

皮膚バリア機能と製剤開発

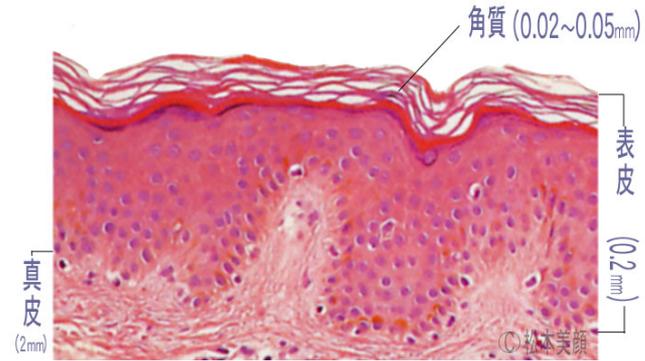
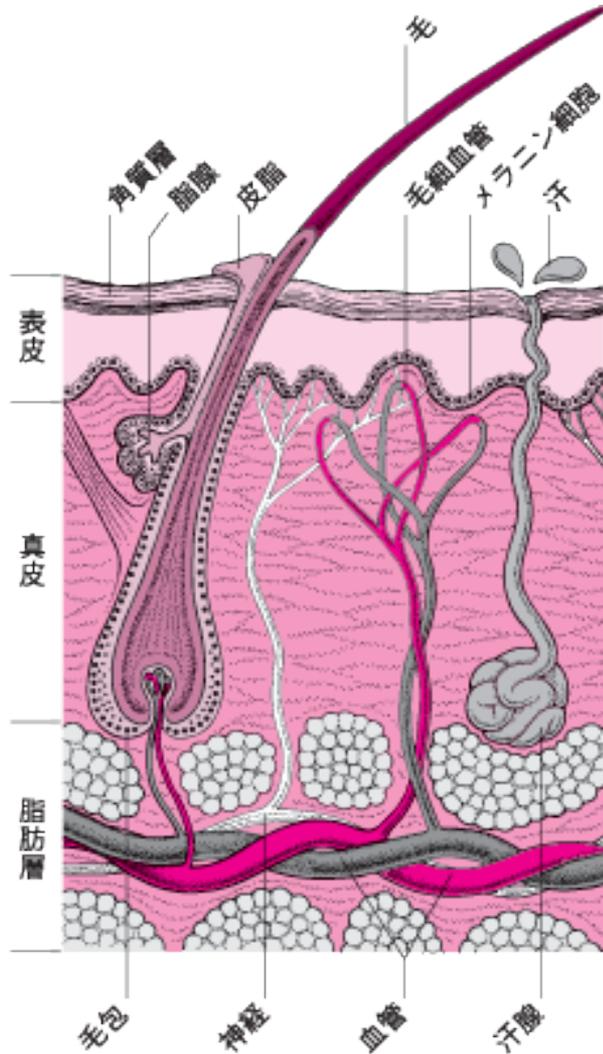


