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## Skull-brain trauma and alcoholism

by

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In recent years, there has been a steady increase in the number of cases of craniocerebral injuries. The chief cause of this frightening increase in these serious injuries is traffic accidents. In the great majority of the accidents, the original cause of the accident is to be sought among the persons who take part in the street traffic. The personality changes brought about by alcohol appear to play a rather significant role here.

According to H. Hoff, alcoholic intoxication leads to dysfunction of ganglion cells, affecting especially the large pyramidal cells of the motor area and the Purkinje cells and also pyramidal cells of other brain regions, especially of the frontal lobe. This results cerebellar disturbances, lengthening of the reaction time, abolition of inhibitions, and a pronounced discrepancy between desire and ability. All of these changes that we have mentioned lead to a readiness for involvement in accidents.

Schweitzer is of the opinion that the chief effect of alcohol on young drivers is that it rids them of inhibitions and causes them to drive more rapidly, thus bringing about more serious accidents. In older drivers, according to this author, alcohol causes a reduction of visual power and acuity and a disturbance of combination, coordination, and concentration.

Elbel also indicates that accidents are less likely to result from states of serious drunkenness than from the incipient action of small amounts of alcohol and slight states of confusion in drives of single- or double-track vehicles. A state of inability to drive well often develops after ingestion of small amounts of

alcohol, at a time when the driver himself believes that he is still perfectly able to drive well and when he does not even present a drunken appearance externally.

The alcoholized person is not in danger only of injury from the traffic accident in which he may participate actively or passively. He may also be threatened by a fall or even a beating as he moves from the place where he has ingested alcohol to the place where he sleeps, and the result is most often a head injury. The person who is actively involved in a traffic accident also endangers other persons in the flow of traffic.

There is reason to believe that the percentage of accidents in which previous consumption of alcohol plays a role is considerably greater than indicated by the official figures. This, of course, is especially true of traffic accidents. A principal reason for this is the fact that in most cases there is no detailed investigation of the degree of intoxication. In the second place, an apparent soberness is often to be seen after an accident, and of course there is often a fairly long interval between the accident and the medical examination. Determination of the alcohol in the blood is the legally recognized method of ascertaining the degree of intoxication. In Austria, however, blood may be withdrawn from this test only with the permission of the injured person. In practice, this test is often refused by the intoxicated person. In practice, then, systematic investigations of the blood alcohol picture, which are of particular forensic interest to the physician, are almost never made. Hence, the official-looking figures are based largely on the findings of the police, who see the injured persons either at the scene of the accident or in the ambulance, or else question the attending physician about possible alcoholic intoxication.

We have collected the clinical material of the accident station of the Second Surgical University Clinic in Vienna and screened out all the cases of skull and skull-brain injuries in order to ascertain to what extent the patients were intoxicated with alcohol at the time of their admission. The figures relate to the years 1957, 1958, and 1959, as well as a random month of 1960. The injured persons who were delivered to the accident station and treated as inpatients were mostly victims of traffic accidents or injuries incurred on the street.

It must also be pointed out that alcoholic intoxication was entered officially in the ambulance book up to the end of 1957. Only circumstances of moderate to severe alcoholic intoxication were recorded, while "tipsiness" was disregarded. The designation



"intoxicated" was applied by the physician on duty on the basis of his personal observations and extensive experience, on the basis of the typical behavior in alcoholic intoxication if the subject is conscious, in addition to such signs as the odor of alcohol on the exhaled breath or in the vomitus and the corresponding case-history or external data. In the case of persons with severe skull-brain injuries delivered in an unconscious state, the diagnosis of alcoholic intoxication was established largely on the basis of data obtained outside the medical history but also from an odor of alcohol on the exhaled breath or in the vomitus.

For a better analysis of the material, we made a more careful evaluation of the cranial injuries of intoxicated males, especially since the number of intoxicated women who were delivered with cranial injuries was small, as might have been expected. We have gone only briefly into other types of injuries incurred by intoxicated persons.

