Fig.1

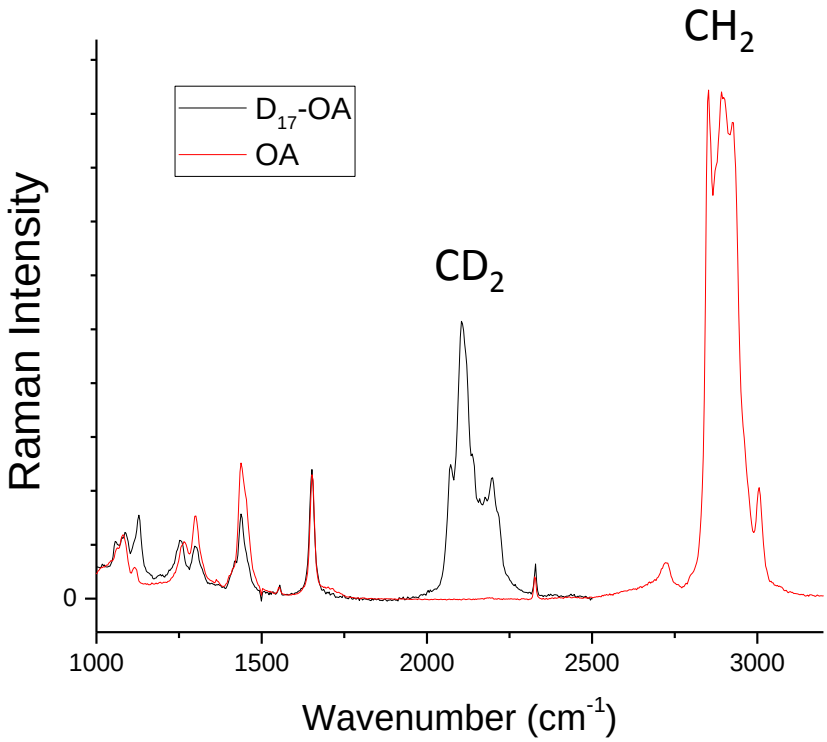
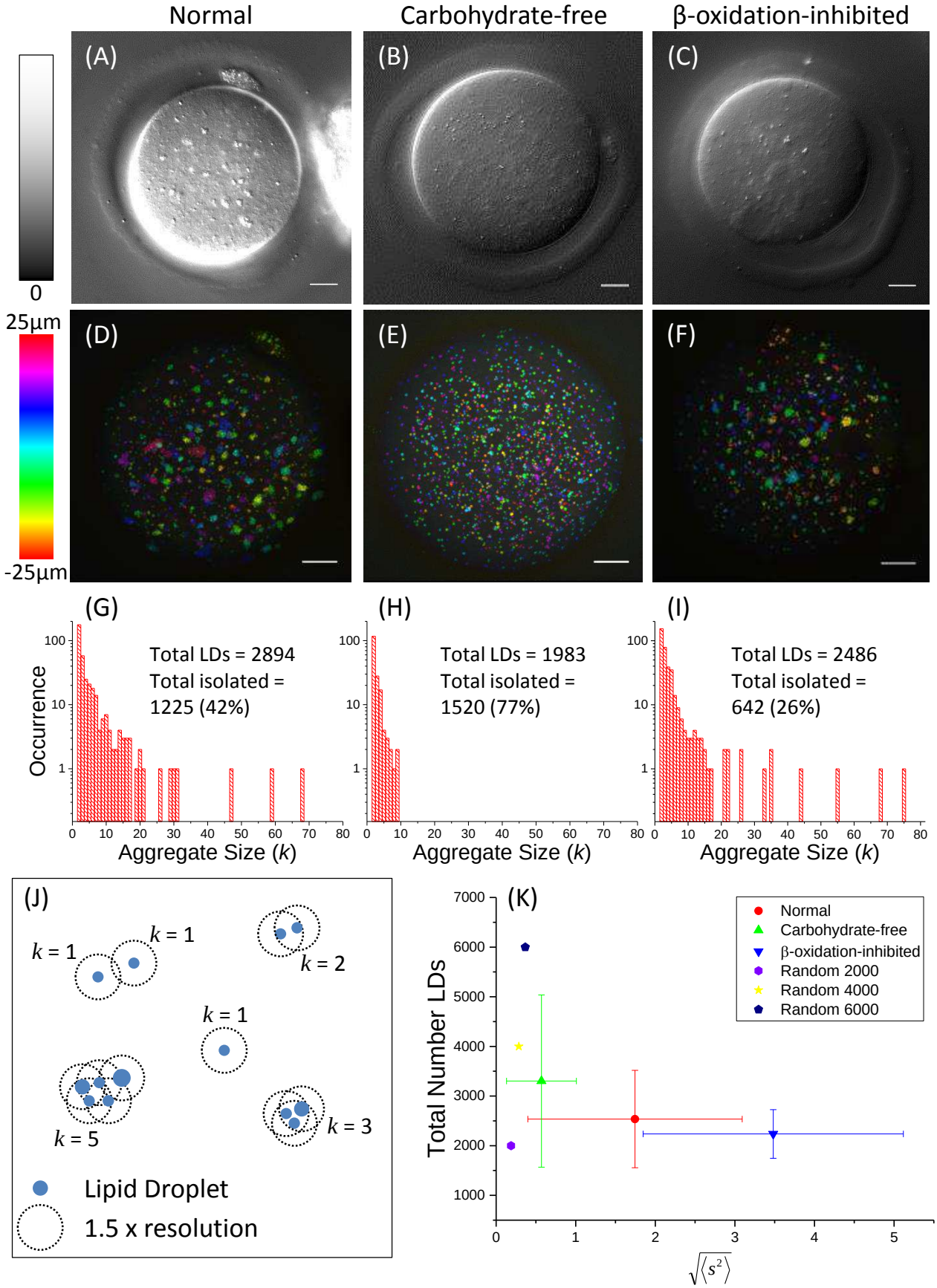
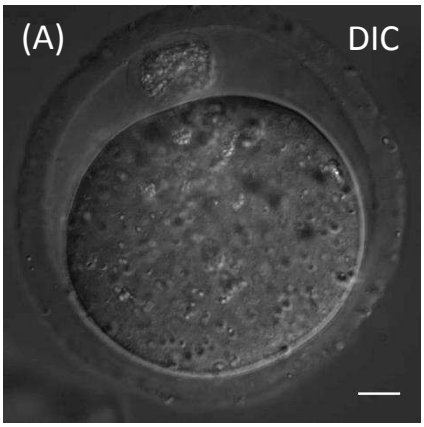
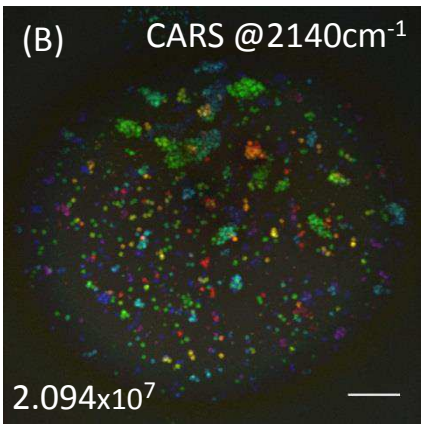