星薬科大学
小幡誉子

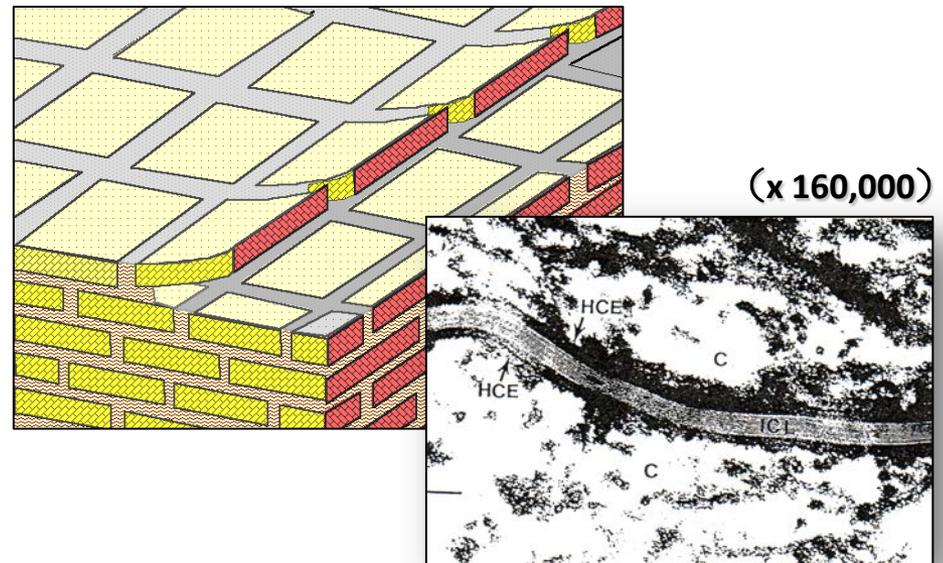
内 容

1. はじめに
2. 角層細胞間脂質の構造解析
3. 細胞間脂質の熱特性と製剤成分の適用による変化
4. まとめと将来展望

皮膚の構造と機能



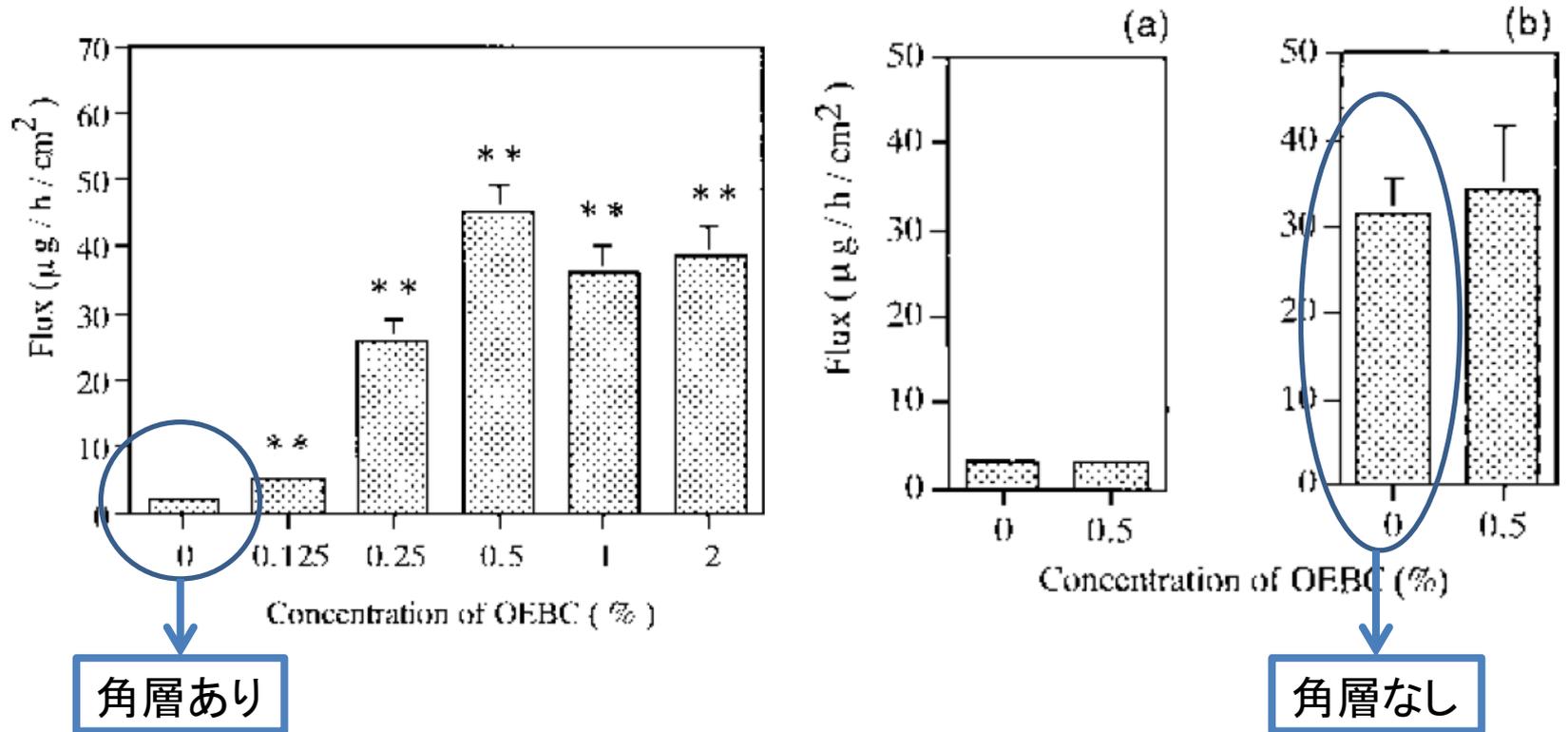
http://matsumotobigan.com/nagoya/seiyo/seiyo_p/seiyou-kakusitusou.html



<http://mmh.banyu.co.jp/mmhe2j/sec18/ch201/ch201b.html>

P. W. Wertz, et al., *J. Invest. Derm.*, **89**, 419-425 (1987).

薬物皮膚透過における角層の役割



薬物の経皮吸収促進の方法

物理的促進法

- イオントフォレシス
- エレクトロポレーション
- ソノフォレシス
- ジェットインジェクション
- マイクロニードルアレイ

化学的促進法

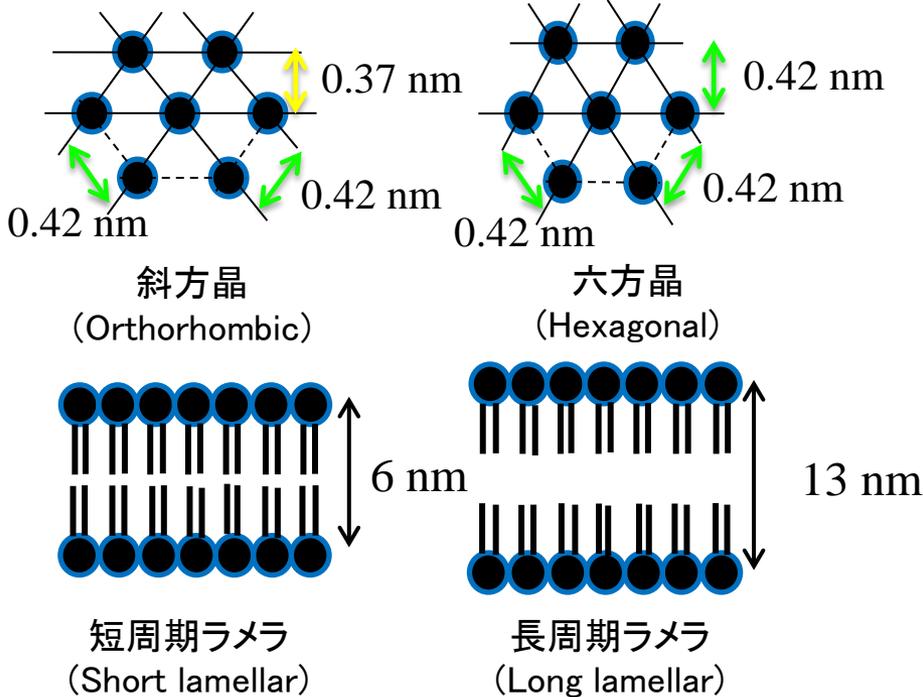
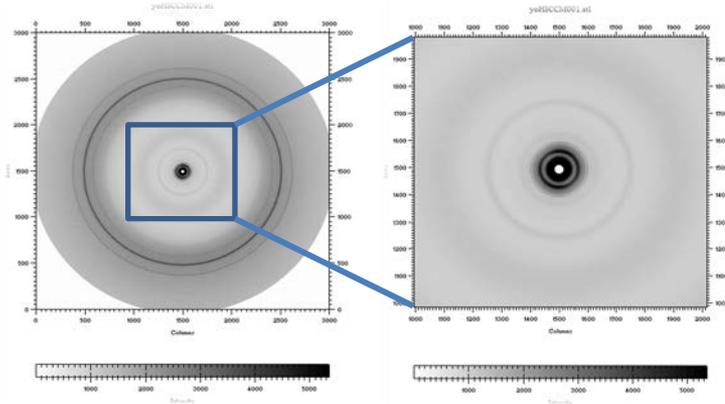
- プロドラッグ
- 経皮吸収促進剤

