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Supplementary Information for

Low doses of the neonicotinoid insecticide imidacloprid induce oxidative stress triggering neurological and metabolic impairments in *Drosophila melanogaster*

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Supplementary Materials and Methods

Collecting third instar larvae

3 to 5 days old male (n = 6) and female (n = 30) adult flies were placed into vials on standard food media. The flies were left undisturbed for 24 hours for oviposition and then cleared from vials, which were maintained at 25°C for 5 additional days at which point in time third instar larvae were collected. Larvae were recovered from the food using 20% w/v sucrose solution (non-Analytical Reagent) into each vial. The top layer of food was then gently disrupted with a metal rod in order to release the larvae, which float in the sucrose solution. The solution was then carefully poured onto a fine cloth mesh to isolate the larvae and transferred onto grape juice agar plates (#Food media recipes).

Food media recipes

Standard Food (1L)		**Grape Juice Plates (1L)**		**Molasses Food (1L)**	
H_2O	987 mL	*H_2O*	720 mL	*H_2O*	800 mL
Potassium Tartrate	8.0 g	*Agar*	20 g	*Molasses*	160 mL
Calcium Chloride	0.5 g	*Apple Juice*	200 mL	*Maize meal*	60 g
Agar	5.0 g	*Brewer's Yeast*	7.0 g	*Dried active yeast*	15 g
yeast	12 g	*Glucose*	52 g	*Agar*	6.0 g
Glucose	53 g	*Sucrose*	26 g	*Acid mix*	7.5 mL
Sucrose	27 g	*Tegosept*	6.0 mL	*Tegosept*	5.0 mL
Semolina	67 g				
Acid Mix	12 mL				
Tegosept	15 mL				

Insecticide dilution and exposure

Pure imidacloprid (Sigma Aldrich) was used in all assays. The chemical was diluted with dimethyl sulfoxide (DMSO) to create a 1000 ppm stocks solution which was kept on freezer (-20°C). Before exposures, 5x stocks were generated for the dose being used by diluting the 1000 ppm stock in 5% Analytical Reagent Sucrose (Chem Supply) solution. An equivalent volume of DMSO replaced the insecticide for controls. For larval acute exposure assays, third instar larvae were exposed in 5% w/v sucrose (Chem Supply) in NUNC cell plates (Thermo-Scientific) dosed with the desired insecticide concentration for up to 2 hr. For adult exposures, the insecticide was diluted in lukewarm food. An equivalent volume of DMSO replaced the insecticide for controls. A new batch of treated food was cooked every week and vials were replaced every second day. Adult flies chronically exposed were kept in dark at 25°C.

Larval movement assay

Larval movement in response to insecticide exposure was quantified by Wiggle Index Assay, as described in (1). Briefly, 25 third instar larvae were used for a single biological replicate and four replicates were tested for each exposure condition. Larvae placed into NUNC cell plates (Thermo-Scientific) in 5% Analytical Reagent Sucrose (Chem Supply) solution were filmed for 30 seconds before insecticide exposure. After adding insecticide solution larvae were filmed again at the desired time-points. Videos were analyzed in R software (v.3.4.3) using the WI script. The motility in response to each insecticide is expressed in terms of Relative Movement Ratio (RMR), normalized to motility prior to addition of the insecticide.

Larval viability and adult survival tests

For all tests 5 replicates of 20 individuals (100 individuals) per condition were used. In assessing third instar larval viability and metamorphosis following insecticide exposure, individuals were rinsed three times with 0.5% w/v sucrose (Chem Supply) and placed in vials on insecticide-free food medium. For the following 10 days the vials were scored for dead larvae, pupae or adults. Cumulative adult emergence from larvae exposed to 2.5 ppm imidacloprid for 2 hr was analyzed using the Kolmogorov–Smirnov test. To examine the survival of adult flies chronically exposed to 4 ppm imidacloprid, 5 replicates of 20 females (3-5 days old) were exposed for 25 days. The same number of flies was used for the control group. Statistical analysis was based on the Kaplan-Meier method and the data were compared by the Log-rank Mantel-Cox test.

