analysis of particles over 40 $\mu$m showed that at equivalent times the diameter corresponding to a cumulative % oversize (volume), except 100%, was greater for the compound tragacanth mixtures. Photomicrographs taken at these times showed evidence of sulphadimidine—compound tragacanth aggregates sedimenting, which would account for the difference in size distributions obtained. At equivalent sampling times, the mixture containing the compound tragacanth powder was increasingly more difficult to redisperse to homogeneity than the mixture containing sodium carboxymethylcellulose 50.

The rapid appearance of a large supernatant layer and the caking tendencies of both suspensions during storage are undesirable. Studies are in progress on the use of agents to aid the optimum formulation of sulphadimidine suspension.

REFERENCES

British Pharmaceutical Codex (1968). pp. 1189–1190, London: The Pharmaceutical Press.
ECANOW, B., GRUNDMAN, R. & WILSON, R. (1966). *Am. J. Hosp. Pharm.*, **23**, 404.
HAINES, B. A. & MARTIN, A. N. (1961). *J. pharm. Sci.*, **50**, 228–232; 753–756; 756–759.
JONES, R. D. C., MATTHEWS, B. A. & RHODES, C. T. (1970). *Ibid.*, **59**, 518–520.
M RTIN, A. N. (1961). *Ibid.*, **50**, 513–517.
MATTHEWS, B. A. & RHODES, C. T. (1968). *Ibid.*, **57**, 569–573.
WILSON, R. & ECANOW, B. (1963). *Ibid.*, **52**, 757–762.

## A possible mechanism for the action of dimethyl sulphoxide on percutaneous absorption

W. E. SNEADER, A. T. FLORENCE AND E. McCOLL
*Department of Pharmaceutical Chemistry, University of Strathclyde, Glasgow, C.1, U.K.*

*In vitro* experiments have been carried out to assess the effect of DMSO on the physicochemical properties of hyaluronic acid and chondroitin sulphate in aqueous solution. Hyaluronic acid and chondroitin sulphate are both present in skin. Day (1952) and others (Laurent & Petruszkiewicz, 1961) have shown that the former plays an important part in the resistance of flow through connective tissue. It exists in solution as a meshwork of long molecules which can impede the passage of even small molecules through the solution. It is therefore feasible that hyaluronic acid plays a part in resisting the percutaneous transport of large and small drug molecules.

A three-compartment cell was used. The aqueous solution of sodium hyaluronate or chondroitin sulphate was placed in the central compartment between two membranes separating the donor and recipient compartments. The rate of diffusion of the methylene blue and salicylic acid into the recipient cell was noted in the presence and absence of DMSO (see Table).

Table 1. *Rates of diffusion on methylene blue and salicylic acid through hyaluronic acid[1] and chondroitin sulphate[2] gels.*

| | | $10^4$K (g cm$^{-2}$ min$^{-1}$) | |
|---|---|---|---|
| Solvent | Methylene Blue - hyaluronic acid* (1 mg ml$^{-1}$) | Methylene Blue - chondroitin sulphate (20 mg ml$^{-1}$) | Salicylic acid - hyaluronic acid* (1 mg ml$^{-1}$) |
| Water or buffer | 2 | 4 | 7·3 |
| 10% DMSO | 4 | 5·6 | 15·0 |

* Molecular weight, from viscosity measurements, $8{\cdot}9 \times 10^5$.
[1] Sigma grade III P. [2] Sigma grade II mixed isomers.

10% DMSO reduces the intrinsic viscosity of hyaluronic acid solutions from 1550 to 900 ml g$^{-1}$, which implies a reduction in the axial ratio of the hyaluronic acid from 156 to 120.

The experimental data support the view that DMSO exerts its absorption-enhancing effects by decreasing the microscopic viscosity of the barrier layers, thereby decreasing the resistance offered to diffusing solute molecules.

REFERENCES

DAY, D. T. (1952). *J. Physiol.*, **117**, 1.
LAURENT. T. C. & PIETRUSZKIEWICZ. A. (1961). *Biochim. Biophys. Acta*, **49**, 258.