In 1957, the total number of patients attended with head injuries was 515, of whom 325 (63%!) were intoxicated. Of these 515 patients, 146 persons with cranial injury had to be hospitalized because of the severity of their injuries. Of these, 37 (25%) exhibited alcoholic intoxication at the time of their admission (see Table 1).

Kept under observation in the hospital for 24 to 48 hours were 267 patients, of whom 265, or 99%, showed alcoholic intoxication.

The observation cases were injured persons who required only brief inpatient observation and treatment. The chief reason for the brief admission as inpatients is precisely that drunken persons who have been injured do require careful observation and repeated re-examination, since the initial examination of a person in a confused state is usually difficult and does not yield accurate results. Some of these briefly admitted patients required more prolonged treatment, since the follow-up study revealed the presence of neurologic functional disturbances or the development of an intracranial hematoma. In some few cases, the original suspicion of alcoholic intoxication had to be dropped. Reasons for this were severe postcommotional states of confusion or Kretschmer's orbital-cerebral syndrome.

The third group consisted of persons with head injuries under ambulatory treatment, a total of 102 patients, of whom 23, or something more than a fifth, were intoxicated.

We see from this review that approximately one fourth of the persons injured in accidents with severe skull-brain trauma in 1957 were drunk. The percentage of the intoxicated persons with less severe head injuries was significantly higher by comparison and amounted to about 87% in our material for the same year. The percentage of drunken persons in the group with severe skull-brain injuries showed good agreement with the observation reported by K. Meyer, who found that every fifth person among 150 cases of covered craniocerebral injury was intoxicated.

An enumeration of the intoxicated subjects in 1957 with other injuries does not yield any reliably comparable statistics. For this reason, we selected a random month of 1960 in order to make a survey, and we shall return to it later.

On the other hand, there were far fewer intoxicated women with cranial trauma in the statistics for 1957. Of the total of 249 women with head injuries during this year, only 45 were intoxicated. There were no severe injuries among these cases that made hospitalization necessary. It should be mentioned in passing that there were 5 attempts at suicide during alcoholic intoxication in this group.

The comparative figures for 1958 show an entirely different picture (see Table). It should be mentioned that in the course of this year, because of an objection, the notation "intoxicated" was entered only in certain individual cases in the ambulance book, and this specifically when a definitely elevated blood alcohol level was found. Since an official remark in the ambulance book of the accident station corresponded to a diagnosis, such an entry was legally equivalent to an expert opinion, and this could have far-reaching consequences. An expert opinion should not rest exclusively, however, on more or less subjective observations.

Among the 518 persons with cranial injuries in 1958, only 49 patients were entered as intoxicated. The 181 persons who were hospitalized included 33 who showed signs of intoxication at the time of their admission. Of the 216 observation cases, 16 were noted as intoxicated, while there were no recorded cases of alcoholic intoxication among the 121 who received ambulatory treatment.

We see from these figures that the percentage of intoxicated persons among the subjects with skull-brain injuries who received inpatient treatment during 1958 had dropped only slightly from the figures for the preceding year, and the number of



intoxicated persons with slight head injuries could not be ascertained. The large number of observation cases, for whom the criteria for admission remained the same, indicates that again in this year at least 50% of the persons with slight head injuries were intoxicated.

In 1959, the notation "intoxicated" was omitted only in individual cases. Of the 568 persons with head injuries, 230, or 42%, were found to be drunk at the time of their arrival. Of the 176 patients who were hospitalized, 36, or one-fifth, were intoxicated. Of the 258 observation cases, 176 were designated as "intoxicated." Of 134 who were treated as ambulatory patients, 18 were drunk (see Table 1).

The review for the year 1959 shows that in about a fifth of the cases of severe skull-brain injuries the subject had been intoxicated at the time of the injury, as compared with approximately half the patients with slight injuries to the head. A comparison of the observation cases with the cases of slight head injury showed that when the number indicated as definitely drunk among the group of subjects treated as ambulatory patients was added to that of the observation cases, of whom more than 90% were delivered in a drunken state according to the criteria indicated above, we obtained a value of about 65%.