Evaluation of mitochondrial turnover

Larvae of the MitoTimer line were exposed to 2.5 ppm imidacloprid for 2 hr. Control larvae were exposed to 2.5ppm DMSO. Midguts and brains were dissected in PBS and fixed in 4% PFA (Electron Microscopy Science) and mounted in Vectashield (Vector Laboratories). 20 proventriculus and 20 pairs of optical lobes were analyzed for each condition. Confocal microscopy images were obtained in Leica SP5 Laser Scanning Confocal Microscope at 200x magnification for both green (excitation/emission 488/518 nm) and red (excitation/emission 543/572 nm) signals. Three independent measurements along the z stack were analyzed for each sample. Fluorescence intensity was quantified on ImageJ software and results were analyzed using a t-test.

Systemic mitochondrial aconitase activity

Relative mitochondrial aconitase activity was quantified using the colorimetric Aconitase Activity Assay Kit from Sigma (#MAK051), following manufacturer's instructions. A total of 6 samples (25 whole larvae per sample) were exposed to 2.5 ppm imidacloprid for 2 hr, whilst 6 control samples (25 whole larvae per sample) were exposed to DMSO for 2 hr. The final reaction absorbance was measured at 450 nm in a FLUOstar OPTIMA (BMG Labtech) microplate reader using the software OPTIMA. Sample absorbance was initially normalized to the respective sample weight and then absorbance levels of exposed animal samples were normalized to the absorbance levels for controls. Data were analyzed using a t-test.

Systemic ATP levels

Relative ATP levels were quantified fluorometrically using an ATP assay kit (Abcam, #83355), following manufacturer's instructions. A total of 6 samples (20 larvae per sample) were exposed to 2.5 ppm imidacloprid for 2 hr, whilst 6 control samples (20 larvae per sample) were exposed to DMSO for 2 hr. The final reaction fluorescence was measured at excitation/emission = 535/587 nm in FLUOstar OPTIMA (BMG Labtech) microplate reader using the software OPTIMA. Sample fluorescence was initially normalized to the respective sample weight and then fluorescence levels of exposed animal samples were normalized to absorbance levels in controls. Data were analyzed using a t-test.

Measurement of superoxide (O^{2-}) levels

To evaluate the level of reactive oxygen species (ROS) we stained tissues with dihydroethidium (DHE – Sigma-Aldrich), as described in (2). Briefly, larvae were dissected in Schneider's Drosophila Medium 1x (GIBCO) and incubated in the same medium containing 30 µM DHE at room temperature on an orbital shaker for 7 minutes in dark. Three washing steps of five minutes each were performed with Schneider's Drosophila Medium 1x. Tissues were fixed in 8% PFA (Electron Microscopy Science) for 5 minutes at room temperature on an orbital shaker in the dark. Tissues were then rinsed once with PBS (Ambion) and mounted in Vectashield (Vector Laboratories). Confocal microscopy images were obtained using a Leica SP5 Laser Scanning Confocal Microscope at 200x magnification (excitation/emission 518/605 nm). Third instar larvae were exposed to 2.5 ppm imidacloprid for 1 or 2 hr. Controls were exposed to equivalent doses of DMSO. A total of 15 brains and 15 midguts were assessed for each condition. Three independent

measurements along the z stack were analyzed for each sample. Fluorescence intensity was quantified on ImageJ software and results were analyzed using a t-test.

Generating oxidative stress in the brain

To test whether the generation of oxidative stress in the brain could trigger disturbances in other tissues, such as fat body and Malpighian tubules, two mitochondrial genes were independently knocked down in brains. ND42 (NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 10) encodes a subunit of complex I of the mitochondrial electron transport chain and Marf (mitochondrial assembly regulatory factor) encodes a GTPase that mediates outer mitochondrial membrane tethering and fusion. To knockdown these genes UAS ND42 RNAi (BDSC #28894) and UAS Marf RNAi (BDSC #55189) were independently crossed with the neuronal driver Elav-Gal4 (BDSC #8760). UAS Luciferase RNAi (BDSC #31603) was crossed with Elav-Gal4 (BDSC #8760) to provide a control. To measure impacts outside central nervous system the fat bodies and Malpighian tubules were dissected from 10 larvae per group, stained with Nile red before using confocal microscopy to visualize and count the number of lipid droplets (# Evaluation of lipid environment of metabolic tissues in larvae).

