BACKGROUND AND PURPOSE

- First described in 1988 [1] and named in 2002 [2], SDD is one of 5 configurations of membranous debris (lipoprotein-derived debris), the principal component of BlinD and soft drusen.
- Like soft drusen, SDD features membrane-bounded particles with neutral lipid interiors, unesterified cholesterol, apolipoprotein E, complement factor H, and vitronectin and lacks immunoreactivity for photoreceptor, Müller cell, and RPE membrane proteins [3,4].
- SDD is a candidate histologic correlate for reticular pseudodrusen (RPD) visualized by widefield fundus photography [4] and spectral domain optical coherence tomography [5]. RPD is common in non-neovascular AMD eyes [6,7].
- To provide insight into SDD’s role in AMD, we characterized the morphologic, prevalence, and topography of SDD with reference to basal linear deposit (BlinD), a diffusely distributed, cholesterol-rich, AMD-specific lesion, for which a testable biochemical model exists [8].

RESULTS

- F1: Donor eyes with median death-to-preservation = 2.40 hr were post-fixed in osmium tannic acid paraphenylenediamine for neutral lipid and prepared for macula-wide high-resolution sections [9]. Studies of histopathologic criteria for AMD. Results are presented from 22 eyes of 20 Caucasian donors [14 female, 6 male, 83.1 ± 7.7 yr] at early (n=17) and advanced (n=5) stages of non-neovascular AMD, including 2 pairs of fellow eyes. Five of 9 donors with clinical histories were diagnosed with non-neovascular AMD 2.1 to 41.2 mo prior to death.

F2: Lesion morphology and documented thicknesses of 21 choriocapillary layers determined at 25 standard locations [8] in 1 section through the fovea and 1 section through the nasal, temporal, and superior perifovea. 2 mm superior to the fovea. Red arrow, SDD.

F3: Basal linear deposits. A-B. BlinD is grayish-pink material between the RPE basal lamina (yellow arrowheads) and Bruch’s membrane, in drusenoid (A) and diffuse (B) forms. Eye B has Rick, late basal laminar deposits. C. A pocket of BlinD, highlighted by yellow arrowheads, is flanked by a Lipid Wall, a 10 µm grayish-pink layer of uniform thickness (arrows).

F4: SDD’s two essential formations (A) isolated domes (1-3) with caps of outer segment-like material and (B) confluent dollops punctuated by tufts of RPE apical processes, both associated with photoreceptor perturbation, including outer segment shortening, outer segment loss with inner segment deflection, and absence.

F5: SDD in superior-temporal perifovea. A,B. Ex vivo images of foveal regions, showing yellowish material in a reticular formation (A). C,D. SDD is distinct from apical processes, which form regularly spaced bundles, along a scalloped apical surface (arrows). E. Photoreceptors, mostly rods, overlaying large SDD mound (yellow arrowheads). Some outer segments are bulbous, lightly stained, and a lack normal disk structure (pink arrow). F,G. Smallest SDD were the size of 1-2 RPE cells. Bars A-B = 1 µm, C-G = 10 µm.

F6: SDD and BlinD are highly prevalent lesions in AMD eyes. Percentages of sampling locations, paced across 22 AMD eyes, were normalized to the number of sampling locations per macular sub-region. A. Lesions are more prevalent in the fovea. B. SDD is more prominent than BlinD in perifovea. BlinD is more prominent in the superior temporal perifovea. Few locations had both SDD and BlinD. On a per eye basis, 19 eyes had SDD at any location, and 19 eyes had BlinD at any location, for comparable prevalences of 86.4%.

METHODS

- To provide insight into SDD’s role in AMD, we characterized the morphologic, prevalence, and topography of SDD with reference to basal linear deposit (BlinD), a diffusely distributed, cholesterol-rich, AMD-specific lesion, for which a testable biochemical model exists [8].

CONCLUSIONS AND MODEL

- SDD and BlinD prevalence in AMD eyes are both high.
- SDD’s organized morphology, topography, and impact on surrounding photoreceptors imply specific processes of biogenesis.
- SDD’s predominantly perifoveal, and BlinD’s predominantly foveal, locations suggest relationships with rod and cone topography, respectively.

REFERENCES


SUPPORT