The notion that "these eyes were only good for eye tissue research. This implies cooperation, or died in the presence of a systemic infection or other contraindications for grafting are not totally accurate notions. Research leads to prevention of human disease and to a basic understanding of the structure and function of the tissues under investigation. Therefore the use of such organs for research must be viewed not only as a humanitarian goal in itself but also as an important benefit to the professional community and the public at large. If such has not happened, perhaps it has not been tried in a properly orchestrated way.

We have focused on the need for two-way communication to improve the progress of human eye tissue research. This implies cooperation, mutual educational effort, sharing with an eye bank the results of one's research findings, and acknowledging their support in one's publications. The problems we have discussed are not only problems but opportunities. Our hope is that interested parties over the next months and years will observe those researchers and eye banks that are enjoying an excellent relationship and will try to learn from them and to emulate them in their own area.

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Molecular shape and effective diffusion radius

To the Editor:
The determination of the pore size of artificial or biological membranes by probe molecules of known dimension is a useful technique. However, one must be careful not to draw the wrong conclusions by using as probes molecules of uncertain shape. Thus Bellhorn, in his recent paper "Permeability of blood-ocular barriers of neonatal and adult cats to fluorescein-labeled dextrans of selected molecular sizes" (INVEST OPHTHALMOL VIS SCI 21:252, 1981), assumed that the "effective diffusion radius" (EDR) of the dextran fractions, used by him and before by others as probes, represents the true molecular dimensions of more or less rigid spherical molecules.

The given EDR corresponds to the Stoke's radius of the dextran fractions. The Stoke's radius is the average hydrodynamic radius of a molecule obtained from viscosity and translation diffusion coefficients of the molecule in solution. The Stoke's radius, calculated by well-known formulas, is closest to the true molecular radius when the molecule in solution approaches the shape of a sphere. The deviation is greatest when the molecule has an ellipsoidal shape with an axial ratio larger than 2. Consequently, the greater the deviation from sphericity, the less useful the Stoke's radius of a molecule as a probe for the determination of the porosity of membranes.

Dextran are polysaccharides that apparently diffuse across membranes not as spherical particles but as elongated flexible molecules. Thus a dextran fraction of 110,000 molecular weight (Stoke's radius about 68 Å) will penetrate through an artificial Diallo membrane (Amicon) that will not allow the diffusion of a globular protein such as myoglobin of 12,400 molecular weight (Stoke's radius about 15 Å). Also, when we used FITC-dextran fractions of molecular weights similar to those used by Bellhorn, their penetration into artificial hydrogel membranes was not related to the Stoke's radius of the dextran fractions. Our results indicate that dextran fractions behaved in their penetration through pores as flexible rodlike molecules and that the different molecular weight dextran fractions behaved as having similar molecular thicknesses for widely different molecular.
To the Editor:

The comments by Dr. Refojo concerning molecular shape and “effective diffusion radius” (EDR) are important and need to be considered by investigators using dextran or other molecules as in vivo permeability probes. We have previously referred in our work with FITC-dextran molecules to the studies of Refojo and Leong, and it is important to keep in mind the apparent dissimilarity of permeability characteristics of dextran molecules when reporting results based on their usage. I thank Dr. Refojo for his letter.

However, while those investigators found in their in vitro studies no correlation between the reported EDR of dextrans and their permeability across artificial hydrogel membranes (all molecular sizes had a similar permeability in spite of the 32 Å to 85 Å EDR spread), we are impressed that in vivo studies continue to demonstrate marked differences in permeability of the various dextrans based on molecular size. And it appears that when dextran studies are compared with in vivo studies of a similar nature using protein traces, reasonably good correlation exists concerning reported EDR.

For reasons unclear to me, it is apparent that dextran molecules behave dissimilarly when subjected to various permeability investigative conditions. I hope that Dr. Refojo and others could suggest more appropriate terms for defining in vivo permeability of the dextrans if indeed the use of the reported EDR is erroneous. It is obvious that a better understanding of the behavior of these molecules is needed.

Roy W. Bellhorn, D.V.M.

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Spatial summation, contrast threshold, and aging

To the Editor:

It is well known that visual acuity declines with increasing age, the onset of the decline usually beginning around 30 to 40 years. This decrease in acuity occurs even in the absence of ocular disease, suggesting that decreased spatial resolution is a fundamental part of human aging. Yet little is known about how aging affects a related visual function, spatial summation. In fact, acuity and spatial summation are often considered complementary functions; summation requires the integration of signals across retinal area, whereas acuity depends on the differentiation of signals from separate retinal areas. But to date, only one study has examined the effects of aging on summation.

Dannheim and Drance measured contrast threshold as a function of spot size in observers ranging in age from 20 to 70 years. Two of their results are of particular interest here. First, for all target sizes on a photopic background, older observers had higher differential thresholds at fixation than those of young observers. This they attributed to “a decrease in retinal sensitivity with age” (ref. 2, p. 316). Second, as target size increased, thresholds declined at the same rate for all age groups, suggesting that spatial summation remains unchanged in later life.

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