

## Intestinal Absorption, Organ Distribution and Histological Localization of the $^3\text{H}$ -Distigmine Bromide in Rats

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Distigmine bromide is known as the cholinesterase inhibitor and very effectively used to treat myasthenia gravis patients. Recently this agent is applied to the patients with atonic constipation and gained 70 percent or more of recovery rate.

We studied with tritium labelled distigmine bromide; the intestinal absorption rate, the distribution in the organs and then the localization of this agent in the colon by autoradiographic method.

In the experiment, we used rats and mice and in order to study the absorption, the agent is administered per os and organ distribution intramuscularly.

The animals are killed at 10, 20, 30, 60 and 120 minutes of the administration.

The organ distribution is investigated on the brain, lung, heart, liver, kidneys, spleen,

stomach and large and small intestines.

The absorption rate already reaches to 60–70 percent of the absorbed dosis in 10 minutes after oral administration of  $^3\text{H}$ -distigmine bromide and thereafter the rate is gradually increased to about 80 percent in two hours after administration.

The organ distribution is prominent in the liver (about 5% of absorbed dosis), in the other organs there are only about one percent of accumulation after one hour.

Studying by autoradiographic method we found the silver grains mostly in the muscular layer without the Auerbach's plexus and smaller amounts in the epithelial layer.

These findings agree with the report that specific cholinesterase is not stained histochemically in the Auerbach's plexus and stained in the nerve fibers.

## Quantitative Measurement of Fecal Blood Loss by $^{51}\text{Cr}$ Method without Using Mixer

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It is generally accepted that measurment for fecal blood loss by  $^{51}\text{Cr}$  is the most reliable to measure the gastrointestinal bleeding in the feces. However, this method has not been commonly used for a routin examination, probably because the method needs to homogenize the feces by mixer.

For the first time, the measuring error was checked when homogenization was avoided from the usual method. A well type scintillation counter ( $\phi 1.75 \times 2$  inch cristal) and a

universal gamma counter with two detectors ( $\phi 5 \times 2$  inch) were used to radioassy the blood in the entire stool specimen. The three specimens of phantom fecal mass of 50g, 100g and 300g were checked by one hundred milliliters  $^{51}\text{Cr}$  standard solution. The error of measurment was with 40% of the standard value in the well type counter and 8% in the universal gamma counter. The physical blood loss was investigated in 8 healthy volunteers, using  $^{51}\text{Cr}$  100–125  $\mu\text{Ci}$ . All feces collected in

twenty-four hour's was measured at one time without homogenization and this measurement was continued for one week in every volunteer. The mean value and standard deviation about their 56 samples were  $0.39 \pm 0.82$  ml. (range:  $-0.72$ – $2.19$  ml.) by the well type counter and  $0.38 \pm 0.48$  ml. ( $0.01$ – $1.01$  ml.) by the universal gamma counter. When one milliliter of  $^{51}\text{Cr}$  labeled blood was measured by our method, the error was 19.4% of the exact value by the well type counter and 3.8% by the universal gamma counter. Therefore, without homogenization, 0.5 ml of blood in feces by the universal gamma counter and 2.0 ml by the well type counter were counted with

statistical counting accuracy of  $\pm 10\%$ .

Secondly, the results obtained by  $^{51}\text{Cr}$ -method were compared with that of the ordinary chemical tests for occult blood in the feces. The positive cases examined by  $^{51}\text{Cr}$ -method were all positive when they were examined by three kinds of the chemical tests. The appearance rate of positive reaction by chemical tests in the negative cases by  $^{51}\text{Cr}$ -method was 16.8% by guaiac, 31.4% by pyramidon and 52.9% by orthotolidin method. It was proved by  $^{51}\text{Cr}$ -method that the guaiac test, so called unsensible reaction, is the most reliable in three chemical tests for occult blood.

## RI Production by IPCR (RIKEN) Cyclotron for Medical Use

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Methods for the preparation  $^{18}\text{F}$  and  $^{52}\text{Fe}$  are described. An oxygen gas stream is bombarded by 15 MeV  $^3\text{He}$  for the production of  $^{18}\text{F}$  mainly by the  $^{16}\text{O}$  ( $^3\text{He}^{++}$ , p)  $^{18}\text{F}$  reaction. The  $^{18}\text{F}$  formed is absorbed from the stream by quartz wool thinly covered with NaOH. The absorption efficiency is 60 to 80% at present. Quartz wool without treatment or covered with  $\text{Na}_2\text{CO}_3$  or NaCl caught the  $^{18}\text{F}$  with a poorer efficiency. Usually, about 1 mCi for 5 min bombardment of  $^{18}\text{F}$  is thus obtained.

Natural chromium electroplated on a copper block is bombarded by  $^3\text{He}$  above 40 MeV for the production of  $^{52}\text{Fe}$  mainly by the  $^{52}\text{Cr}$  ( $^3\text{He}^{++}$ , 3n)  $^{52}\text{Fe}$  reaction. The bombarded

target is transferred to a remote-operation cell and dissolved in HCl. The  $^{52}\text{Fe}$  is extracted by isopropyl ether or methylisobutyl ketone and then back-extracted into water. It takes about an hour for the chemical process and the practical yield of the separated  $^{52}\text{Fe}$  is about 1 mCi for one hour bombardment.

Procedures for the production of  $^{67}\text{Ga}$ ,  $^{111}\text{In}$  and  $^{28}\text{Mg}$  are now being developed. Nuclear reaction and incident particle are following;

$^{67}\text{Zn}$  (d, 2n)  $^{67}\text{Ga}$  with deuteron above 20 MeV  
 $^{109}\text{Ag}$  ( $\alpha$ , 2n)  $^{111}\text{In}$  with  $\alpha$ -particle 40 MeV  
 $^{27}\text{Al}$  (t, 2p)  $^{28}\text{Mg}$  with triton 25 MeV

IPCR cyclotron is the first cyclotron accelerating triton in the world.