If we now consider the findings for 1957, 1958, and 1959, we find that from 1/4 to 1/5 of all male patients with severe skull-brain injuries, among which we include diagnostically such conditions as severe concussions, cerebral contusions, damage to the brain stem, severe cranial fractures, and also intracranial hematomas and the few cases of open craniocerebral injuries, were drunk at the time of the accident. On the other hand, 87% of the patients with slight head injuries in 1957 were found to be intoxicated, while in the other 2 years they gave a figure of more than 50% according to the criteria that we have set forth. The number of female patients with craniocerebral injuries who were intoxicated was very small.

In order to obtain very accurate figures for purposes of comparison, we very recently took March 1960 as a random month and carefully examined the injured persons who were delivered as to a possible state of intoxication. Here again, the criteria of intoxication were the same as those already stated above. The usual figures for this month showed that these corresponded to the average and that the seasonal alcohol consumption could not be taken as elevated.

From March 2 to March 30, 1960, the accident station of the Vienna University Second Surgical Clinic treated a total of 1,102 patients with a great variety of injuries. These included 562 men and 540 women. Of the 562 males, 82 patients, or 14%, were found to be drunk at the time of their arrival. On the other hand, only 6 of the 540 women were intoxicated. From these comparative figures, we see that among the males delivered for treatment almost every 7th person showed signs of a moderate alcoholic intoxication. Expressed in figures, an average daily case load of 37 men included 5 who were drunk! Injuries to the head represented the largest contingent among the men who were brought to the station in a state of alcoholic intoxication. There were 58 such cases among the total of 82, that is, more than 2/3, of whom 14 had suffered severe skull-brain trauma. Most of the other 24 had injuries to the extremities, especially the legs. Of these 562 male patients, 59 were hospitalized as inpatients, 31 because of craniocerebral trauma, and 14, that is, somewhat less than half of them, were in a state of alcoholic intoxication. In the month of March 1960, 68 patients were seen with craniocerebral injuries.

The particularly careful study of the possible alcoholic intoxication of the patients who were brought to the accident station for treatment showed that about 14% of all the injured men were drunk. The largest contingent of these represented persons with cranial trauma (more than 2/3). More than 90% of the men with slight head injuries who were examined during this random month were found to be in a state of alcoholic intoxication. Although these statistics are small, we can see from them that a shockingly large number of men are injured while drunk, and the greater number of them have head injuries.

After having examined the involvement of intoxicated persons in cranial traumas, it seemed necessary for us to gain some insight into the nature of the head injuries.

Of the 325 intoxicated patients who suffered head injuries, 243 had mild injuries in the form of cranial contusions, lacerated and contused wounds on the forehead, supraorbitally or occipitally, or hematomas in the region of the galea or face (see Table 2). Concussion was noted in 65 intoxicated persons, representing more than 1/2 the total number of concussions reported in 1957, 4/5 of which were mild. Of the more severe craniocerebral injuries with concussion or fracture of the base, 1/3 to 1/6 were intoxicated. Of the 35 cases of cranial fracture, 7 were found to be intoxicated (Table 2).



In 1958, the relations of the severe craniocerebral injuries with respect to alcoholic intoxication remained approximately the same, while the comparative figures for head or skull-brain injuries of medium severity were not evaluable this year for the reasons that we have already indicated. The same may be said of the year 1959, although to an even lesser degree.

Among the serious injuries incurred by intoxicated persons which made hospitalization necessary, injuries to the head were by far in first place. Only a fifth of the members of this group who were hospitalized, totaling 9 out of 46 men, showed injuries of other parts of the body without involvement of the head.

As we see from a review of the kind of injuries found among intoxicated males, mild head injuries were in first place.