生体保護作用

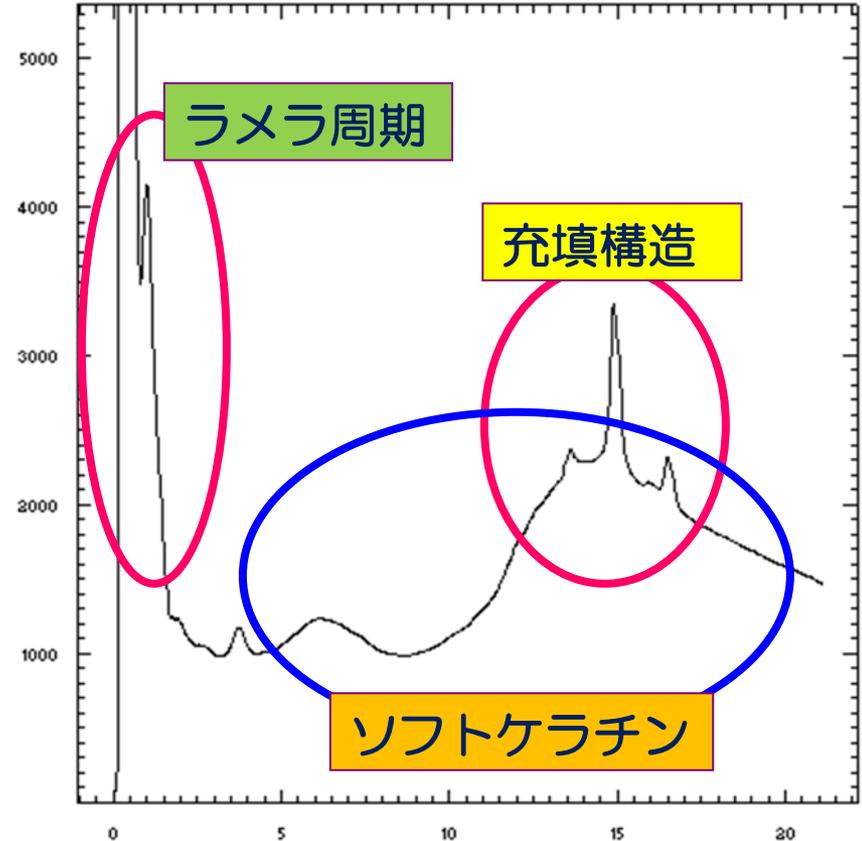
角層のバリア機能

薬物投与部位

角層細胞間脂質の構造解析

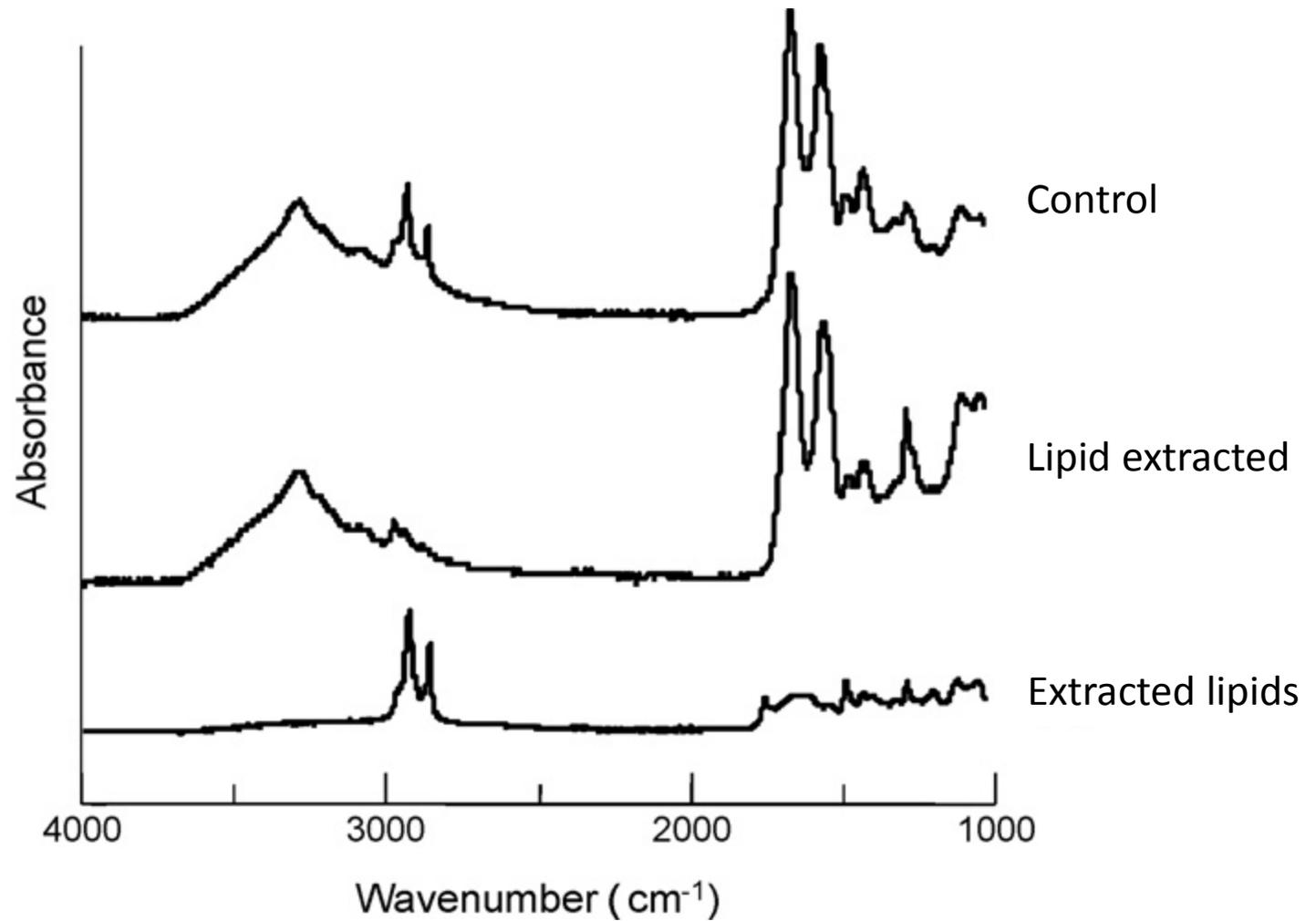


Human stratum corneum

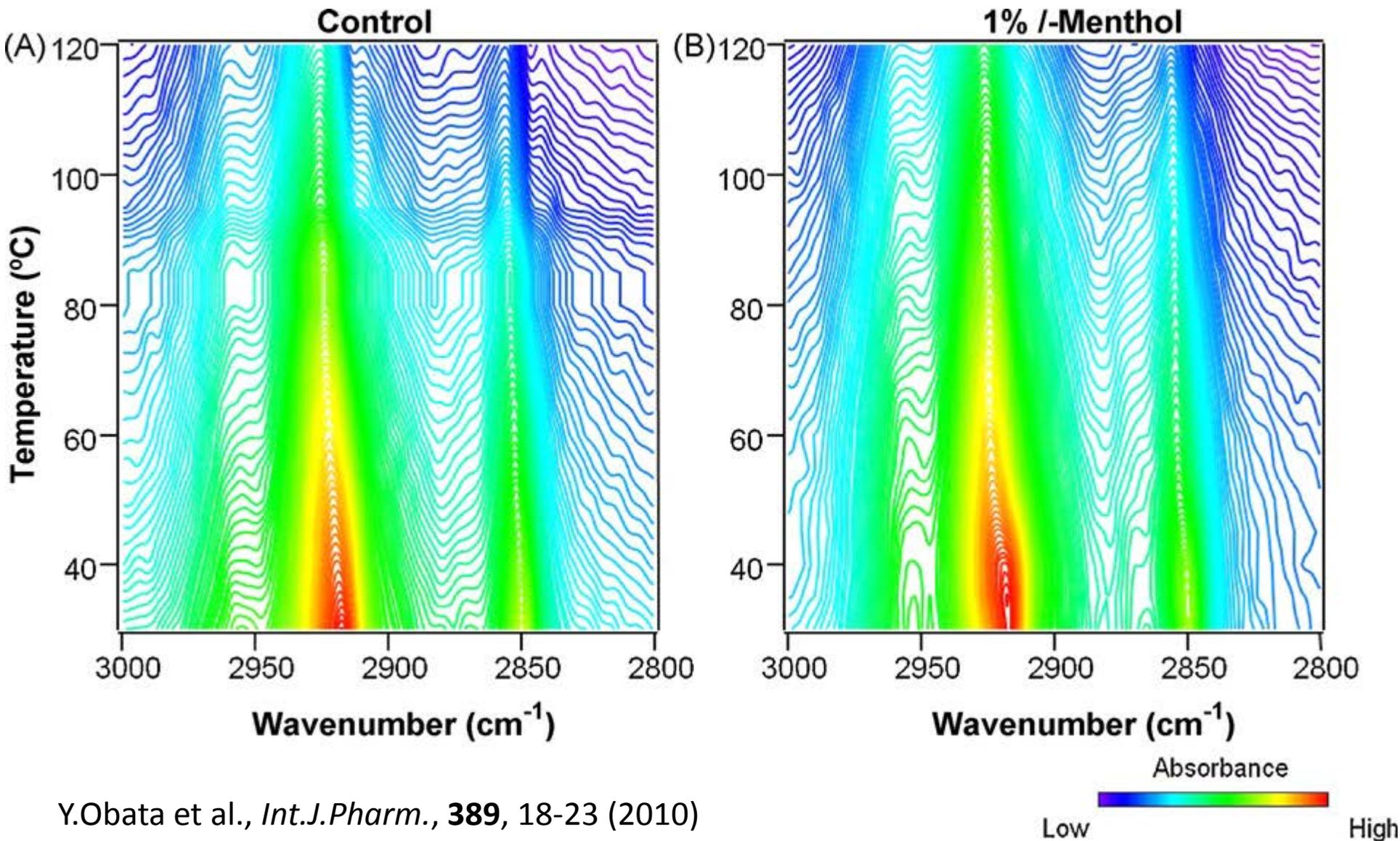


