Erratum

In Volume 23, Number 4, the July/August 1995 issue of *Annals of Biomedical Engineering*, figures 1, 3, 5, 6, and 7 of the paper by Shahram Vaezy and John I. Clark, entitled "Characterization of the Cellular Microstructure of Ocular Lens Using 2D Power Law Analysis," were poorly reproduced. An improved reproduction of these figures appear below.

FIGURE 1. Electron micrographs of transparent (a) and opaque (b) lens cells. The microstructure of transparent cells contains a homogeneous distribution of cytoplasmic proteins, with the spatial fluctuations in microstructure having dimensions much smaller than the wavelength of light. The microstructure of opaque cells contain a heterogeneous distribution of cytoplasmic proteins, with the spatial fluctuations in microstructure having dimensions of the order of the wavelength of light. In the linescans of the micrographs (c from a and d from b) one can observe the dimensions of the spatial fluctuations. The linescans are plots of normalized pixel intensity (0-1) which represents the stain density in the electron micrograph. The micrographs and the linescans demonstrate that the spatial fluctuations in microstructure of the lens cells are complex and composed of many components. Bar = 1 μm .

FIGURE 3. Outline of the method of 2D power law analysis. An electron micrograph of the lens cells was obtained (a). A 256×256 pixel region of interest (ROI) of the micrograph was selected for the 2D power law analysis (b). The ROI was Fourier transformed to obtain the 2D Fourier spectrum (c) of the spatial fluctuations in the ROI. In the 2D Fourier spectrum, pixel intensity and pixel position represent amplitude and spatial frequency of the Fourier components respectively. Dark pixels represent large amplitudes. Pixels near the center of the spectrum represent low-spatial frequency, and pixels near the periphery represent high-spatial frequency. The general shape of the Fourier spectrum is represented in a profile of the spectrum (d). The wavelength ranges of the profile and the 2D Fourier spectrum are 43–5565 nm. The log-log plot of the spectrum (e) is used to determine the power law scaling of the amplitude of the Fourier components as a function of increasing frequency. The slope of the line fitted to the log-log plot is the negative of β , the exponent of the power law function. Two regions having two different power law scaling were found in the 2D Fourier spectra of the lens cells. The low-frequency region is near the center of the plot and the high-frequency region is near the edge of the plot. These two regions are separated by a vertical dashed line which is positioned at the bend wavelength.

FIGURE 5. Five representative ROI from the electron micrographs of the lens cells. ROI 1 is from the cells immediately under the lens epithelium, containing organelles and cytoplasmic inhomogeneities. Across the radius of the lens (ROI 2 to 5) there is a gradual increase in the dimensions of the spatial fluctuation in microstructure, due to aggregation of proteins. Bar = 1 μ m.

FIGURE 6. The 2D Fourier spectra of the five ROI in Fig. 5, and profiles of the Fourier spectra. In all spectra the Fourier components near the center of the spectrum have larger amplitude (pixel intensity) compared with those near the edge of the spectrum.

FIGURE 7. The log-log plots of the five 2D Fourier spectra in Fig. 6. The log-log plots were used to determine the power law scaling of the spatial fluctuations in microstructure. Two regions of different power law scaling were found for each log-log plot: low- and high-frequency regions. For each log-log plot, a line fitted to the points of each region is shown.