The principal cause of death among intoxicated persons with skull-brain injuries was extensive crushing of the brain, found in all the 17 patients who died in the years 1957 to 1959: the total number of persons with severe skull-brain injuries during these 3 years was 97. Although we cannot go into greater detail, it is interesting to note that 10 of the 17 who died exhibited fractures of the base of the skull, some of them severe. In 7 cases there was a subdural hematoma, in 1 instance bilateral; in 4 cases the autopsy revealed hemorrhages in the brain stem in addition to extensive foci of contusion.

In Table 3 we have investigated and categorized the nature of the accidental injury suffered by the patients, considering only the 97 cases hospitalized with severe craniocerebral trauma in the years 1957 to 1959. It was found that the majority of the patients had incurred their serious injuries in traffic accidents, that is, more than half the cases, although a relatively large number were attributable to a fall while in a state of alcoholic intoxication.

Table 4, in which the men admitted as inpatients in 1957 were compared with the observation cases for the same period, gives a very clear picture of the kind of accident. The ambulatory cases were not included. Here again the cases of the traffic accidents represented the largest contingent. It was found that the serious head injuries of the intoxicated men came about as a result of traffic accidents, while the less serious injuries came about largely as a result of

falls while in a state of intoxication.

On the basis of our clinical material, we studied the intoxicated persons who had suffered head injuries in order to discover the participation of chronic alcoholics and get a picture of the effects of the trauma and of the degree of injury.

Among the 97 intoxicated patients admitted during the 3 years from 1957 to 1959 to the accident station with severe covered skull-brain traumas, 27 were found to have a confirmed diagnosis of chronic alcoholism. These patients were almost always more than 50 years of age, with a mean age of 58 years. Ten of them had cerebral concussions, and 12 had cerebral contusions, sometimes with signs of damage to the brain stem. Five patients had subdural hematoma, 2 of them despite surgical removal. All 4 also exhibited skull fractures.

It is evident from this that among the chronic alcoholics who were hospitalized, almost all were older patients who had suffered serious injuries, and that the mortality was very high. Skull fractures, especially of the base, were very common. Careful examination of the medical history showed that the trauma itself was often relatively slight, despite the severe injury. Thus, among the 27 seriously injured chronic alcoholics, 12 fell while intoxicated and only 4 were injured during a scuffle.

Of the 27 seriously injured chronic alcoholics, 5 exhibited delirium, 4 of them in the form of delirium tremens and 1 as an arteriosclerotic state of confusion. Two of these patients, who had also had fractures of the base of the skull, died, bringing the number of deaths to 10, that is, more than a third. On the other hand, that is, 1/10, only 7 of the other 70 intoxicated patients with severe skull-brain trauma died during the years in question.

When we consider intoxicated persons, we must distinguish basically between occasional intoxication and chronic alcoholism; and the second group must in turn be divided (according to H. Hoff) into chronic alcoholics who have already experienced irreversible physical and mental damage and the chronic misuse of alcohol.

We have now sought to break down the cases of intoxicated persons with skull-brain injuries according to their ages, in order perhaps to be able to say something about the participation of the individual groups of intoxicated subjects. The figures again refer to the intoxicated persons of 1957.



As we see in Table 5, the older patients most often received their head injuries by falling while intoxicated. The mean age was about 60 years. The majority of these patients came with slight head injuries from these falls and did not require any prolonged inpatient treatment (see Table 5). The only exception to this is the case of the chronic alcoholics, as we have mentioned earlier.

When we divided the persons injured in traffic accidents into active and passive traffic participants (Table 6), we found a distinct age shift among the former at a mean age of about 30 [tr.: this is not clear]. It should be noted that 14 of these younger patients had fallen from a "moped" [tr.: motor scooter?]. The patients who had been knocked down by a motor vehicle showed a definite shift toward the older age groups.