SPring-8 BL40B2
 Imaging Plate; Exposure 30 s
 Sample : Stratum corneum (2 mg)

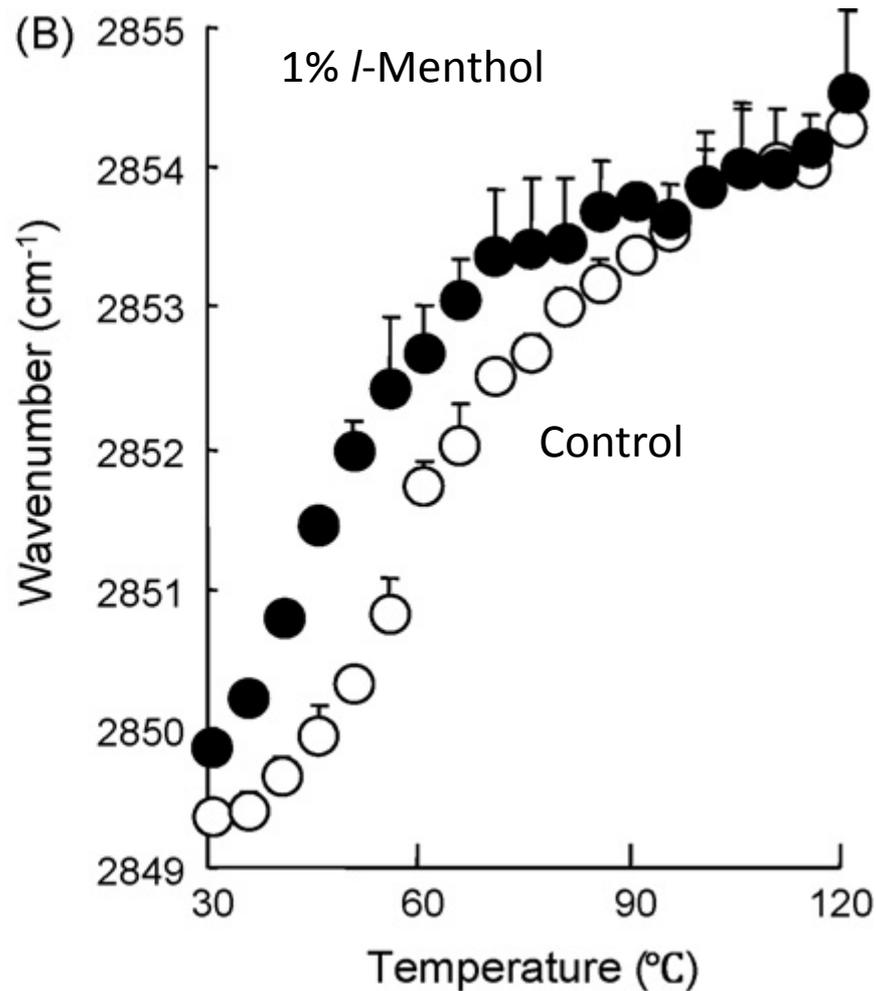
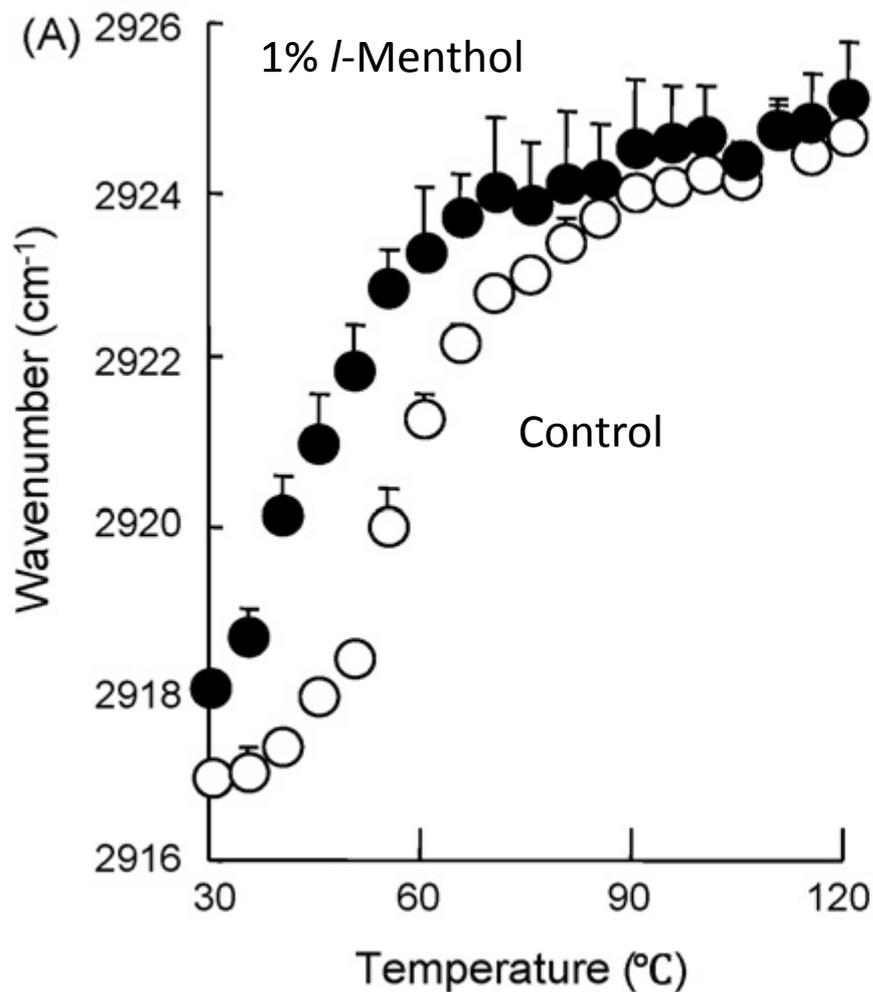
角層の赤外分光測定(1)



