individual sexual practices, viral load and administration of medication, STDs, risks of drug use).

2.6 Special considerations for the desire to have a child, pregnancy, and breastfeeding

The following statements apply to couples who want to have a child when one or both partners are HIV positive:

- When the viral load is undetectable and the conditions named under 1 and 2 are fulfilled the couple can have the child in the natural way without risk of infection for the partner.
- In the case of HIV positive mothers with undetectable viral load the risk that HIV is transmitted to the child during pregnancy and birth is low. With the corresponding medical care by specialists a vaginal birth is therefore also possible.
- Breastfeeding, however, continues to be advised against – the scientific data are still inadequate for any changes to this recommendation.

3. Backgrounds and explanations

3.1 Meaning of mucosal lesions and sexually transmitted diseases (STDs)

Mucosal lesions (ulcers, inflammation) play a considerable role in the transmission of HIV. For HIV negative partners they are a portal of entry for HIV, and for HIV positive partners they lead to an accumulation of immune cells in the ulcer or inflammation. Because some of these immune cells are infected with HIV the virus also accumulates in and around the lesion.

Mucosal lesions occur e.g. with

- sexually transmitted diseases – syphilis and herpes infections lead to ulcers and are the greatest contributors of all STDs to the increased probability of HIV transmission. In the case of other STDs the decisive factor is the extent of the mucosa's inflammatory reaction: gonococci (gonorrhoea) and chlamydial infections can cause extensive inflammation in the intestine – whereas they may give rise to negligible lesions in the throat
- Colitis ulcerosa, Morbus Crohn, amoebic dysentery

- fistulae from the vagina or intestine/anus.

The raised probability of HIV transmission with diagnosed STDs on HIV positives not undergoing antiretroviral therapy has been documented by a great many thorough scientific studies (e.g. Laga 1993, Craib 1995, Fleming 1999, Cohen 2005). There have as yet been no significant epidemiological studies treating persons with stable antiretroviral therapy, although increases to HIV concentrations in genital secretions (mucous membranes) have been verified with diagnosed STD (Sadiq 2002).

Sexually transmitted diseases can develop asymptomatically either completely or phase wise. Accordingly, great importance is attached to the diagnostics or screening of STDs, also in the absence of symptoms. The following examinations are possible and usual:

- **syphilis** serology (blood test)
- **herpes** inspection and medical history (questioning/medical files) as to whether herpes blisters or ulcers were observed; owing to the relatively high prevalence serology is of secondary importance because the antibodies can be detected for the rest of the patient's life
- **chlamydia** smears from the vagina/cervix, the urethra, rectum, and throat; a urine test is possible as an alternative or supplement to the urethral smear (painful for men)
- **gonococci** smears from the vagina/cervix, the urethra, rectum, and throat; a urethral smear is generally not considered to be necessary on the man when there are no symptoms because gonococci – unlike chlamydia – lead to complaints in the man's urethra.

3.2 Meaning of viral load in the blood and in genital/rectal secretions

A reduction to the viral load in blood is generally followed by a reduction to the viral load in genital and rectal secretions and mucous membranes. Exceptions though are possible. HIV could be detected in the sperm of some few HIV positive persons whose viral load in blood plasma remained under the detection limit for longer than six months and who were not diagnosed with STDs (detection limit for blood plasma 40 copies/ml, for sperm about 200 copies/ml); however, the measured viral load was in a low area (< 1.500) and there were no reports of transmissions in these cases.

There is no scientific clarification as to whether there is a threshold value for the viral load in blood or genital secretions under which an infection can no longer take place.

3.3 Meaning of therapy compliance and therapy control

Stable antiretroviral therapy (SRT) includes regular checks of the viral load, as a rule every three months. The medication should be taken constantly for the purpose of minimising fluctuations in the agent's concentration and therefore the risk of resistances developing with ensuing therapy failure.

Resistances and therapy failure, however, cannot be put down exclusively to poor therapy compliance. Other factors, too, can prevent the agent from concentrating in the blood to the required extent. These facts should be pointed out to persons seeking advice.

- Interactions with other (also non prescription) drugs or naturopathic substances can lead to a loss in efficacy of HIV drugs. The ingestion of other drugs should therefore be discussed with the HIV doctor.
- Diseases can delay or prevent the absorption of HIV drugs in the body (diarrhoea and vomiting, lymphoma, atypical mycobacteriosis).
- There may be reduced absorption of drugs following operations on the

gastrointestinal tract.