CH2
D17-OA
OA
CD2
Raman Intensity
0
1000
1500
2000
2500
3000
Wavenumber (cm-1)

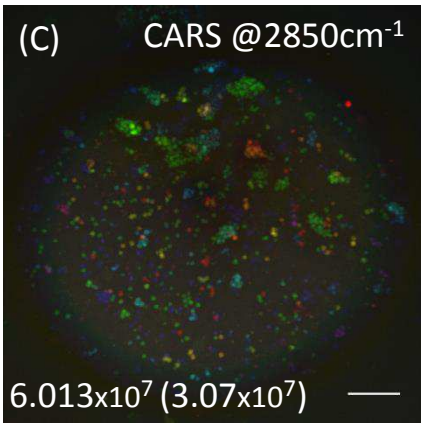
Fig.2


Normal
Carbohydrate-free
β-oxidation-inhibited
(A)
(B)
(C)
0
25μm
-25μm
(D)
(E)
(F)
(G)
(H)
(I)
Occurrence
Total LDs = 2894
Total isolated = 1225 (42%)
Total LDs = 1983
Total isolated = 1520 (77%)
Total LDs = 2486
Total isolated = 642 (26%)
Aggregate Size (k)
(J)
k = 1
k = 1
k = 2
k = 1
k = 5
k = 3
Lipid Droplet
1.5 x resolution
(K)
Total Number LDs
Normal
Carbohydrate-free
β-oxidation-inhibited
Random 2000
Random 4000
Random 6000
$\sqrt{\langle s^2 \rangle}$

