Comments on *Synchrotron fibre diffraction identifies and locates foetal collagenous breast tissue associated with breast carcinoma* by V. J. James (2002). *J. Synchrotron Rad.* 9, 71–76

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The paper by James (2002) raises several questions. In our opinion, the small-angle scattering data shown in the article do not support all the conclusions of the author. We have analyzed the data and arrived at interpretations that are quite obvious, but not as exciting as those offered by the author. The scales in Figs. 2 and 3 are not given, but those can be established by indexing the collagen pattern in the meridional direction. In Fig. 3(*c*), inside the bright ring, reflections 00*l*, with $l = 5, 6, 7, 8, 9, 10, 11, 12$, are identified. Using $d = 65$ nm for the axial period of collagen fibrils, we calculate the bright ring to correspond to a period of 4.24 nm. The bright ring arises from the presence of fat. The pattern is very typical for breast tissue samples, as seen in our Fig. 1 here, where azimuthal averages of SAXS patterns from fat and collagen are shown. The period giving rise to the fat peak is 4.26 nm, and in the two-dimensional pattern the intensity of the fat ring is uniform. The characteristic ring in the fat pattern is strong and narrow, like the ring in Fig. 3(*c*), and not diffuse and barely discernible as in Fig. 3(*a*). Triglyceride molecules in the 'tuning fork' conformation are about 4 nm long, and they are arranged parallel to each other building layers, which are typically 4.25 nm thick. Layers form stacks, and this regular packing gives rise to the diffraction peak. It is obvious that the author has misinterpreted her data by assigning the 32.1 nm period to the fat ring.

The right-hand side of Fig. 2 is actually taken from a previous publication (James *et al.*, 1998). It shows several maxima, which correspond to the cylindrical fibrils and are described by the Bessel function J_1 of the first kind. There is also some fine structure, which

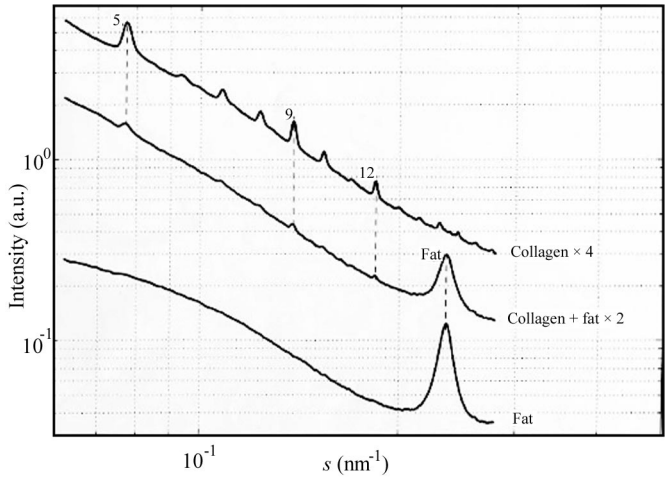

Figure 1
Azimuthally averaged SAXS patterns from breast tissue samples.

the author claims to arise from the 353 nm periodicity of the 'chicken wire' lattice associated with collagen IV. The intensity variations in Fig. 2(*b*) are very sharp, and, if they are due to diffraction from a lattice, the lattice must be extended and regular like in a para-crystal. We are not saying that such a lattice does not exist, but Figs. 2(*b*) and 2(*c*) cannot be used as evidence for the existence of the lattice. It is much more likely that the author has managed to index the noise of the SAXS pattern.

In Fig. 1 here the collagen peaks are weak but clearly visible even though logarithmic scales are used. The strong peak in the fat pattern arises from layers of triglyceride molecules, and the same peak is visible in the scattering pattern of a collagen-containing sample. The intensities have been re-scaled for a better separation of the curves.

References

James, V. J. (2002). *J. Synchrotron Rad.* (2002). **9**, 71–76.
James, V. J., McConnell, J. F. & Amemiya, Y. (1998). *Biochim. Biophys. Acta*, **1379**, 282–288.