角層の赤外分光測定(2)



角層の赤外分光測定(3)

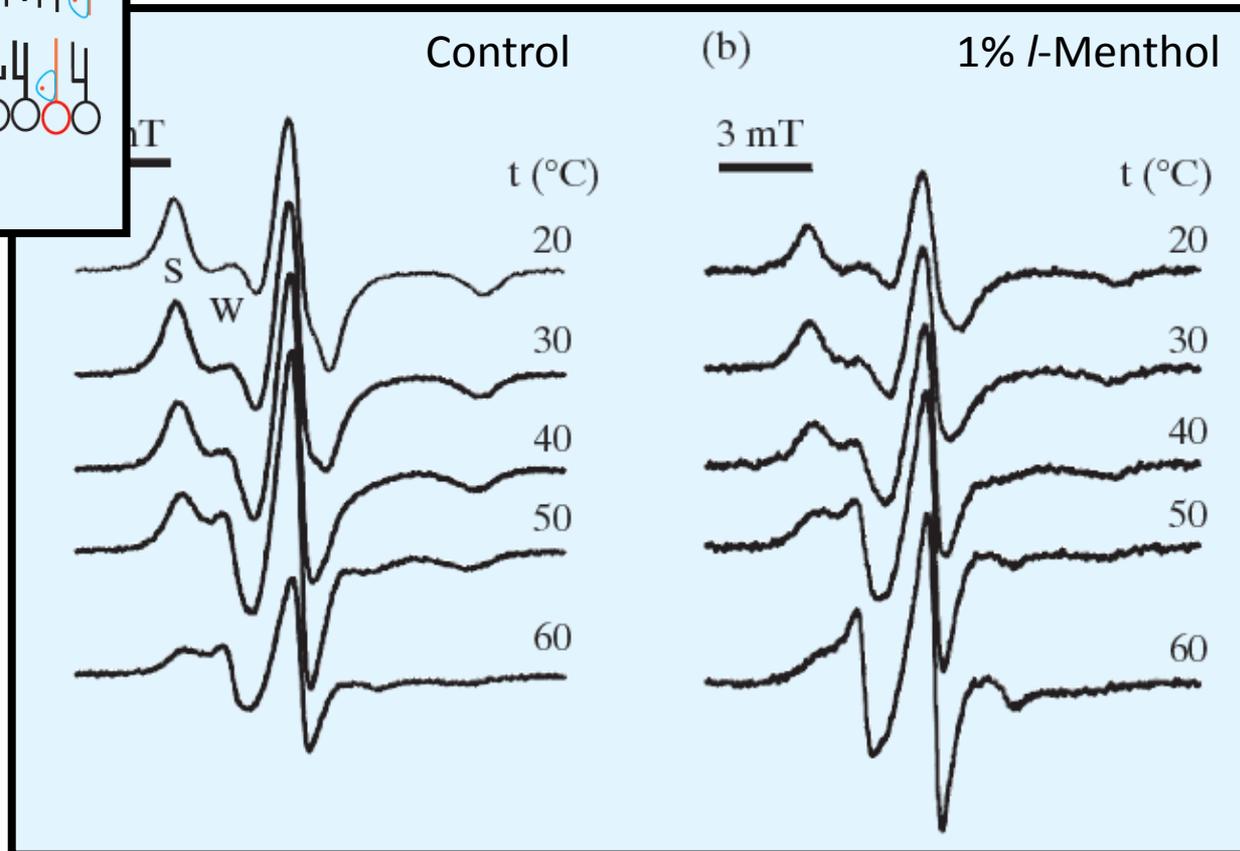
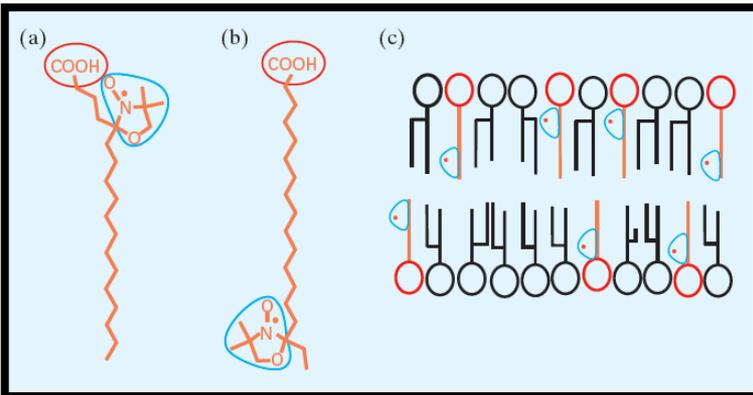


角層の赤外分光測定(4)