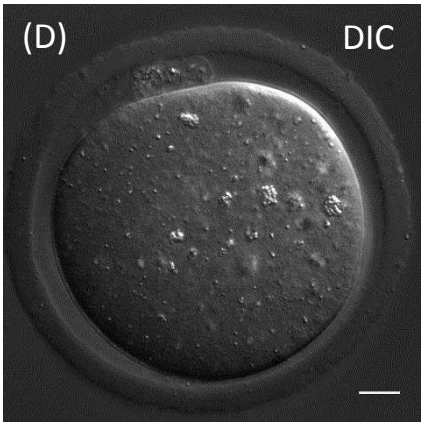
D-OA-matured MII Egg at time 0

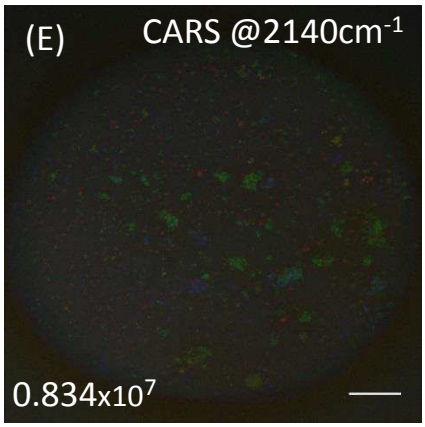


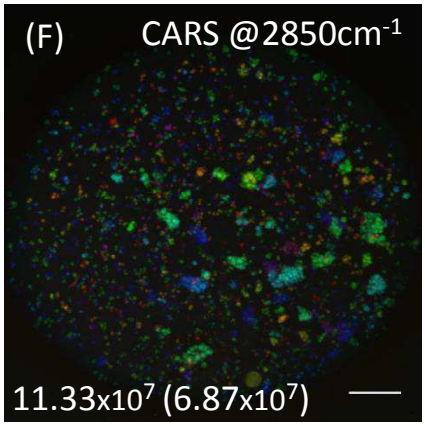




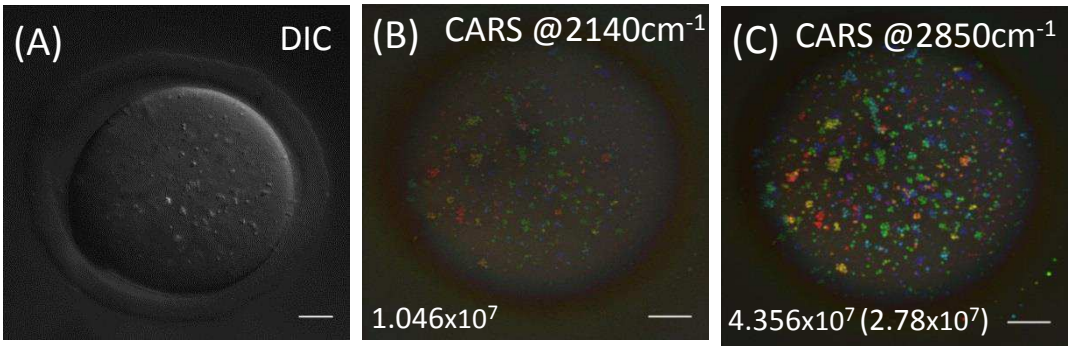