Evaluation of lipid environment of metabolic tissues in larvae

Fat bodies, midguts and Malpighian tubules were dissected in PBS (Ambion) and subjected to lipid staining with Nile Red N3013 Technical grade (Sigma-Aldrich). For insecticide exposures three biological replicates were performed for each exposure condition. Each replicate consisted of a single tissue from a single larva. A Nile Red stock solution (100 µg/mL in acetone) was prepared. A 10 µg/mL intermediate PBS dilution was used to prepare 1 µg/mL PBS use solution. Tissues were fixed in 4% paraformaldehyde (PFA-Electron Microscopy Science) in PBS for 20 minutes at room temperature. PFA was removed and tissues were washed 3 times in PBS. Samples were stained with 0.5 µg/mL Nile Red/PBS for 20 minutes in dark and agitation and washed 5 times. Slides were mounted in Vectashield (Vector Laboratories) and analyzed using a Leica SP5 Laser Scanning Confocal Microscope at 400x magnification. Red emission was observed with 540 ± 12.5 nm excitation and 590 LP nm emission filters. Images were analyzed using ImageJ software. For fat bodies, the number, size and percentage of area occupied by lipid droplets was measure in 5 different sections, 2500 μm^2 per tissue per section. For Malpighian tubules, the number of lipid droplets was measure in 5 different sections of 900 μm^2 per tissue per replicate. Results were analyzed using t-test.

Lipid quantification in larval hemolymph

Extracted hemolymph lipids were measured using the sulfo-phospho-vanillin method. 30 third instar larvae were used for a single biological replicate and 7 replicate samples were prepared for each exposure condition. Larvae were wounded with a sterile needle and placed into a microtube with a hole at the bottom, which was placed inside another microtube and centrifuged for 5 minutes at 9500 rpm. In total 4 µL of hemolymph were collected for each replicate. Hemolymph was dissolved in 100 µL of chloroform/methanol solvent (2:1 ratio). Solvent was evaporated at 95°C for 10 minutes. 100 µL of concentrated sulfuric acid was added and then the solution was incubated for 20 minutes at 95°C. After cooling in ice for two minutes, 500 µL of vanillin reagent (0.2% vanillin in 67% ortho-phosphoric acid) was added. The final reaction absorbance was measured at 540 nm in a CLARIOstar (BMG LABTECH) microplate reader using MARS Data Analysis Software (version 3.10 R3). Cholesterol (Sigma-Aldrich) was used for the preparation of standard curves. Results were analyzed using a t-test.

Lipid extraction for LC-MS

Third instar larvae exposed for 2 hr to 2.5 ppm imidacloprid (2.5 ppm DMSO for controls) were transferred to cryomill tubes and frozen in liquid nitrogen. Three biological replicates were prepared for each condition; each replicate was composed of 10 larvae and kept at -80°C until lipid extraction. Larval weight was recorded to normalise lipid quantification. For sample extraction 200 µL of methanol containing 0.001% BHT (butylated hydroxytoluene, an organic lipophilic antioxidant) and 0.01 g/mL 13C5 Valine (IS) were added to each cryomill tube. Samples were subsequently homogenized (three × 45 seconds at 6100 rpm, with 30 seconds rest

between) using a Cryomill (Bertin Technologies) at -10°C. Then 400 µL of chloroform was added to each tube and samples were incubated for 15 min at room temperature in a shaker at 1200 rpm. Samples were then centrifuged for 15 minutes, at 13000 rpm at room temperature; the supernatants were removed and transferred to new 1.5 mL microtubes. For a second wash, 100 µL of methanol (0.001% BHT and 0.01 g/mL 13C5 Valine) and 200 µL of chloroform were added to cryomill tubes, followed by vortexing and centrifuging as before. Supernatants were transferred to the previous 1.5 mL microtubes. 300 µL of 0.1 M HCl was added to pooled supernatants, microtubes were then vortexed and centrifuged (15 minutes, room temperature, 13000 rpm). Upper phases (lipid phases) were collected and transferred to clean 1.5 mL microtubes, as well as the lower phases (polar phases). Microtubes with lower phase were washed with 200 µL of chloroform, centrifuged as before and the new upper phases were transferred to clean 1.5 mL microtubes, whereas the lower phases were combined with the lower phases from previous wash. Once the final upper and lower phases were extracted and sorted in different microtubes, 50 µL aliquot from each upper phase sample were pooled together to make a PBQC (pooled biological quality control sample). The same was done to create a PBQC from lower phase samples. For each sample, 300 µL of the lower phase was transferred into glass inserts and dried down then re-suspended in 100 µL of 50% methanol:water (v/v) for LC-MS analysis. The rest of the lower fractions were transferred to HPLC vials for the LC-MS analysis. Samples from upper phase were dried down in glass inserts for lipid analysis (speed vac at minimum vacuum of 200 bar to avoid chloroform bubbling). Upper phase samples were re-constituted in 100 µL 1:1 buthanol:methanol with 100 mM ammonium formate. All samples were kept at -20°C until analysis. For LC-MS analysis, microtubes were shaken for 30 minutes at 30°C, then centrifuged at 100rpm for 10 minutes at room temperature after which the supernatants were transferred to LC vials. Extracts were used for lipid analysis as well as for peroxidized lipid analysis.

