Heroin as a Drug of Intoxication

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Heroin is a derivative of morphine, which is obtained from the opium poppy plant. Morphine is currently the most interesting alkaloid (i.e. active constituent) of the opium poppy. The fully grown, but unripe capsule of the poppy is slit open in the evening, allowing juice to run out of the capsule overnight. The next day the dried juice, now a viscous substance, is scraped off and collected. This is raw opium. Raw opium is processed chemically to obtain morphine, which in its hydrochloride form is a white, crystalline substance. Morphine has both depressant and stimulant effects on the central nervous system, which includes the brain. It suppresses pain and is thus the basis of extremely effective analgetics (i.e. painkillers). It also inhibits the cough reflex. It also has, however a range of side effects, one being its considerable addictive potential. Morphine induces calm and drowsiness, as well as euphoria and brings on a blissful mood, banishing all pain in the process. Morphine causes a general state of intoxication in which individual morphine users forget their problems, are barely aware of worries, and lose much of their sense of responsibility.

As part of its depressant effect on the central nervous system, morphine has another side effect on the respiratory centre in the brain stem, precisely in the medulla oblongata. On the first overdose, morphine impairs breathing, and may reduce the respiration rate to between two and four cycles per minute. Generally such respiratory depression occurs in novice users unaccustomed to morphine. This respiratory distress results from raising of the stimulus threshold of the respiratory centre. More precisely, the respiratory centre reacts less sensitively to a rise in carbon dioxide content and fall in oxygen content in the blood (increase in CO_2 and decrease in O_2 tension in the blood). The opiate probably causes respiratory depression by coming into contact with My-2 receptors. Morphine can, however, stimulate the central nervous system, exciting the oculomotorius nuclei and

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cause narrowing of the pupils (miosis). This is probably due to a reaction of morphine with kappa receptors.[1]

The drug Heroin is the diacetic acid ester of morphine, synthesised by acetylisation. Its chemical name is diamorphine or diacetyl morphine. Basically, Heroin shows the same effects as Morphine. It differs from the alkaloid morphine in that it quickly overcomes the blood-brain barrier and floods extremely quickly into nerve tissue of the brain. Thus the effects of heroin are felt immediately after injection and are much more intense. In particular, an intense feeling of bliss ensues moments after injecting the drug. This sudden euphoria – called the "kick" – is craved by the heroin addict but is short-lived, lasting several seconds, perhaps. The blissful feeling is thought to be roughly equivalent to intense orgasm during sexual intercourse. To obtain the "kick" each time, the heroin dose has to be continually increased. After a long period of injecting the "kick" often fails to materialise. The state now achieved after each injection of diamorphine is subjectively normal, marked by suppression of stimuli, inner calm, equanimity and indifference to any problems. In other words, a happy, contented mood arises, for which there is no actual reason. After a few hours this mellow feeling gives way to symptoms of withdrawal. A craving for a further dose of heroin develops and the body reacts to the lack of the drug with sudden onset of tachycardia, tremor, extreme nausea, vomiting, agitation, sleeplessness, headache, depression and other phenomena. To avoid this reaction, the heroin addict must have another "fix". He must inject heroin again. Instead of injecting into a vein, people are now tending to smoke the drug to avoid the risk of HIV infection, although this delays the onset of the "kick", as it takes longer for the diacetyl morphine to come into contact with brain cells via their my and delta receptors and consequently to trigger neurological/biochemical reactions. The rapid flooding caused by heroin involves a high risk of sudden paralysis of the respiratory centre in the medulla oblongata, which can be fatal.

Opium derivatives, heroin in particular, lead to rapid development of tolerance. This means that the organism of the injecting addict quickly accustoms itself to the drug. Then paralysis in the brain stem no longer occurs, because the brain has become less sensitive to

1 Julien, R. M., *Drogen und Psychopharmaka* (Illicit and therapeutic psychoactive drugs), Spektrum 1997, p. 519.

diamorphine. After taking the drug for a long time, an individual addict needs up to 500 mg, in some circumstances as much as one gram of heroin daily to achieve the desired opiate high. Due to such habituation the addict can, in principle, tolerate these high doses, although the "kick", as noted earlier, may not occur.

It should not be forgotten that, despite tolerance to heroin, the respiration rate can fall, in many cases, by about one to three cycles per minute. The average rate in humans is 14 per minute, but is reduced in a chronic diamorphine user to 12 or 11, reducing the oxygen supply; although the user is unaware of it. In reaction to the short supply of oxygen, some of the addict's body organs show impaired function.[2] This can in some circumstances kill the user. The international literature repeatedly warns that acute heroin intoxication can cause complications such as cellulitis, endocarditis, pneumonitis, rhabdomyolysis and thrombophlebitis.[3] Pulmonary oedemas, in particular, often develop due to heroin intoxication[4] and, according to Steensen et al., mortality is high.[5] Asthma and eosinophilic pneumonia are not uncommonly described as pathological consequences of heroin smoking.[6] As pulmonary oedemas form, serum liquids accumulate in the pulmonary alveoli or the interstitial pulmonary tissue, reducing lung function and causing extreme respiratory distress. Heroin-induced pulmonary oedema differs essentially from pulmonary oedema of cardiac origin and is characterised more by the porosity of pulmonary capillaries. Drug-induced diseases are often fatal, although the various medical statistics only indicate failure of the body organ concerned and hardly ever indicate a drug such as heroin as the real cause.