No D-OA IVM Control MII Egg



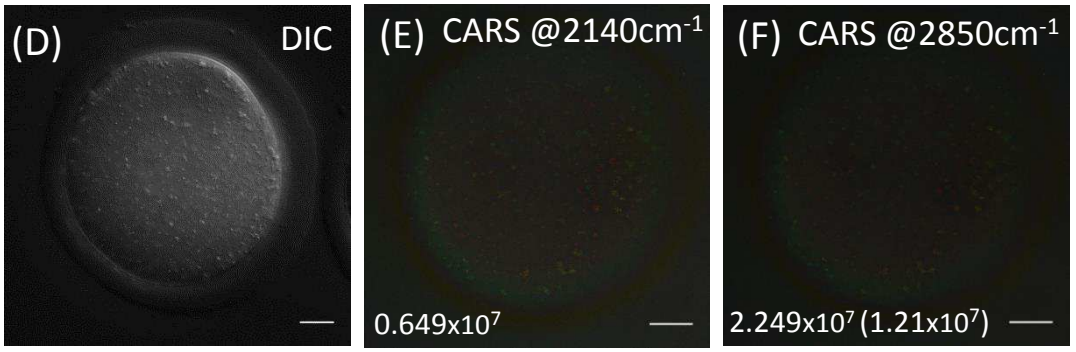




D-OA loss after ~6hrs in simple M2 medium



D-OA loss after ~6hrs with carbohydrate starvation



