

lipoid, such changes could account for a loss of conductivity, as long as the narcotic is more soluble in water. But this explanation fails with the higher alcohols in which the lipid solubility prevails. 2. It seems more probable that the different alcohols differ in effect on the sorption capacity of colloidal lecithin. Freundlich and Rona¹⁴ have explained the sensitizing action of narcotics upon ferric sol through sorption of the narcotics to the surface of the colloid. Heymann and Boye¹⁵ working on the same series of alcohols have shown a very similar phenomenon to the one observed on lecithin. In their experiments, the sorption capacity of charcoal for various acids decreased with increasing chain length and molecular polarization of the added alcohols. 3. The relation between salt-binding capacity and degree of dispersion in the lecithin sols have been mentioned above. Therefore, in the case of lecithin, the influence of those alcohols upon the dispersion of the sols should in itself lower the salt-binding capacity of lecithin. Chloralhydrate which has less effect upon the salt-binding capacity of lecithin sol has been found to increase the dispersion of lecithin sol.² If it is warranted to assume that egg-lecithin behaves physicochemically like human lecithin, then the diminished ability of the lipoids in the cellular surface films to fix salt ions should diminish the reactivity of the cell upon stimuli. Changes in ion concentrations must reach a higher threshold in order to act upon the lipoids of the cell surface or of its interior. In this connection, it seems of interest that there is a certain parallel between the power of homologous alcohols to lower the salt-binding capacity of lecithin and their narcotic effect.

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Localization of Pain Following Faradic Stimulation of the Common Bile Duct.

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Previous studies¹ have demonstrated the inability to reproduce pain referred to the back by mechanical distention of the gallbladder or common duct in conscious patients. Pain, characteristic of the

¹⁵ Heymann, E., and Boye, E., *Z. f. phys. Chem.*, 1930, **150A**, 219.

¹ Zollinger, Robert, *Proc. Soc. Exp. Biol. and Med.*, 1933, **30**, 1260.

referred pain described preoperatively, was reproduced by faradic stimulation of 8 patients in whom an electrode was incorporated in the common duct catheter at operation. These patients had chronic cholecystitis and cholelithiasis with well defined indications for choledochostomy.

Method. A platinum wire was incorporated in a small soft rubber common duct catheter adjusted to present an uninsulated area, one-fourth of an inch beyond the tip of the catheter. Following exploration of the common duct through a longitudinal incision distal to the entrance of the cystic duct, the catheter electrode was inserted upward for a distance of about one inch. The end of the electrode was usually at the bifurcation of the hepatic ducts, some distance from the pancreas and duodenum. The position of the electrode, as demonstrated by roentgenograms in the majority of patients, was at the level between the eleventh and twelfth rib, approximately $1\frac{1}{2}$ inches to the right and $2\frac{1}{2}$ inches anterior to the vertebral bodies. At intervals during the first 12 postoperative days a stimulus of faradic current was applied to the catheter electrode from a Harvard inductorium using 3 volts on the primary circuit.

Results. The radiation of the pain differed on various days during the convalescent period. The majority of the patients complained of distress in the epigastrium or right upper quadrant on stimulation similar to their preoperative pain. Four patients also complained of pain in the back, either in the midline at the level of the electrode or with as frequent radiation to the left as to the right. Three patients at some time referred pain to the right side of the abdomen, about 3 inches to the right of the umbilicus. One patient experienced pain in the left epigastrium in the neighborhood of the tip of the eighth rib.

In 3 patients barium was given by mouth and fluoroscopy carried out during faradic stimulation. These patients complained of epigastric distress following stimulation, but in only one did peristaltic waves at the pylorus accompany the stimulation and discomfort.

Conclusions. The sites of pain following faradic stimulation of the common duct are not restricted to the anterior abdominal wall as found following electrical excitation of the stomach and duodenum.² The location of the pain coincided more closely with the level of the electrode in relation to the cerebro-spinal segment involved. Pain was referred to the back in those who described such radiation preoperatively. The epigastric distress at times seemed to coincide with peristaltic contractions of the pylorus.

² Boyden, Edward A., and Rigler, Leo G., *J. Clin. Invest.*, 1934, **13**, 833.