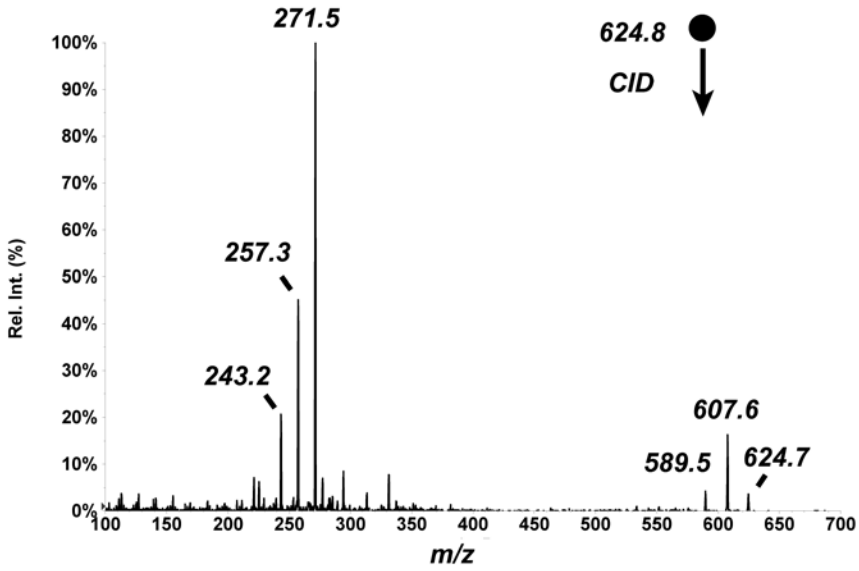

Figure S1. CID mass spectrum of the ion isolated at *m/z* 624.8. Product ions at *m/z* 271.5, 257.3 and 243.2 are tentatively assigned as 17:0, 16:0 and 15:0 protonated fatty acids respectively.

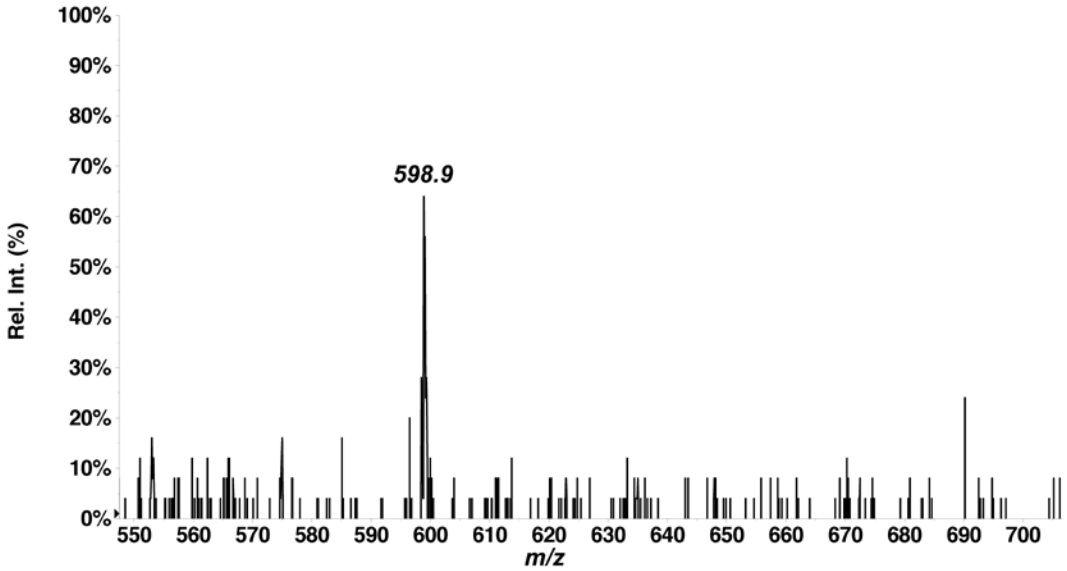

Figure S2. MS/MS precursor ion scan targeting *m/z* 271 ($[17:0\ \text{fatty acid}+H]^+$) from LESA of an unworn Senofilcon A contact lens.

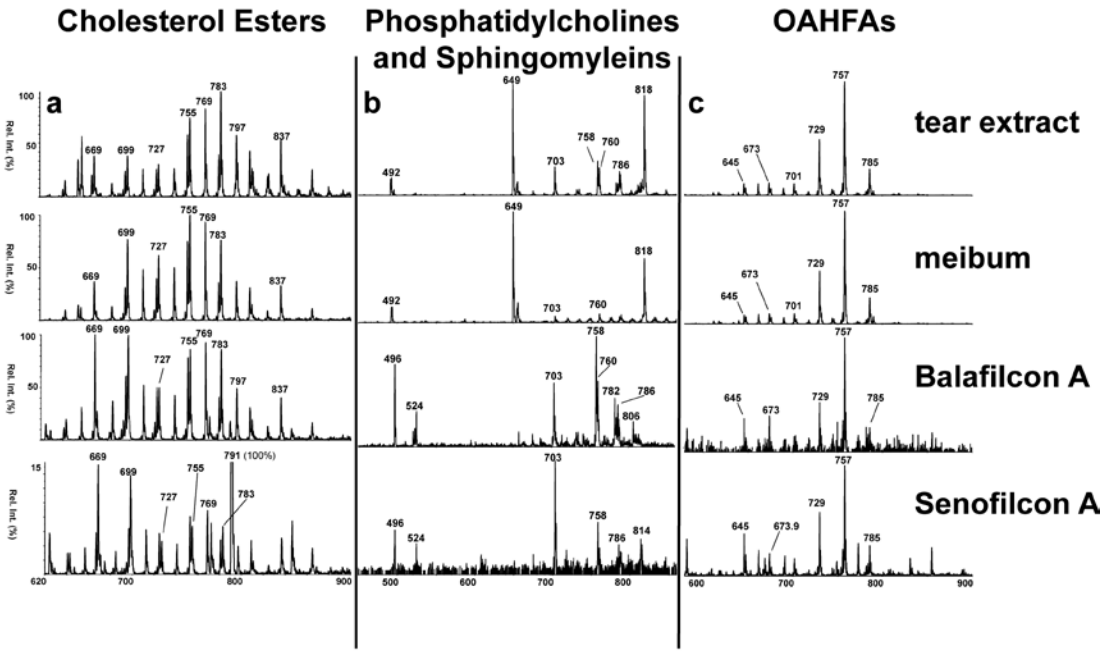

Figure S3. LESA-MS/MS precursor ion spectra targeting: a) cholesterol esters, b) phosphatidylcholine and sphingomyelin, and c) 18:1 fatty acid OAHFAs. A representative spectrum for each scan type is shown for human tear extract, human meibum, worn Balafilcon A lens, and worn Senofilcon lens. Each spectrum is normalized to the ion with the greatest ion count. Cholesterol ester species were identified with acyl chain ranging from 14 to 32 carbons in length and included both saturated, monounsaturated, and polyunsaturated species. Phosphatidylcholine included species ranging from 32 to 38 sum carbon chain lengths, as well as lyso species with 16 and 18 carbons. Phosphatidylcholine was dominated by species with one or two double bonds. Sphingomyelin was dominated by the species 34:1. OAHFAs containing 18:1 fatty acid ranged from 42 to 52 sum carbons, and were primarily monounsaturated. Tear and meibum extracts contained internal standards at *m/z* 649 and 818 (dihydrosphingomyelin and phosphatidylcholine respectively).