Lipid analysis using LC-MS

Lipids were separated by injecting 5 µL aliquots of lipid extract onto a 50 mm × 2.1 mm × 2.7 µm Ascentis Express RP Amide column (Supelco, Sigma, St Louis, USA) at 35 °C using an Agilent LC 1200 (Mulgrave, Australia), and eluted at 0.2 mLmin-1 over a 5 min gradient of water/methanol/tetrahydrofuran (50:20:30, v/v/v) to water/methanol/tetrahydrofuran (5:20:75, v/v/v), with the final buffer held for 3 min. Lipids were analysed by electrospray ionisation-mass spectrometry (ESI-MS) using an Agilent Triple Quad 6410 (Mulgrave, Australia). Lipid species from each class were identified using precursor ion scanning from 100 -1000 m/z, in positive ion mode, phosphatidylcholines (PC, precursors of m/z 184.1), ceramides (CER, m/z 264.6), cholesterol esters (CE, m/z 369.4), phosphatidylglycerols (PG, m/z 189) and in negative ion mode phosphatidylinositols (PI, m/z 241). Neutral loss scanning was used to identify phosphatidylethanolamines (PE, in positive ion mode, neutral loss of m/z 141) and phosphatidylserines (PS, negative ion mode, m/z 87). Diacylglycerol (DG) and Triacylglycerol (TG) species were identified according to the neutral loss of fatty acyl moiety. Identified lipid species were quantified using multiple reaction monitoring (MRM) with a 20 ms dwell time for the simultaneous measurements of ~20 to 50 compounds and the chromatographic peak width of 30 sec to 45 sec, a minimum data points collected across the peak was 12 to 16. Optimised parameters for capillary, fragmentor, and collision voltages were 4000 V, 140 - 380, and 15–60 V, respectively. In all cases, the collision gas was nitrogen at 7 Lmin-1. Lipid standards (Avanti Polar Lipids, Alabaster, USA) were prepared by combining equal volumes of individual lipid stock solutions. The standard solution was then diluted to provide a set of calibration solutions ranging in concentration from 0.1 to 10 µM. Calibration curves were constructed by least squares linear regression, fitting reverse phase peak area of the analyte against the concentration of the lipid in the reference standards. The concentration of each lipid species in the larvae extract samples was estimated by using the regression model to convert normalized peak area to lipid concentration. Detected lipid species were annotated as follows; lipid class (sum of carbon atoms in the two fatty acid chains:sum of double bonds in the fatty acid chains). The LC/MS ESI-MRM data was processed using Agilent MassHunter quantitative software (version 6) (Mulgrave, Australia). For statistical analysis the concentration of lipid compounds was initially normalized to sample weight. We calculated the Principal Components Analysis (PCA) to verify the contribution of each lipid compound in the variance of each treatment. PCA was calculated using the first two

principal component axes. To discriminate the impacts of imidacloprid on the accumulation of specific lipid compounds we performed a One-way ANOVA test with post-hoc Tukey's HSD ($p<0.05$).

Electrophysiology of the retina
Electroretinogram (ERG) recordings (Amplitude and ON transients) from chronically exposed flies were performed as described in (3). In preparation for the ERG adult flies were anesthetized and glued to a glass slide. A reference electrode was inserted in the back of the fly head and the recording electrode was placed on the corneal surface of the eye. Both electrodes were filled with 100 mM NaCl. Flies were maintained in the darkness for at least 5 min prior to a series of 1 s flashes of white light delivered using a halogen lamp. During screening 8 to 10 flies per treatment group were tested. For a given fly, amplitude and ON transient measurements were averaged based on the response to the 3 light flashes. Responses were recorded and analyzed using AxoScope 8.1. Data were analyzed using t-test.