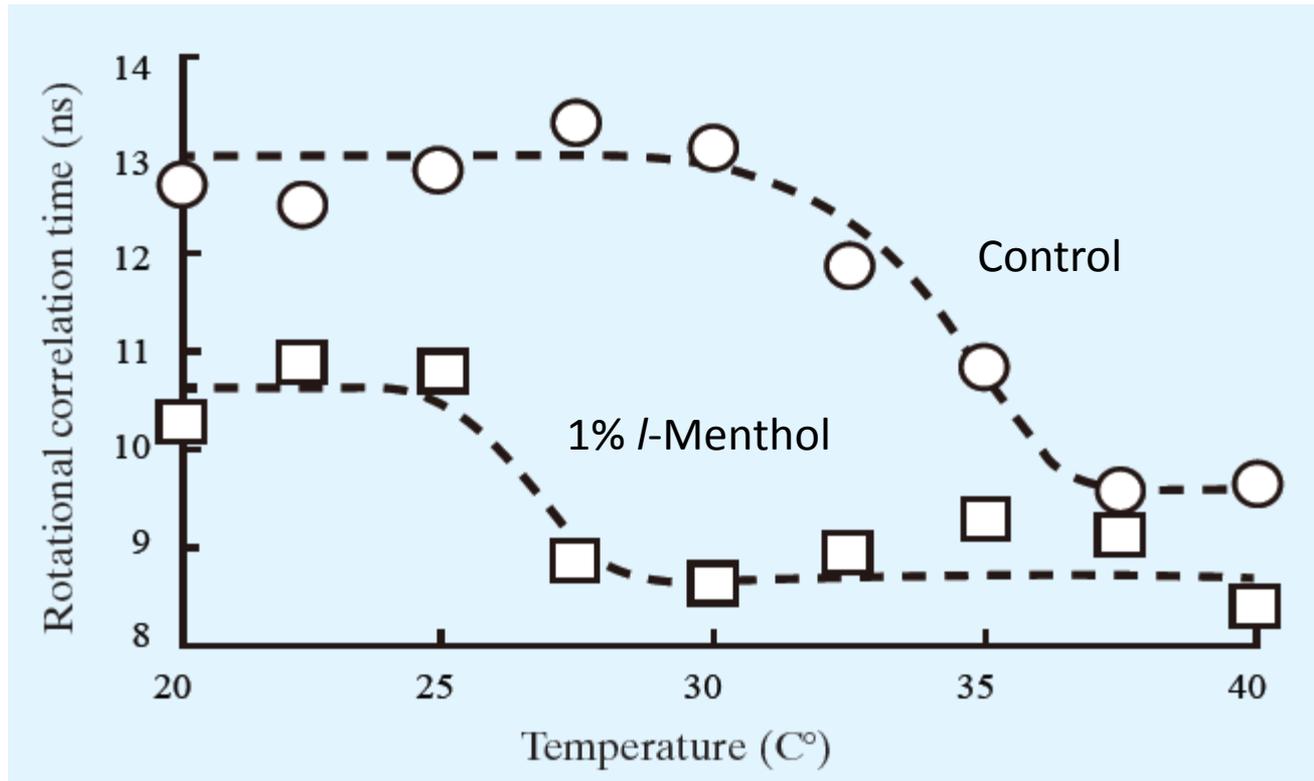
The corresponding temperature required to influence stratum corneum obtained from pretreated stratum corneum at 30 °C.

	Asymmetric stretching	Symmetric stretching
40% ethanol	37.8	36.5
0.5% L-menthol	42.8	38.1
1.0% L-menthol	46.0	43.4

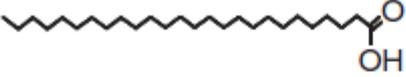
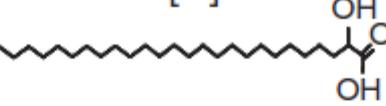
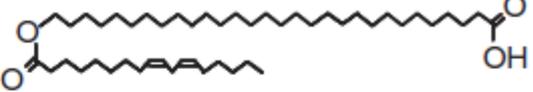
電子スピン共鳴による測定(1)



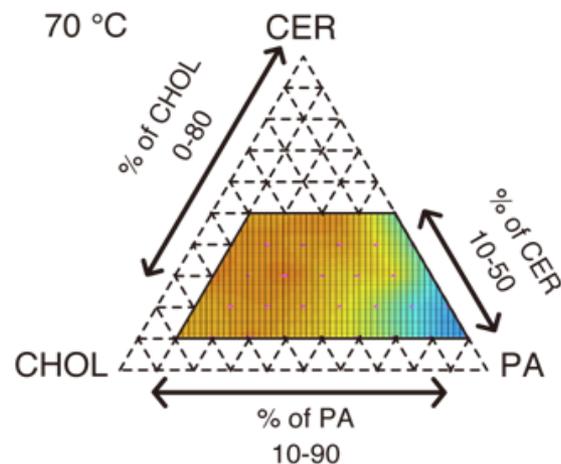
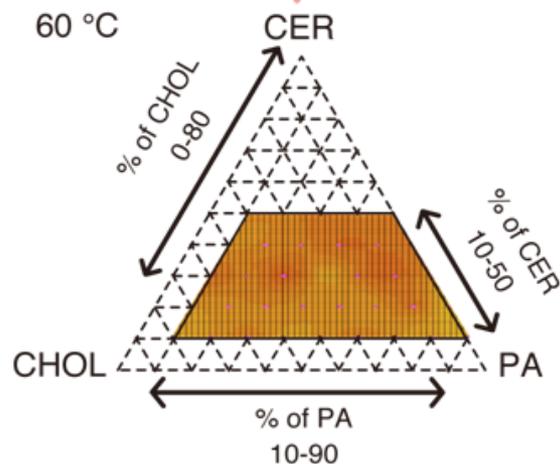
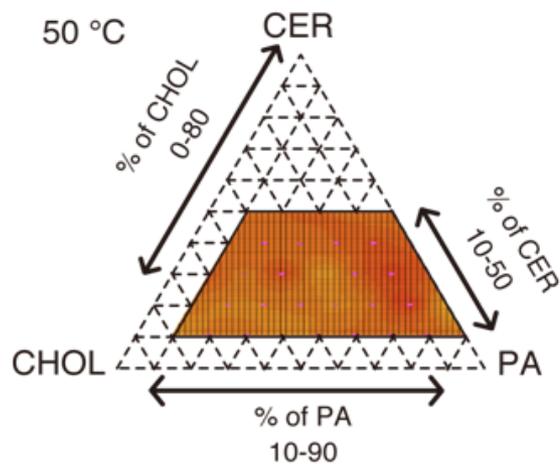
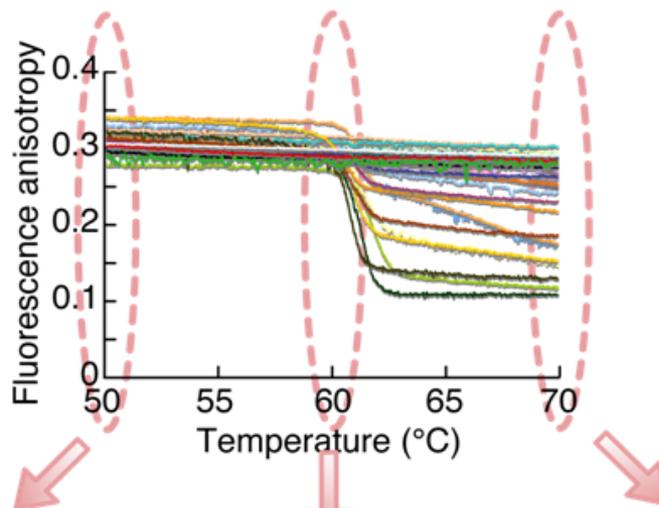
電子スピン共鳴による測定(2)