As we have already mentioned in the discussion of the chronic alcoholics with skull trauma, the mean age among our patients was about 58 years. Only 1 patient with chronic alcoholism was less than 35 years old. Hence, we may conclude (with some reservations) from the present figures that, as we should naturally be inclined to assume, the chronic alcoholic falls or is knocked down when he is intoxicated, while young persons are primarily involved in active traffic accidents, and the majority of these may be assumed to be occasional drinkers. As we see from Table 7, younger persons were most likely to be involved in brawls, and these also gave the most serious injuries.

A survey of the total figures for the year 1957 shows the existence of 2 peaks in the age distribution among the males with head injuries who suffered their injuries while intoxicated, one of them at about 35 years and the other at about 55 years, with the numerical preponderance in the second age group (see Table 8). In this table we have considered only the patients who had been treated as inpatients for a longer or shorter time and the circumstances of those accidents had been clearly established (a fall while intoxicated, traffic accident, brawl). The participation of severe skull-brain injuries, however, was approximately the same in both age groups.

As we see from the review of the age distribution, the intoxicated older man is in greater danger of incurring head injury. The principal cause is a fall while intoxicated. In the majority of cases, this results in slight injuries, but in a small fraction, mostly among chronic alcoholics, serious injuries occur in spite of the slight trauma.

In the present summary, we have attempted to gain some insight into the problem of persons who have been injured in accidents while intoxicated. It is very difficult to confirm the fact that a patient was intoxicated at the time of an accident, and the figures obtained are often highly contradictory. It is evident from the present material that the number of women who injured themselves while intoxicated was small, and the injuries were always slight. among the males, it was found that 1/4 to 1/5 of the patients with severe skull-brain injuries were in a state of alcoholic intoxication at the time of the injury. A shockingly large percentage of the slight to moderately severe head injuries, definitely more than 50% and in accurate studies over 80%, occurred among intoxicated persons. Accurate counts in a random month revealed that approximately every 7th man was intoxicated at the time of his treatment, and 2/3 of them had suffered head injuries. The injuries to other parts of the body were far fewer than the injuries to the skull among the intoxicated.

In terms of the kind of injury, slight injuries to the head represented about 76%, and the presence of extensive brain crushing and damage to the brain stem was found to be the principal cause of death among the persons with severe skull-brain injury. Chronic alcoholics represented a particularly large percentage of the persons with severe skull-brain injury and showed a high lethality. Intracranial hematomas were especially frequent.

In terms of the kind of accident, the statistical review showed that in the majority of instances the intoxicated persons had suffered severe skull-brain trauma in a traffic accident, while most of the slighter head injuries had taken place when the subject had fallen while drunk. The age breakdown reveals that the majority of head injuries come about through falls while intoxicated and are suffered by older persons, probably most of all chronic alcoholics. The trauma itself may be slight among chronic alcoholics and yet give rise to serious injuries. Younger persons are especially often involved in traffic accidents and appear most often to be seen as occasionally intoxicated.

Although, as we have already indicated in the introduction, it is very difficult to get an accurate picture of the involvement of intoxicated persons in accidents, especially traffic accidents, the present material shows definitely that a frighteningly large percentage of intoxicated persons suffer head injuries as a result of accidents. Injuries very



often occur in traffic accidents.

#### Summary

Cases from the accident station of the Vienna Second Surgical University Hospital were studied in order to determine the connection between alcoholic intoxication and head injuries or skull-brain trauma. For special reasons that are discussed above, only the year 1957 and a random month, March 1960, were statistically evaluable, of the years 1957, 1958, and 1959. The number of intoxicated patients with head and skull-brain injuries was strikingly high. Of the 515 men with head injuries in 1957, 325, or 63%, were intoxicated. Of those with severe skull-brain injuries, 25% were intoxicated at the time of their arrival. On the other hand, only a small percentage of the women with head injuries were in a state of alcoholic intoxication.

With regard to the nature of the injury, it was found that slight injuries to the head, such as cranial contusions and contused-lacerated wounds, were particularly common among the older patients. Of 97 persons with skull-brain injuries who were treated while intoxicated during the years 1957 to 1959, 17 died, 10 of them were chronic drinkers, a total of 27 had incurred serious skull-brain injuries. As we have seen, the death rate among the chronic alcoholics was very high, while it was no higher among the occasionally intoxicated than among the unintoxicated.