No D-OA loss after ~6hrs with β-oxidation-inhibition

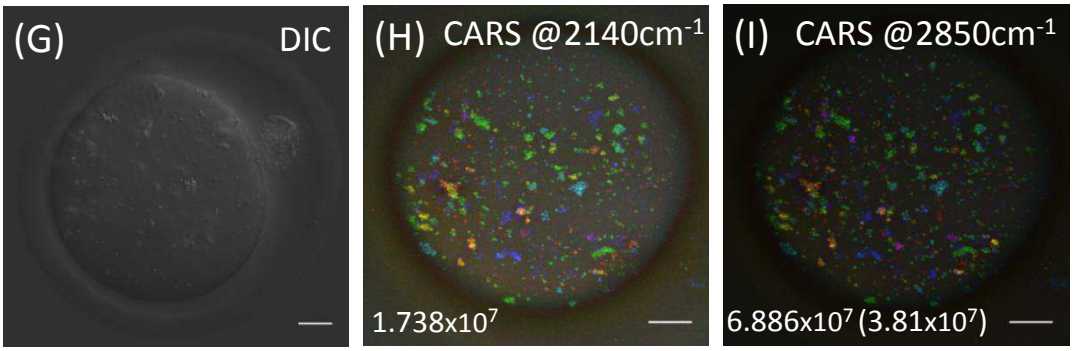


Fig.5

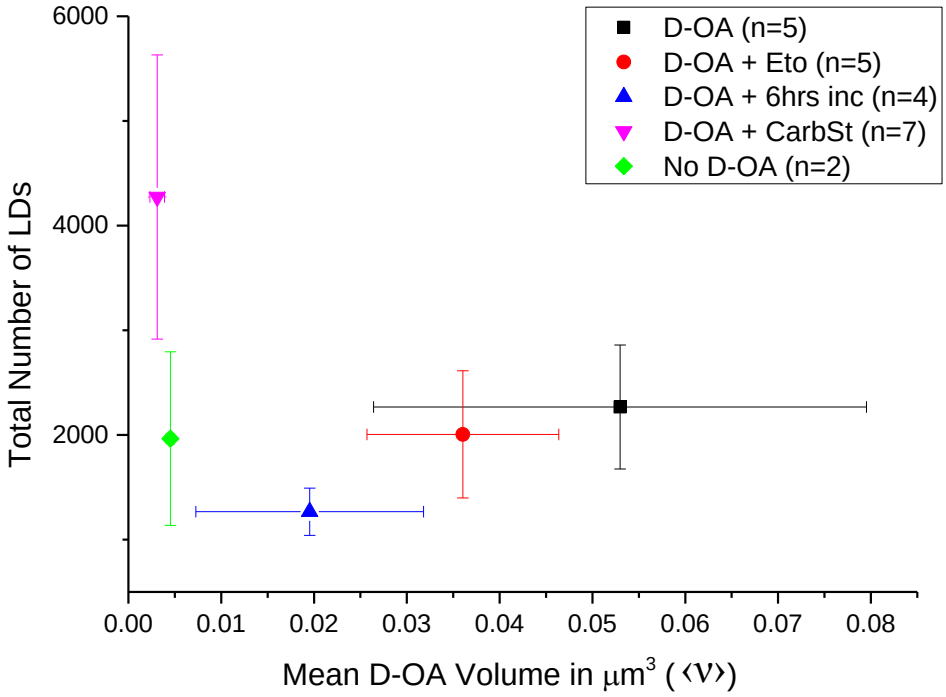
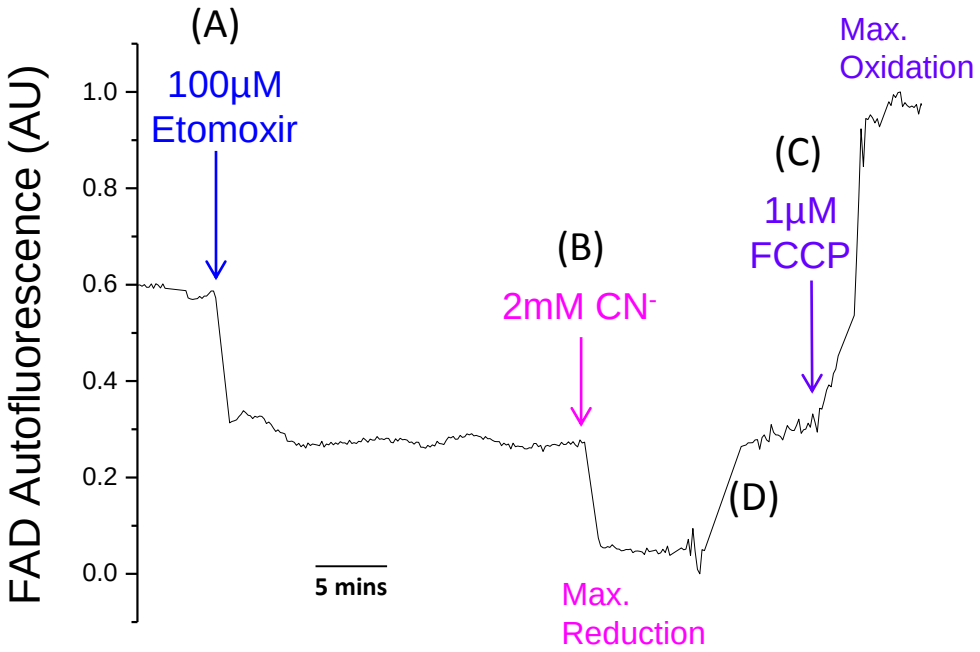
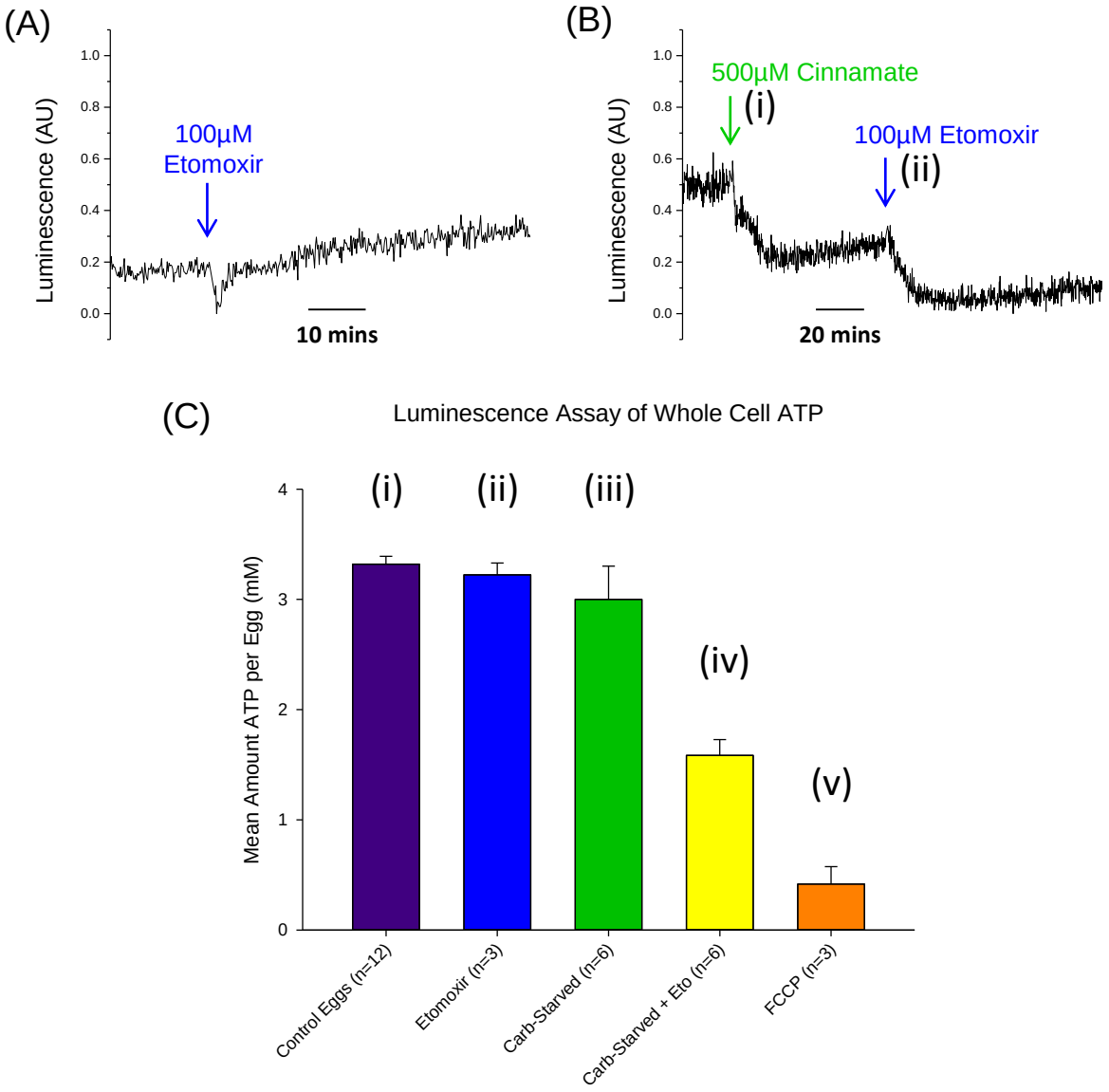