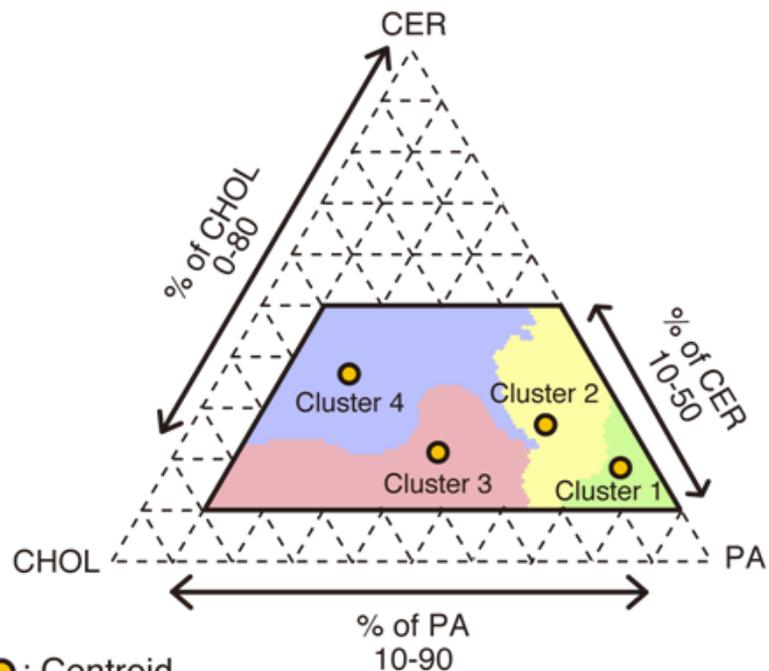
ヒト細胞間脂質のセラミドの分類

Fatty acid	Non-hydroxy fatty acid [N]	α -Hydroxy fatty acid [A]	Esterified ω -hydroxy fatty acid [EO]
Sphingoid			
Dihydrosphingosine [DS]	CER[NDS] 10	CER[ADS] 11	CER[EODS] 12
Sphingosine [S]	CER[NS] 2	CER[AS] 5	CER[EOS] 1
6-Hydroxy sphingosine [H]	CER[NH] 8	CER[AH] 7	CER[EOH] 4
Phytosphingosine [P]	CER[NP] 3	CER[AP] 6	CER[EOP] 9