3.4 Meaning of communication between partners

More than the use of condoms the prevention method "reducing the viral load under the detection limit" needs functioning communication between the sexual partners. Inadequate therapy compliance or unintended breaks in therapy (e.g. holidays) should be made the subject of discussion, and condoms should then be used again.

Counsellors should always address "outside sexual contacts" and how to deal with them, even if the couples are not intending to foster any outside contacts at the time of counselling. Outside sexual contacts are in principle associated with the problem that STDs may be contracted and the conditions for the "viral load method" may then no longer be given.

3.5 Comparison: strengths and weaknesses of condoms and the "viral load method"

Both methods come with differing profiles of advantages and drawbacks. Both methods can be combined with each other or with other risk reduction strategies. Counsellors can help in the choice of individually matching prevention methods.

3.5.1 Use of condoms

Strengths

- It does not need clarification of preliminary conditions.
- It also reduces the risk of other sexually transmitted infections (e.g. syphilis, gonorrhoea, chlamydial infections, etc.) and is therefore ideal for sex with casual partners and for sex work
- At the same time it provides contraception (if wished).

Weaknesses

- Mistakes in use are possible: damage to the condom when handled wrongly, use of unsuitable lubricants (e.g. fatty oils), use of lubricant between condom and penis
- Material defects are possible (but very rare).
- Effectiveness drops, if not used constantly (100 %), e.g. following the consumption of alcohol before sex or erectile dysfunction.

3.5.2 Reducing the viral load under medication

Strengths

- This covers not only sexual practices with a high risk of HIV transmission (anal and vaginal intercourse) but also "minor risks" that cannot be reduced with or do not usually require a condom, e.g. oral sex, sperm games with mucosal contact, drinking of mother's milk, noninsertive contact between mucous membranes, blood contact.
- Pregnancy is possible (if wished).

Weaknesses

- It requires clarification of the preliminary conditions: the viral load has been under the detection limit of currently 40 copies/ml for at least six months; the viral load is checked regularly, i.e. every three months as a rule; the therapy is taken reliably and both partners do not have lesions of the mucous membranes e.g. as a result of sexually transmitted diseases.

- There may be an inadequate reduction of the viral load in the genital/rectal secretions (rare).
- There may be an increase to the viral load during medication interactions or therapy failure (this generally takes place slowly and is noticed during the checks).
- It provides no protection against other sexually transmitted diseases.

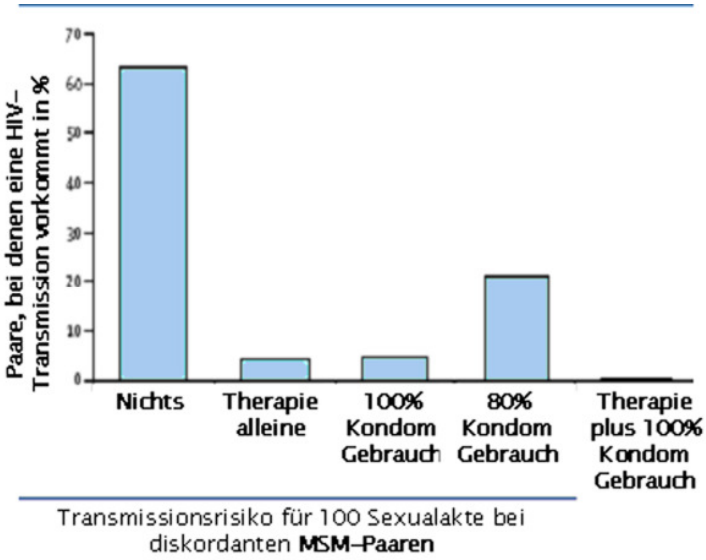
3.5.3 Efficacy of condoms and the "viral load method"

Both the consistent (100 %) use of condoms[10] and the permanent reduction of the viral load on the HIV positive partner – with the absence of mucosal lesions and STDs on both partners – provide adequate protection against HIV infection, and the residual risk of HIV transmission is negligibly low.[11] When both methods are combined the residual risk tends to zero.

[10] It is generally assumed that safer sex reduces the risk of HIV transmission by 95 %. Residual risks arise through mistakes in use, material defects, and so called "minor risks" during sex that are not covered by or generally do not need a condom (oral sex, other contact between mucous membranes, blood contacts). One Cochrane analysis (Weller et al 2006) on heterosexuals calculated a protective effect of 80 %. MSM are generally assumed to be more skilled in the handling and therefore provide a greater protective effect (95 %) than heterosexuals. There is no Cochrane analysis on the reliability of condoms with MSM.