D-OA (n=5)
D-OA + Eto (n=5)
D-OA + 6hrs inc (n=4)
D-OA + CarbSt (n=7)
No D-OA (n=2)
Total Number of LDs
6000
4000
2000
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
Mean D-OA Volume in μm3 (‹v›)

Fig.6


(A)
100µM
Etomoxir
(B)
2mM CN-
(C)
1µM
FCCP
(D)
Max.
Oxidation
Max.
Reduction
FAD Autofluorescence (AU)
1.0
0.8
0.6
0.4
0.2
0.0
5 mins


(A)
Luminescence (AU)
1.0
0.8
0.6
0.4
0.2
0.0
100µM
Etomoxir
10 mins
(B)
Luminescence (AU)
500µM Cinnamate
(i)
100µM Etomoxir
(ii)
20 mins
(C)
Luminescence Assay of Whole Cell ATP
Mean Amount ATP per Egg (mM)
4
3
2
1
0
(i)
(ii)
(iii)
(iv)
(v)
Control Eggs (n=12)
Etomoxir (n=3)
Carb-Starved (n=6)
Carb-Starved + Eto (n=6)
FCCP (n=3)

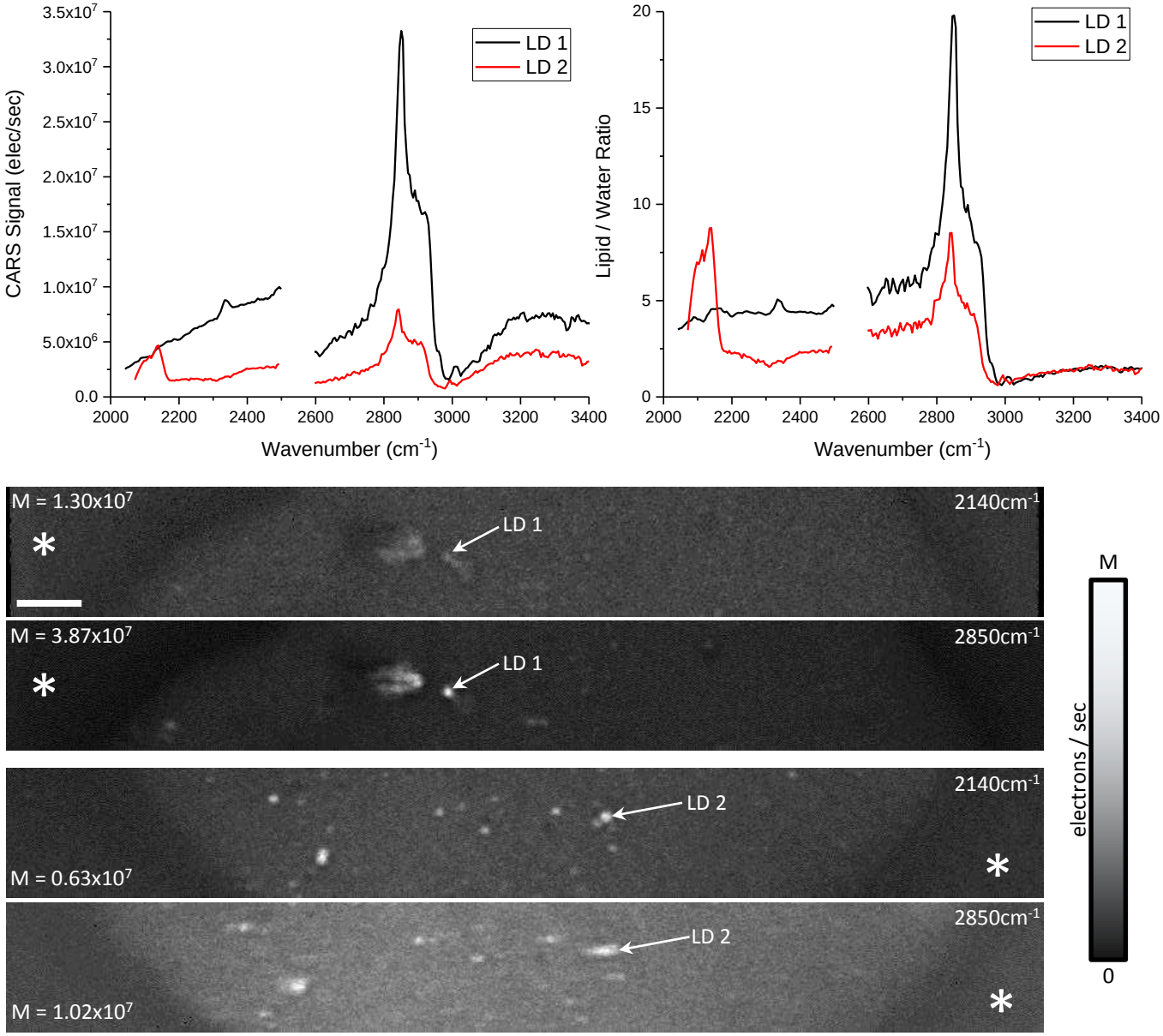


Figure S1. Lipid droplet spectrum (averaged over a single droplet, as indicated in images) taken from two different MII eggs incubated in etomoxir for 6hrs after incubation with D-OA. Graph top left, CARS signal averaged across lipid droplet. Graph top right, lipid/water ratio. Water signal was averaged in the region identified by the * in images. CARS images at the frequencies 2140 cm-1 and 2850 cm-1 showing the location of the lipid droplets used to plot the spectra in the above graphs. M indicates the grey scale range, in electrons per second, over which the images are plotted. Scale bar equals 5 microns.