脂質モデルの蛍光異方性



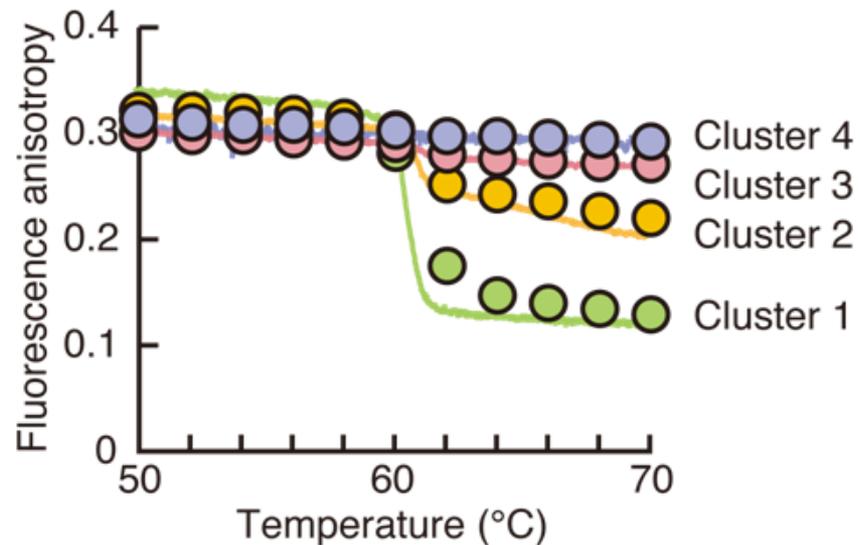
特徴的な脂質モデルの抽出



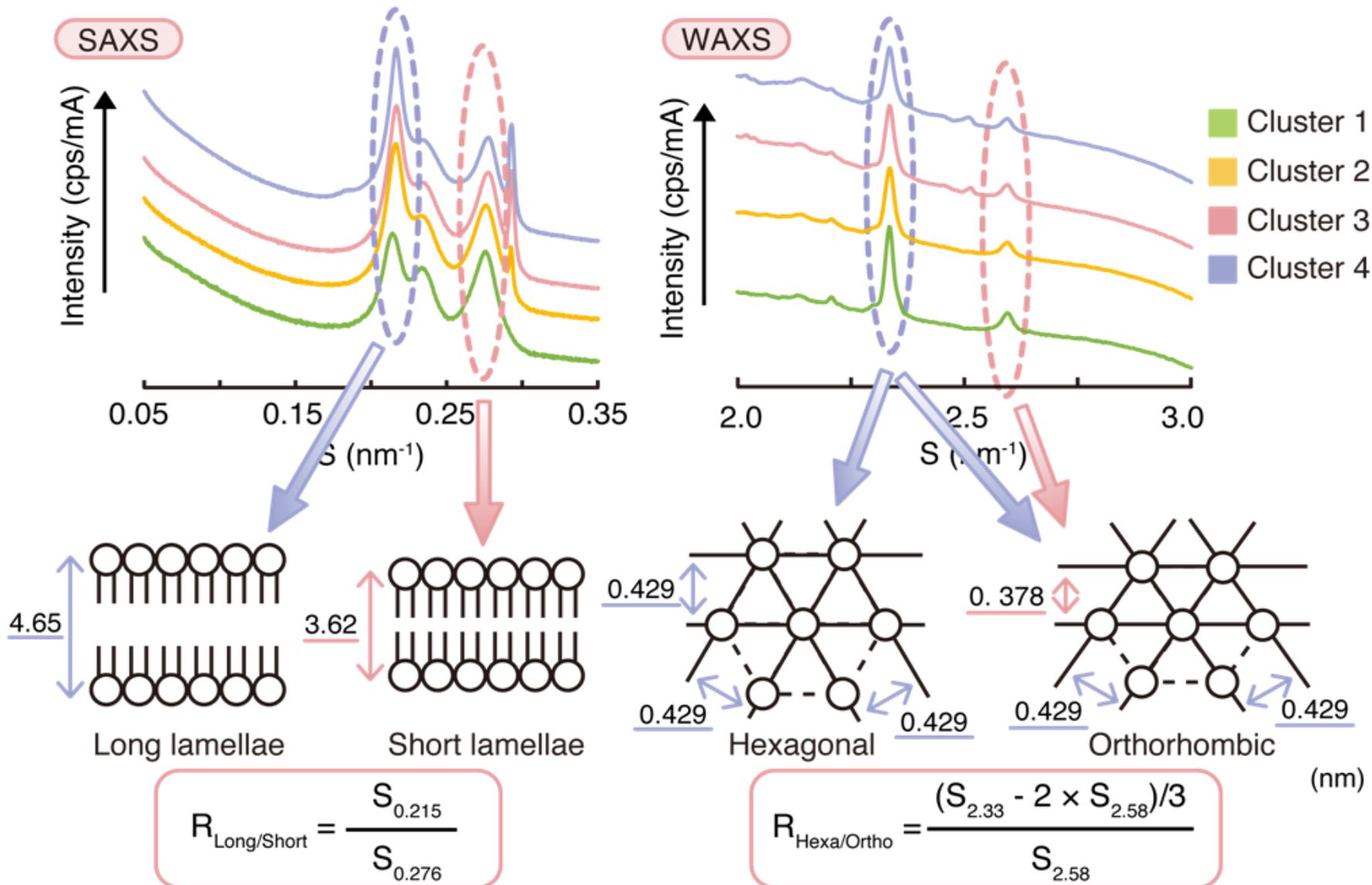
●; Centroid

	CER	CHOL	PA
Cluster 1	17.8	5.5	76.6
Cluster 2	26.4	13.9	59.5
Cluster 3	20.9	35.1	43.8
Cluster 4	36.6	42.7	20.6

(mol%)

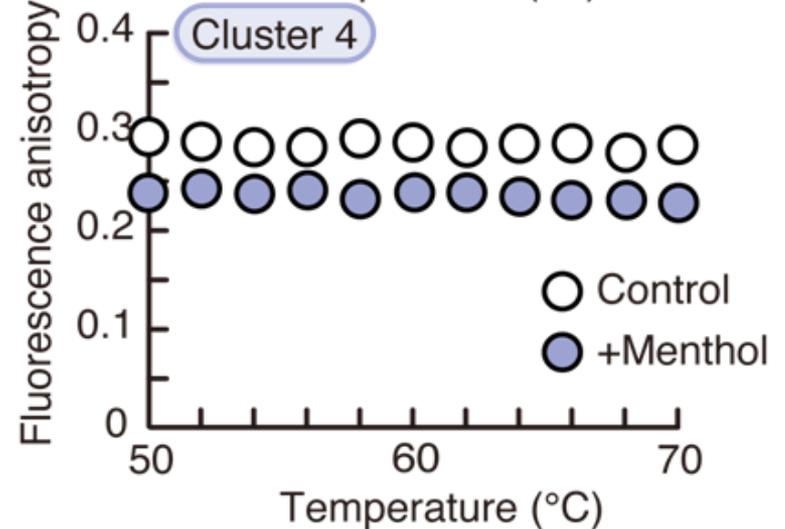
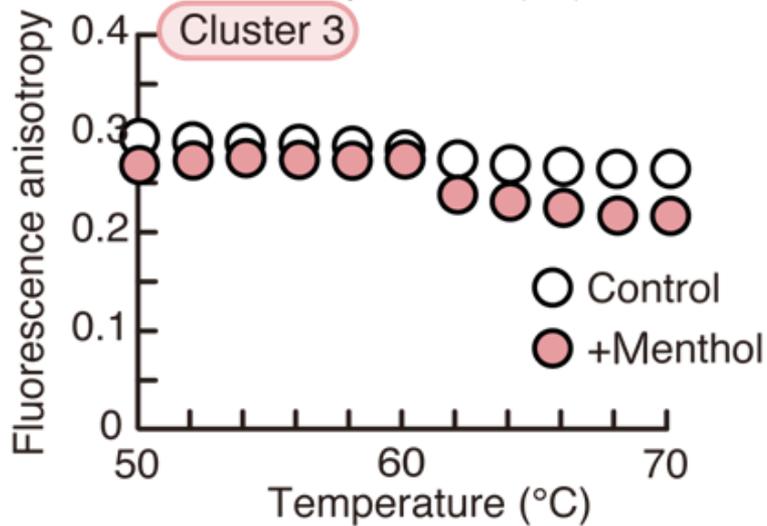
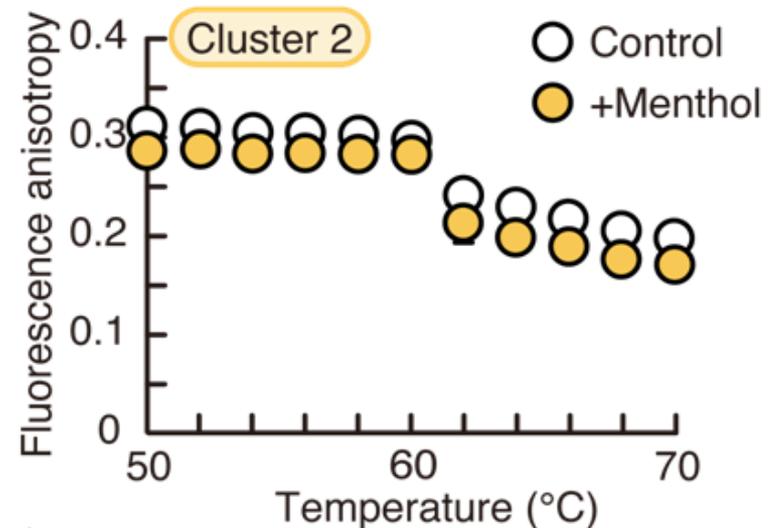
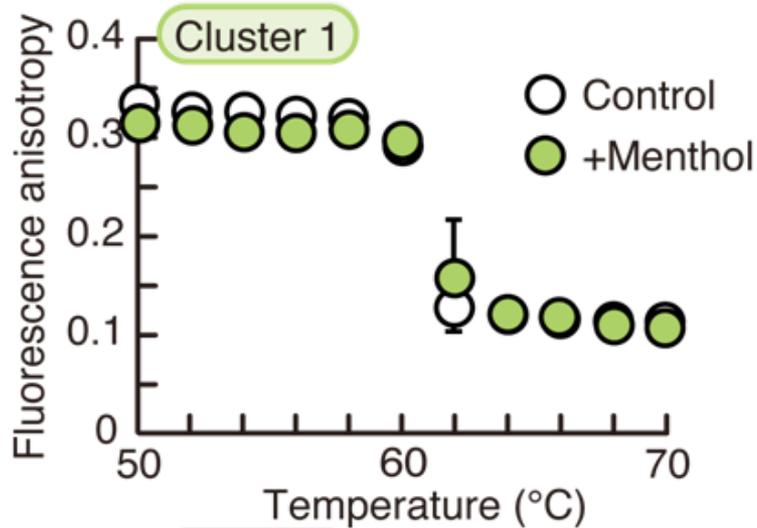


脂質モデルのX線回折プロファイル



S; Area of diffraction peak

脂質モデルの蛍光異方性



Each point represents mean \pm S.D. (n = 3)

充填構造に及ぼすメントールの影響

