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ALCOHOL AND PNEUMONIA.

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THE action of alcohol on the different organs of the human body has been investigated so carefully and systematically that it almost seems impossible to add anything new on the subject. Looking over the literature we find abundant evidence of careful study of the question in its bearing upon heart, brain, liver, kidneys, and the digestive tract; but, strange to say, the lungs have apparently escaped attention, although a few straggling notices hinting at the true relation between alcohol and the respiratory organs have been published at different times and in different countries. As early as 1855 Dr. B. Cohen (*Zeitschr. für klin. Medizin*, Breslau, 1855, p. 401) maintained that the abuse of alcoholic drink is a strong predisposing cause of death when the drinker is attacked by pneumonia. Out of fifty-seven such cases treated at the Breslau Hospital, twenty-four died. Another notice confirming this statement is given by Dr. William Osler in a report on pneumonia in the Pennsylvania Hospital. According to this authority, pneumonia is, as a rule, fatal if a drinker is attacked when under the influence of alcohol; if cases of chronic alcoholism are excluded, the death-rate for that disease in the

Pennsylvania Hospital, 29 per cent., would be only 8 or 10 per cent. A few reports are on record of autopsies made on children who died after drinking large quantities of strong drink, stating that the lungs were dark and congested, but no experimental evidence has been given as to the action of alcohol in the production of pathologic conditions of the lung-tissue.

In order to determine this question I made a series of experiments during the winters of 1890, 1891, 1892 and 1893, and the results are embodied in this report.

The animals used were dogs, male and female, mongrels of very mixed origin, picked up from the streets by the city dog-catchers. They ranged in weight from fifteen to twenty-five pounds, and were all apparently in good health, if voracious appetites and strong fighting propensities can be accepted as indications of physical well-being. Twelve animals were used during 1890–91, ten the following winter, and nine during the winter of 1892–93.

The experiments were simple. The animal, carefully etherized, received an injection of a quantity of commercial alcohol, varying from one dram to one ounce, into the trachea just below the larynx, by means of a large hypodermic syringe. After the narcosis had passed away the symptoms were noted, from hour to hour first, from day to day later, and post-mortem examinations made after a certain time, varying from half an hour to four weeks, gave evidence of the internal conditions of the respiratory organs.

The general symptoms were invariably the same,

differing in severity only according to the quantity of alcohol given and the age, weight, and strength of the animal experimented upon. The terms age and strength are used guardedly, for the temptation is strong to say "idiosyncrasy;" otherwise it is difficult to account for the different effects produced by equal quantities of alcohol upon dogs of the same weight. For instance, two dogs, each weighing twenty-five pounds, were treated with a dose of two drams each, and one died after one hour, and the other after six hours; while two other dogs of twenty-four pounds weight, and two more weighing respectively fifteen and eighteen pounds, received the same quantity, two drams each, and all four survived and were as well as ever after four weeks. One dog, weighing eighteen pounds, died in five minutes after receiving two drams of alcohol, while another, of fifteen pounds weight, took *one ounce*, and recovered.

So, whether there is a similar idiosyncrasy in dogs as there is in men, or whether the differing results were due to age and strength of the animal, is an interesting question open to discussion.

The symptoms in all dogs experimented upon were alike and as follows: difficulty in breathing, increasing with the advance of the inflammation set up in the respiratory passages by the action of the alcohol, until it finally resembled a wheezing noise and called into activity all the accessory respiratory muscles; stethoscopic examination gave evidence not only of the difficulty which the air encountered in trying to force an entrance into the bronchial tubes and air-vesicles, but also of the

tumultuous beating of the heart while attempting to drive the blood through the capillaries of the lung. Copious expectoration of a bloody, frothy mucus indicated the progress of the disease.

As the animal weakened it usually pressed itself against the wall of the room with the thorax as much as possible resting on the floor, and displayed a constant desire for cold water, probably due to the feverish condition induced by the inflammation. No temperatures were taken, for after three thermometers had been broken by the struggles of the animals the attempt to gain correct information on that point was abandoned.

Post-mortem examinations always showed the lungs dark and congested, solid in some places, so solid indeed that these parts sank when thrown into water.

Cutting into the lung, the air-passages were found to be always filled with bloody frothy mucus; even the animal that died five minutes after the injection presented the same symptoms. The lungs were dark and congested and full of bloody mucus, showing the rapidity of the inflammatory processes and clearly demonstrating how *acutely sensitive the respiratory passages are to the action of alcohol.*

There is probably no danger of meeting contradiction when we define pneumonia as an inflammation of the lung-tissue; whether of bacterial or traumatic origin, of lobar or lobular form, need not concern us here, as long as we are satisfied that these inflammatory processes produce the phenomena observed in the respiratory passages during an attack of the disease.

Alcohol introduced into the lungs of dogs sets up a pneumonia more or less severe. Whether we call it a traumatic pneumonia, or a broncho-pneumonia, or coin a new name for it, will not change the fact.

On microscopic examination of such lung-tissue the air-tubes and vesicles are found to be partially or completely filled with immense numbers of red and white blood-corpuscles and large quantities of mucus, and present the same picture as that obtained from a slide made from the lungs of a child that died from broncho-pneumonia, and although one is from a human being, the other from a dog, the former representing a well-known type of disease, the latter an artificial form, the similarity between the two is certainly striking enough to prove that the pathologic condition of the lung-tissue is the same in both, and that the alcohol has induced inflammatory processes very closely resembling, if not absolutely like, those found in attacks of broncho-pneumonia in human beings.

Admitting then that alcohol *can* produce all the grades of inflammation of the lung-tissue from the mildest to the fatal form, according to the quantity used, we can perhaps understand to some extent why drunkards if attacked by pneumonia will succumb more speedily than the patient of temperate habits.

By virtue of the alcohol coursing with the blood through the lung-capillaries on the one side, and the alcohol exhaled with the breath, be it ever so little, filling the air-vesicles and air-tubes on the other side, the lung-tissue itself, so sensitive to alcohol, stands between two fires, so to speak, and

must be in a chronic state of semi-engorgement, of mild inflammation, like the highly-colored nose of the drunkard or the engorged mucous membrane of his stomach.

Certainly such a state of affairs will change the normal condition of the cells of the lung-tissue and reduce their vitality, and in proportion their power of resistance to external influences; and if now a severe, acute form of inflammation, such as pneumonia, is added to the pathologic conditions already existing, the lungs find themselves powerless against the attack of the disease, and the drunkard's death-rate from pneumonia illustrates the time-honored law which says that an organ or organism weakened by previous ills cannot compete with normal organs in fighting the battles against acute diseases in the struggle for existence, and the man of temperate habits, with lungs free from alcoholic inflammation, has from five to seven chances for recovery from pneumonia when the drunkard has only one.