2 Schreiber, L. H., "Drogenabhängigkeit geht jeden was an" (Drug dependence affects everyone), *Der Allgemeinarzt,* 1998, p. 99.

3 Chan, P. et al., "Acute heroin intoxication with complications of acute pulmonary edema, acute renal failure, rhabdomyolysis and lumbosacral plexitis: a case report", in: *Chung Hua i Hsueh Tsa Chih,* Taipeh 1995, 55 (5), pp. 397.

4 Chan, P. et al., *op. cit.*, p. 397; Kohler, H. P., "Wie lautet Ihre Diagnose? Unilaterales Lungenödem nach Heroinintoxication" (What is your diagnosis? Unilateral pulmonary oedema after heroin intoxication), *Schweizerische Rundschau für Medizin Praxis,* 1994, p. 991; Wang, M.L. et al., "Heroin lung: report of two cases", *Journal of the Formosan Medical Association,* 1994 February; 93 (2), pp. 170.

5 Steensen, P. et al., "Heroin-induced pulmonary oedema", *Ugeskrift for Laeger,* 1993, September 155 (37), pp. 2866.

6 Brander, P. E. et al., "Acute eosinophilic pneumonia in a heroin smoker", *The European Respiratory Journal,* 1993, pp. 750.

These examples of disturbed function are not attributable to impurities added to the drug. They also occur when unadulterated heroin is used. Heroin is a drug which as such can cause neurological lesions, reduce lung function and damage health in many other ways. This fact remains, quite regardless of the human body's ability to adjust to its depressant, and therefore crippling, effects, and thus diamorphine, even in chemically pure form, remains a dangerous poison. State-approved dispensing of heroin to addicts under the guise of healthcare is controversial. The addict has to be warned repeatedly of the risks of disease and death, just like any other patient undergoing a surgical procedure. Quite apart from this, a junkie under the influence of diacetylmorphine is a serious danger to the public, due to drug-induced apathy and indifference. Even though he is getting chemically pure heroin, his apathetic attitude and impaired sense of responsibility render him incapable of the reasoned consideration, the weighing up of different factors, and the "fine-tuning" that is required for many activities. Junkies under the influence of diamorphine are not reintegrated into normal life. They cannot generally be reinserted into employment, at least not into a complicated work process. The ideologically/politically motivated will say that they can, but this is wishful thinking and impossible in practice.

It must also be borne in mind that the dose-effect relationship for diacetyl morphine is not constant. Several things cause it to fluctuate. Disorders of the kidneys, for example, can reduce the sensitivity of the injecting heroin addict, lowering the fatal dose threshold.[7] The amount of heroin needed for yesterday's high is too much today, due to an incipient kidney disorder, and may disable the respiratory centre, causing sudden death. A chronic heroin addict, continuously anaesthetised by heroin, has in any case lost the warning mechanisms of pain and indisposition. If he does feel unwell or suffer pain, he attributes this to early withdrawal symptoms and injects his usual dose, which is now too high, as the illness has affected his sensitivity; and thus he risks death from respiratory paralysis.

Even quite transient physical conditions, and trivial everyday changes in the user's state of health, may considerably alter the dose-effect relationship. Several factors influence the effect of a substance such as her-

7 Forth, W. et al., *Pharmakologie und Toxicologie* (Pharmacology and toxicology), 1993, p. 209.

oin on the human organism, although these are not individually measurable and not yet accessible.[8] In this context, it must not be forgotten that the fluctuating dose-effect relationship remains a danger, irrespective of the purity of the heroin, in cases where the heroin user's sensitivity has been affected by illness. Indeed diamorphine dulls sensory input and suppresses stimuli: effects which are linked to changed requirements and to analgesia. The drug alters the user's perception of health and hygiene. If something causes no pain it is ignored – this very indifference being due, notably, to heroin's stimulus-suppressant effect. Subjectively, problems are regarded as solved and difficulties as overcome. But it is precisely in this indifference that danger lurks: danger, that is, to the public at large. Suppression of stimuli affects the heroin user's sense of responsibility towards others and towards his environment. As a motorist, for example, he perceives hazards differently, if at all. All his other actions are ruled by indifference and irresponsibility. A person under the influence of heroin does not lead a normal life.

Insulated from external stimuli in this way, people are in every respect a danger to others.