[11] With both methods – the use of condoms and the viral load method – there may be in rare cases transmissions of HIV despite correct observance of the rules; one such case has been documented to date for the viral load method (Stürmer 2008).

The graphic presents the transmission risk for 100 sexual acts between discordant MSM couples (according to Garnett, Gazzard 2008). The authors refer to a model calculation by Wilson et al (2008) that assumes a high transmission risk and casts a critical eye on the value of the "viral load method".



Transmissionsrisiko für 100 Sexualakte bei diskordanten **MSM-Paaren**

3.6 Scientific data on the subject of viral load and infectivity between heterosexuals and men who have sex with men (MSM)

The epidemiological data on the subject of "viral load and infectivity" paint a worse picture for men who have sex with men than for heterosexuals. It is expected that nothing will change this inequality in the next few years. The only randomised intervention study (HIV Prevention Trial Network 2008) running at present for the purpose of reducing infectivity during antiretroviral therapy has concluded recruitment and has not included a single MSM couple.

May we now withhold from MSM a prevention method that works so impressively with heterosexuals until we receive data on MSM as well? Or are we not compelled in the face of the clearly higher HIV incidence among MSM to draw analogous conclusions and to pronounce recommendations on the basis of less evidence so that we can utilise all the possibilities of prevention particularly for MSM?

It cannot be assumed that the connection between viral load and infectivity is fundamentally different for MSM as it is for heterosexuals. For both HIV positive heterosexuals and MSM an effective antiretroviral therapy reduces the viral load to a thousandth or ten thousandth. In the case of heterosexuals cohort studies have verified that there are practically no more infections when the above conditions are fulfilled (Barreiro 2006, Bernasconi 2001, Castilla 2005, Melo 2006, Quinn 2000, Gray 2001). There are no such cohort studies for MSM. Solely an epidemiological study with MSM in San Francisco verifies a clear reduction in infectivity following the introduction of antiretroviral therapy (Porco 2004). Observations from clinical cohorts and practice indicate that a similar reduction of infectivity can be observed between MSM couples as well.

Even when a "safety factor" is included (and the possibility taken into consideration that the effectiveness of the method on MSM and anal intercourse should be less than for heterosexuals) we may reckon on an effectiveness that equals or surpasses that when condoms are used (see above).

3.7 Individual level and public health

On the individual level at present there is hardly any scientific controversy disputing that the transmission of HIV is improbable when the criteria are fulfilled (viral load at least six months

under the detection limit, therapy compliance, no mucosal lesions).

The situation on the public health level is different. Here there are fears that the adoption of the “viral load method” in prevention may cause a rise in the number of new HIV infections. A statement from the Southwest Pacific (Wilson 2008) on the publication of the Swiss National AIDS Commission (2008) assumes on the basis of a mathematical model that HIV positive persons with stable ART who previously practised safer sex are now doing away with condoms to a great extent. Assuming that the use of condoms under stable ART reduces the risk of HIV transmission to zero Wilson et al assume that the risk grows when only one of the two methods is used (to the residual risk level of the other). Overall this scenario could in fact give rise to a “risk increase” and therefore to a potential growth in infections based on the population – even when the risk for the individual remains negligibly low.

This position ignores various arguments.

- The criteria for using the “viral load method” are strictly worded: only relatively few persons are candidates. Since the EKAF information was published a year ago we could observe no reduction in the use of condoms.
- For twenty five years prevention has tolerated precisely this extent of residual risk by propagating the message “safer sex”. It would be beyond understanding, if an even smaller residual risk was not tolerated for the individual. In prevention we have been focusing for twenty five years on protection that one method (e.g. the use of condoms) provides, and not on the very low remaining risk.
- The prospect of being scarcely more infectious can be an incentive for people with HIV to start therapy in good time and to continue this consistently. At present, too many people with HIV are starting therapy too late, and about 30 % of the freshly diagnosed are so called “late presenters”.

Overall DAH cannot follow the fears that there may be a rise in the number of infections when the “viral load method” is used in prevention. In contrast, DAH sees an opportunity for prevention in the benefits that antiretroviral therapy provides.

3.8 Literature (extract)

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