In terms of the nature of the accident, it was found that the most common cause of slight head injuries was a fall while in an intoxicated state, while traffic accidents were in first place among the causes of serious skull-brain injuries. A breakdown by age groups revealed that the older intoxicated persons usually incurred their injuries either by falling while drunk or as passive participants in traffic, while the younger intoxicated persons, who were probably, for the most part, persons who occasionally got drunk, suffered their head injuries as drivers of or passengers in motorized vehicles. Injuries to other parts of the body were much less common in the present material.

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Table 1

Total number of men with head and skull-brain injuries and number intoxicated. First column, reading down: Number of persons with head injuries treated. Hospitalized. Observation cases. Treated as outpatients. "Alk." = "Intoxicated."

Tab. 1. Gesamtzahl der Kopf- und Schädel-Hirnverletzten (Männer) und Zahl der Alkoholisierten

	1 9 5 7			1 9 5 8			1 9 5 9		
	Alk.	%		Alk.	%		Alk.	%	
Zahl der behandelten									
Kopfverletzungen	515	325	63	518	492	?	568	230	42
stationär behandelt	146	37	25	181	33	18	176	36	20
Beobachtungsfälle	267	265	99	216	162	?	258	176	66
ambulant behandelt	102	23	22	121	0	0	134	18	13

Table 2

Nature of skull-brain injuries (men) and number intoxicated. "Zusammen" = "Total."

Tab. 2. Art der Schädel-Hirnverletzungen (Männer) und Zahl der Alkoholisierten

	1 9 5 7		1 9 5 8		1 9 5 9	
	Alk.		Alk.		Alk.	
Contusio capitis						
five vuln. lac. cap.	329	243	277	177	353	179
Contusio cerebri	101	65	149	162	139	60
Fractura cranii	35	7	39	4	35	8
Fract. baseos cran.	33	5	22	5	29	11
Contusio cerebri	17	5	31	7	12	2
Zusammen	515	325	518	492	568	230



Table 3

Nature of accident. Intoxicated patients (men) treated as inpatients. First column, reading down: Traffic accident. Fall while drunk. Brawl. Work accident. Total. Deaths.

Tab. 3. Art des erlittenen Unfalles. Stationär behandelte, alkoholisierte Patienten (Männer)

	1957	1958	1959	Zus.	Tote
Verkehrsunfall	23	16	14	53	10
Sturz im Rausch	10	12	11	33	6
Rauferei	4	4	2	10	1
Arbeitsunfall	0	1	0	1	0
zusammen	37	33	27	97	
Tote	6	6	5		

Table 4

Nature of accidents suffered by all the head- and skull-brain-injured men in 1957. Column headings, left to right: Hospitalized as inpatients: intoxicated, total. Observation cases. Hospitalized and observed cases. First column, reading down: Traffic accident. Fall while intoxicated. Brawl. Not clear.

Tab. 4. Art des erlittenen Unfalles, auf die Gesamtzahl der kopf- und schädel-hirnverletzten Männer des Jahres 1957 bezogen

	Stationäre Aufnahmen			Beobachtungs- fälle			Aufnahmen u. Beob. Fälle		
	Alk.	zus.		Alk.	zus.		Alk.	zus.	
Verkehrsunfall	103	23	126	2	70	72	105	93	198
Sturz im Rausch		10	10		129	129		139	139
Raufhandel	1	4	5		44	44	1	48	49
ungeklärt	5	0	5		22	22	5	22	27
zusammen	109	37	146	2	265	267	111	302	413

Table 5

Head injuries by falls while drunk (men, 1957, 139/10 seriously). Ordinate: Number. Abscissa: Age (years).  
At upper right: Observation cases; Hospitalized as inpatients.