Opiates such as heroin react with receptors in the brain, located on nerve cells, by triggering in the mesolimbic dopaminergic system the typical phenomena of addiction. These receptors are by nature not adapted for foreign matter such as opiates, but for reaction processes with the body's own morphine-like substances.[9]

Endorphins and enkephalins are amino acid compounds with properties very similar to those of morphine or heroin. They can also induce dependence and euphoria and remove pain. They are formed by the body in physiological quantities and for short periods, when under extreme stress such as injury or intense stimulation, in order to restore calm and equanimity. The body then immediately breaks them down again. Their true significance is not yet understood. But opiates such as diamorphine taken into the body certainly invade this internal endorphin-enkephalin system, chiefly in the central nervous system, and suppress the body's own functions in nerve cells. Heroin changes the

8 Forth, W. et al., *op.cit.*, p. 6.

9 Schreiber, L. H., "Pathologisches Glückspielverhalten unter dem Aspekt neurochemischer Erkenntnisse" (Pathological gambling in the light of neurochemical findings), *Sucht*, 1994, p. 359, 360.

neurological and consequently the mental processes in the brain. That such continual effects have pathological consequences for the brain as a whole is hardly surprising. A study published a few years ago listed a whole series of neurological functions impaired by heroin. Resulting symptoms included deep unconsciousness, cerebral haemorrhages, cerebral oedema with pressure effects, seizures, severe vision impairment, and psychoses.[10] The international literature also mentions leucoencephalopathy, myelopathy and polyneuritis;[11] in other words neuronal degeneration can result. The dosages concerned are not high enough to lead to respiratory failure and death. To what extent they result from shortage of oxygen is still unknown.

It is in any case interesting that the brain's mesolimbic dopaminergic system, indeed its limbic system as such, plays a crucial role in forming impulses, emotions, motivation and other affective mental processes. Young people in particular are subject to strong emotions and at the mercy of their feelings, needing to act them out, which is why they resort to substances which act on the brain area in question. Intoxication with opiates is not the same as the intoxication of sexual desire, but it, too, changes the world of emotions.

The miosis already mentioned, or narrowing of the pupils, results from excitation of the parasympathetic nervous system. All opiates such as heroin and morphine reduce the aperture of the iris and impair the user's night and twilight vision. The habitual user under the constant effect of heroin cannot remember having had better vision and so does not notice this. This is another danger that opiate users constitute to the public. No tolerance develops in respect of pupil diminution, as it stems from excitation of the parasympathetic nerves. Tolerance develops only to the depressant effects on the central nervous system.[12] Miosis therefore occurs as a matter of course, the extent of pupil diminution depending on the quantity of drug taken.

Heroin is thus a dangerous, addictive drug, which seriously impairs the health of the user, and in individual cases can kill. If diamorphine is taken together with other substances, these additives can obviously

10 Blanke, J., Kömpf, D., "Ischämischer Infarkt nach Heroininjektion" (Ischaemic infarction after heroin injection), *Sucht*, 1995, p. 4, 6.

11 Chan, P. et al., *op. cit.*, p. 397, 399.

12 Forth, W. et al., *op. cit.*, p. 207.

lead to further complications and to death. Substances with which heroin is mixed include glucose, powdered milk and other household products, gypsum, and the spasm-inducing poison strychnine. It goes without saying that these substances, strychnine in particular, greatly increase the risk of death.

Finally, something should be said about accelerated opiate withdrawal under anaesthetics by use of opiate antagonists Naloxon or Naltrexon. Whereas conventional detoxification lasts from a few days to as much as three weeks, accompanied by severe and much-feared physical withdrawal symptoms, this procedure can be carried out in roughly 24 hours in an intensive care unit. The patient is under full anaesthetic and feels nothing of the forced withdrawal.[13] Once the patient has been detoxified, treatment is continued with opiate antagonists which occupy the appropriate receptors in the central nervous system, preventing any more injected diamorphine from reacting with them. This therapy cannot be unreservedly recommended, as it does not remove the long-lasting psychological effects of withdrawal. The craving for the drug remains and can be overcome or attenuated only by psycho-socially oriented dehabituation. The psychological symptoms of withdrawal are, after all, the really agonising part of the treatment of addiction. When, on the other hand, the client has been through physical withdrawal, with the typical symptoms described above, he has already notched up one success, which then strengthens him and gives him courage to face the pressures of psychological withdrawal and fight the craving. Ultimately it all comes down to will-power and strength of mind to stay off the drug.

Bearing this in mind, rapid physical withdrawal, so-called turbo-withdrawal, must not be recommended to addicts without caution. Provided that heroin addicts have retained a degree of mental stability this treatment may be appropriate and contribute to a successful outcome. In other cases help and cure can only be achieved by the painful journey of classical physical withdrawal, with all its disadvantages, followed up with long-term measures to combat the craving for the drug.

The addict's personality has to be rebuilt and reinforced. This means hard work and agony for medical staff and client alike. But in numerous cases it has proved the only way to success.

13 Tretter, F., "Von der Phantasie, die Sucht auszuschlafen" (The fantasy of sleeping addiction off), *Münchener Medizinischer Wochenschrift*, 1996, 6, p. 26/76.