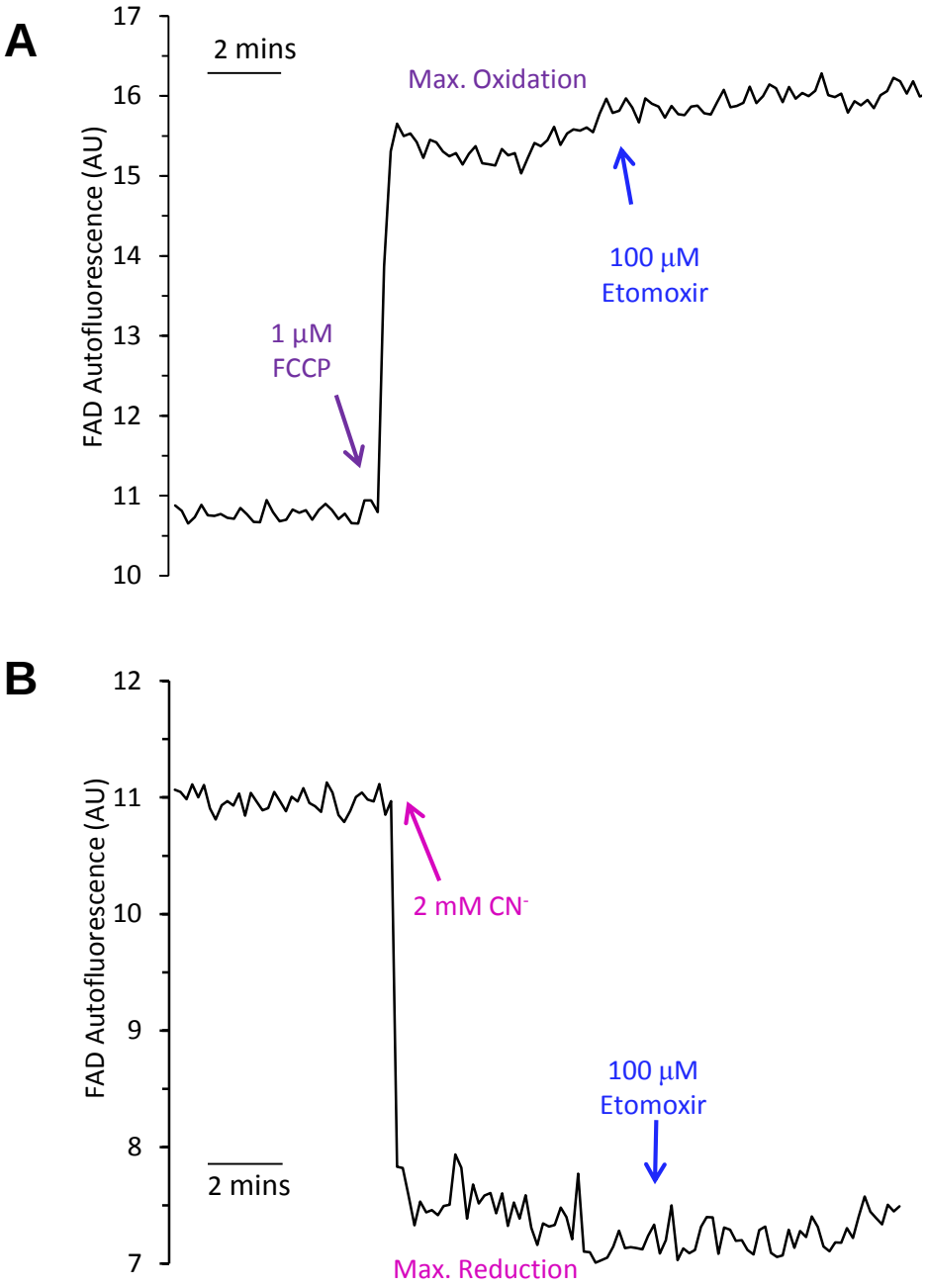


Figure S2. Etomoxir on FAD autofluorescence in mouse eggs.
Mitochondrial FAD autofluorescence signals in MII eggs incubated and imaged in standard HKSOM media. In **A** the eggs were subjected to exposed 1 µM FCCP to cause maximum oxidation, followed by addition of 100 µM etomoxir (n = 9). In **B** the addition of 2mM cyanide was added to cause maximum reduction, followed by addition of 100 µM etomoxir (n=9). All data is representative of multiple trials, using 2-3 mice for each. In neither type of experiment did etomoxir cause a change in autofluorescence.