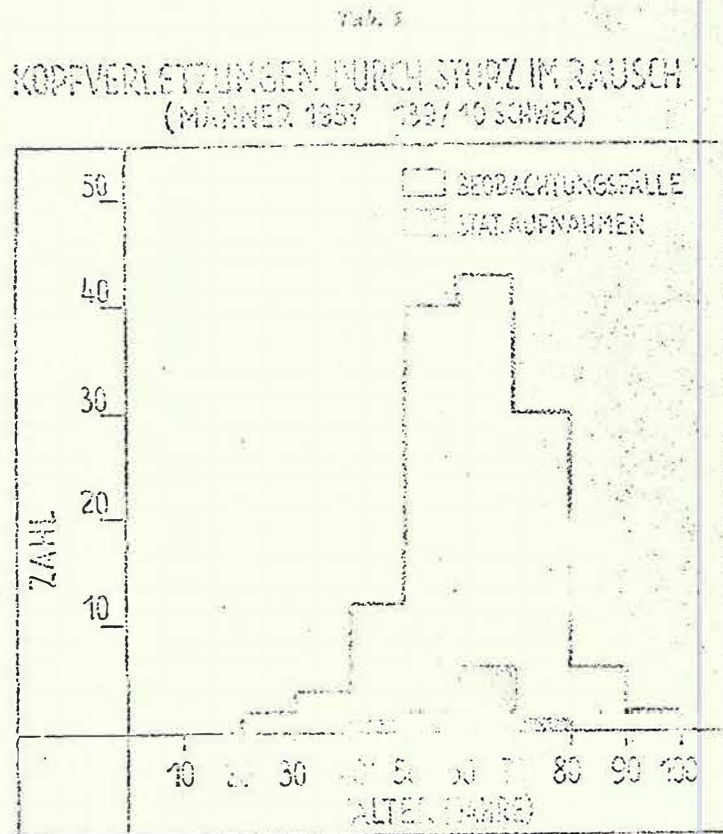


Table 6

Head injuries incurred by intoxicated persons in traffic accidents (men, 1957, 93/23 seriously).  
Top left: Actively.  
Top right: Passively.  
Ordinate: Number.  
Abscissa: Age (Years).  
Above middle of graph: Observation cases.  
Admitted as inpatients.

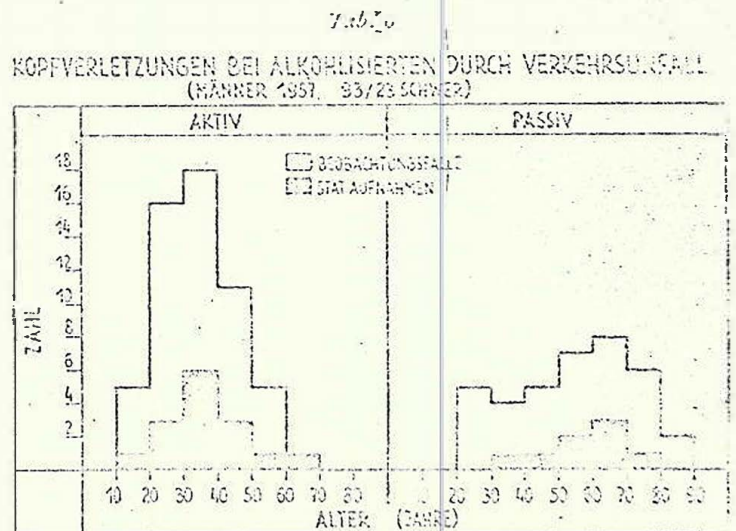




Table 7

Head injuries during brawl while in a state of alcoholic intoxication. (men, 1957, 48/4 seriously. Upper right: Observation cases. Admitted as inpatients. Ordinate: Number. Abscissa: Age (years). Upper right: Observation cases. Admitted as inpatients.

