This modification of the detector was equally useful for analysis of methyl esters of fatty acids. It seemed to possess the same characteristics of response as the *Sr-detector, with some advantages in the operation.

The response of this detector was studied in a gas-chromatography apparatus made in our laboratory according to James, using a 4 feet glass column of 4 mm diameter filled with Celite 545 of 100—120 mesh containing 20 % (w/w) Apiezon L grease as stationary phase. Commercial argon (99.8 %) at an inlet pressure of 0.5 atm was used as carrier gas. The column and the detector were maintained at a temperature of 180°C. The ionization current was amplified by a feedback electrometer amplifier with 6 000 MΩ input resistance and recorded by a Honeywell recorder. Different anode-voltages ranging from 450 V to 2 000 V could be applied. Using a potential of 2 000 V and applying 0.1 μl of a 1:200 000 dilution (w/v) of methyl laurate in chloroform, the detector still gave a well detectable response, which corresponds to $5 \times 10^{-4}$ μg of methyl laurate.

The sensitivity of this detector is at least of the same order as that of Lovelock’s detector. The absence of the strontium plate causes a considerable fall of the basic ionization current and increases stability of the detector at higher anode potentials and gives a low noise level.


The Mechanism of Inactivation of SH-Enzymes by X-Rays

Rolfe Lange* and Alexander Pihl

Norsk Hydro’s Institute for Cancer Research,
The Norwegian Radium Hospital,
Oslo, Norway

Previous work in this laboratory has established that, if the SH-enzymes muscle glyceraldehyde dehydrogenase (GAPDH) and yeast alcohol dehydrogenase (ADH) are inactivated by X-rays with ionic yields which fall in the same range as those of non-SH-enzymes. This finding, which stands in contrast to previous claims, raises the question as to the radiosensitivity of protein SH-groups and the role of such groups in the radiation induced inactivation of SH-enzymes. In order to throw light on these questions the X-ray inactivation of GAPDH and ADH in dilute solution has been correlated with the concomitant disappearance of titratable SH-groups.

In the case of GAPDH, the disappearance of the protein SH-groups as well as the enzyme inactivation was found to be a linear function of the radiation dose. Complete inactivation of the enzyme occurred when 3 SH-groups per enzyme molecule had been destroyed. Since GAPDH is completely inactivated by the addition of 3 moles of p-chloromercuriophenyl sulphonate the present data strongly indicate that the radiation induced inactivation of the enzyme is entirely due to radiochemical destruction of SH-groups.

The ADH was inactivated by X-ray to a somewhat greater extent than could be expected on the basis of the disappearance of the titratable SH-groups. Thus, from a comparison of the experimentally determined number of SH-groups with the theoretical number calculated on the basis of the remaining enzymatic activity, it was estimated that approximately 60—80 % of the enzyme inactivation can be accounted for by the radiochemical destruction of SH-groups.

In both enzymes the disappearance of SH-groups proceeds with a low ionic yield compared with that observed on irradiation of low molecular thiols. This finding indicates that the enzyme SH-groups are protected by the rest of the protein molecule and that the major part of the radiation energy is dissipated in reactions not leading to the loss of thiol groups. The consequent alterations of the enzyme molecules are apparently of little significance for the enzymatic activity.


* Fellow of The Norwegian Cancer Society, Oslo, Norway.