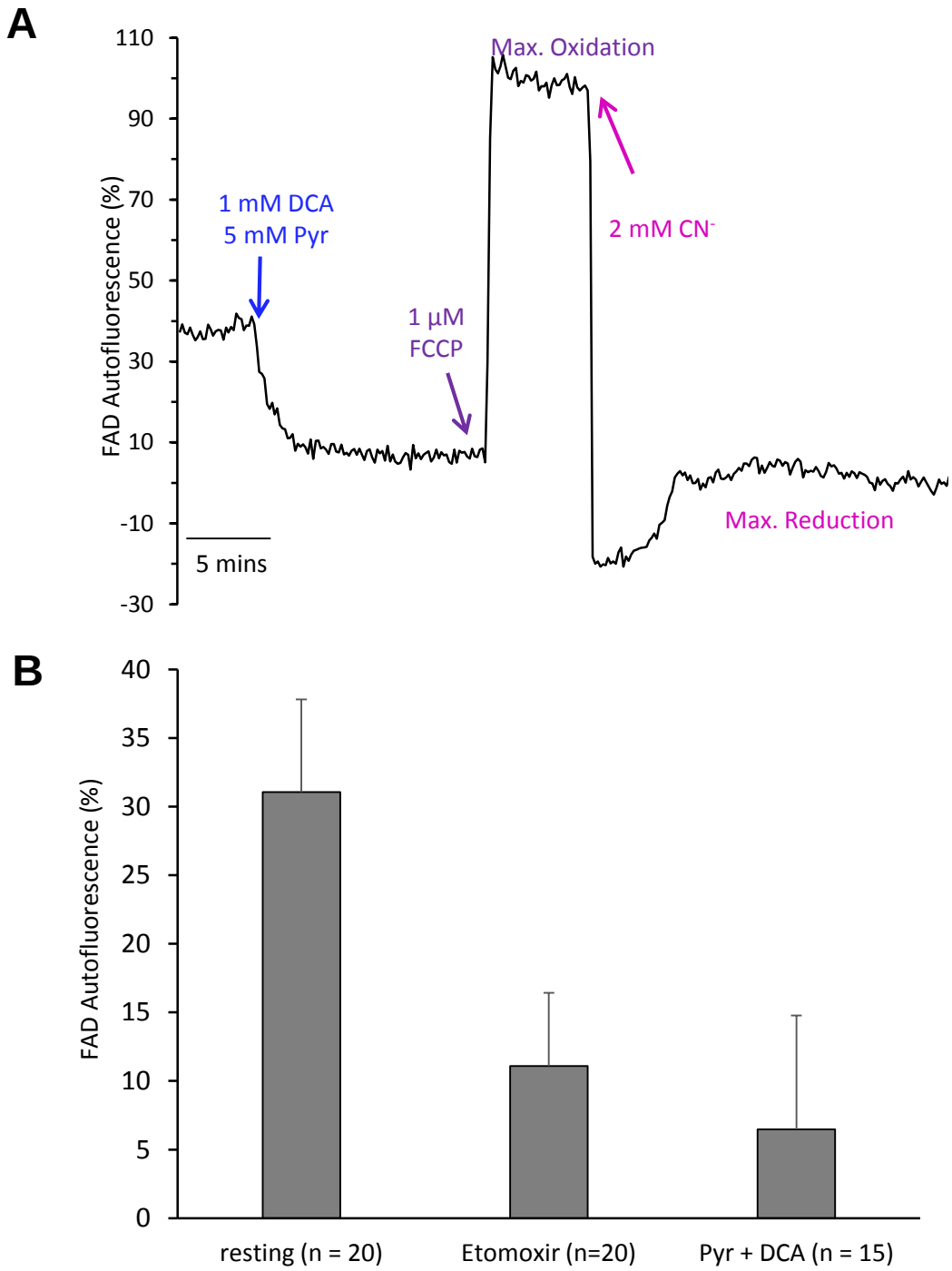


Figure S3. Effects of Pyruvate Intake On Mitochondrial Redox Potential of FAD in MII eggs.

In **A** the mitochondrial FAD autofluorescence signal was measured from MII eggs in standard HKSOM media. Then eggs were exposed to 1 mM dichloroacetate (DCA) plus 5 mM pyruvate which caused a decrease in FAD autofluorescence. This was followed by maximum oxidation (1 µM FCCP) and induction of maximum reduction (2 mM cyanide) (n=15). Data is representative of multiple trials, using 2-3 mice for each. In **B** the average mitochondrial redox potentials are shown based upon FAD auto-fluorescence measurements, all eggs were incubated and imaged in standard HKSOM media. The resting state is that seen at the start of the experimeny, then the average is shown for eggs treated with 100 µM etomoxir, and finally the level is shown for that seen after adding 1 mM DCA and 5 mM pyruvate.