Tab. 7

KOPFVERLETZUNGEN DURCH RAUFHANDEL  
IM ALKOHOLRAUSCH.  
(MÄNNER 1957, 48/4 SCHWER)

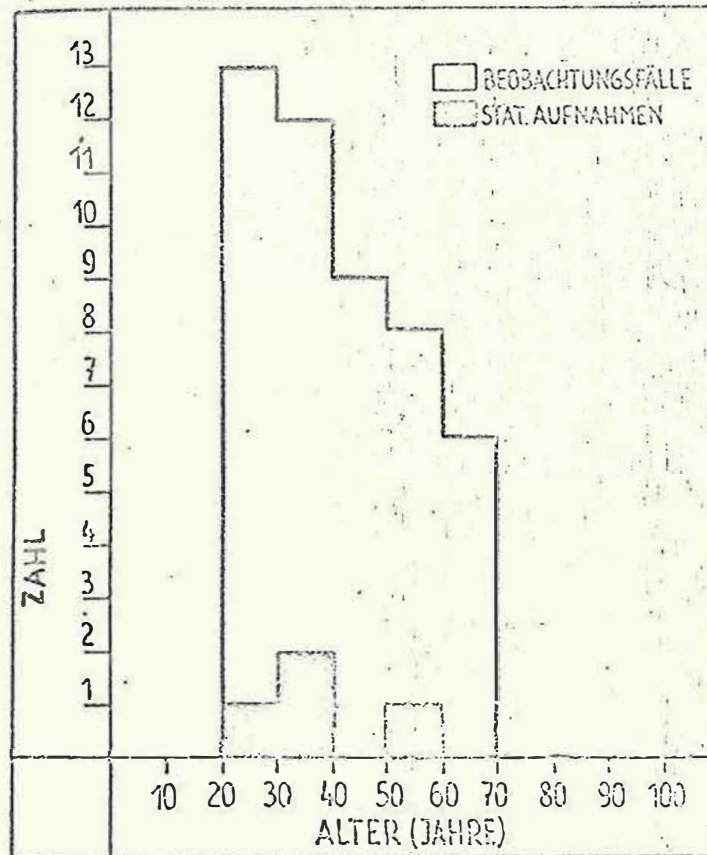
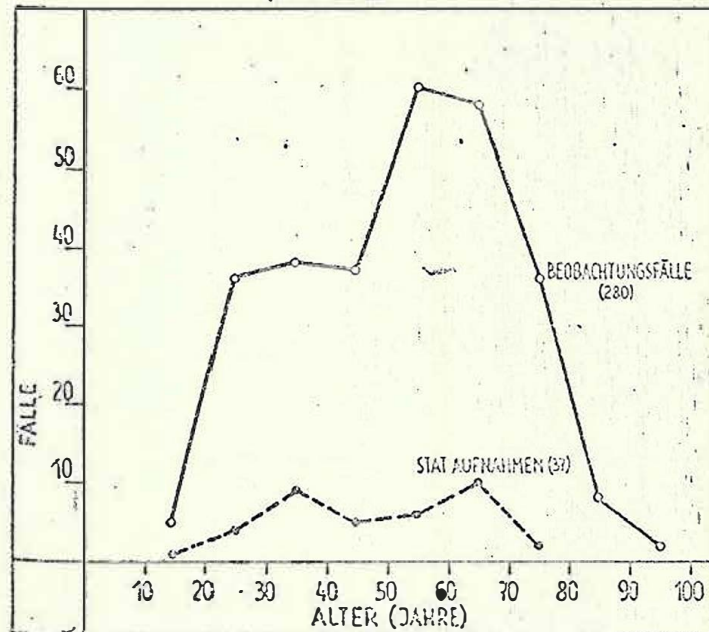


Table 8

Number and age of intoxicated persons with head injuries in 1957 (men). Ordinate: Cases. Abscissa: Age (years). Upper curve: Observation cases. Lower curve: Admitted as inpatients.

Tab. 8

ZAHLE ALTER DER ALKOHLISIERTEN KOPFVERLETZTEN 1957  
(MÄNNER)



PDePorte, Translator  
7/17/69