Transmission Electron Microscopy (TEM)
Retinas of adult flies chronically exposed for 20 days were processed for TEM imaging as described in (4). Samples were processed using a Ted Pella Bio Wave microwave oven with vacuum attachment. Adult fly heads were dissected at 25 °C in 4 % paraformaldehyde, 2 % glutaraldehyde, and 0.1 M sodium cacodylate (pH 7.2). Samples were subsequently fixed at 4 °C for 48 hr. 1 % osmium tetroxide was used for secondary fixation with subsequent dehydration in ethanol and propylene oxide. Samples were then embedded in Embed-812 resin (Electron Microscopy Science, Hatfield, PA). 50 nm ultra-thin sections were obtained with a Leica UC7 microtome and collected on Formvar-coated copper grids (Electron Microscopy Science, Hatfield, PA). Specimens were stained with 1 % uranyl acetate and 2.5 % lead citrate and imaged using a JEOL JEM 1010 transmission electron microscope with an AMT XR-16 mid-mount 16 mega-pixel CCD camera. For quantification of ultrastructural features, electron micrographs were examined from 3 different animals per treatment. Data were analyzed using a t-test.

Supplementary Materials and Methods References

1. S. Denecke, C. J. Nowell, A. Fournier-Level, T. Perry, P. Batterham, The wiggle index: An open source bioassay to assess sub-lethal insecticide response in *Drosophila melanogaster*. *PLoS One* **10**, 1–18 (2015).
2. E. Owusu-Ansah, A. Yavari, U. Banerjee, A protocol for in vivo detection of reactive oxygen species. *Nat. Protoc.* **doi:10.103**, 1–10 (2008).
3. S. Yamamoto, *et al.*, A *Drosophila* genetic resource of mutants to study mechanisms underlying human genetic diseases. *Cell* **159**, 200–214 (2014).
4. X. Luo, *et al.*, Clinically severe CACNA1A alleles affect synaptic function and neurodegeneration differentially. *PLoS Genet.* **13** (2017).

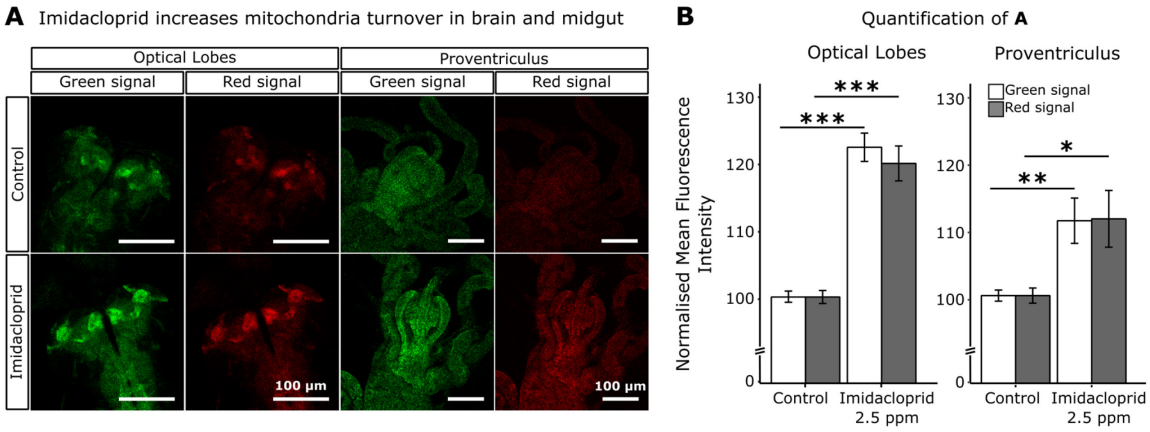

Fig. S1. Mitochondrial turnover is increased in larvae exposed to 2.5 ppm imidacloprid for 2 hr. A, Optic lobes in the brain and proventriculus of Mitotimer reporter strain larvae. Insecticide exposure increased the signal of healthy (green) and unhealthy (red) mitochondria (n = 20 larvae/ treatment; 3 image sections/ larva). Images obtained in Leica SP5 Laser Scanning Confocal Microscope, 200x magnification. **B**, Normalized mean fluorescence intensity. Error bars indicate standard error (t-test; *P < 0.05; **P < 0.01; ***P < 0.001).

A 2hr exposure to 2.5 ppm imidacloprid led to an increase of 22% and 20% for the green and red signals in the optical lobes of larval brain, respectively (**Fig. S1A, B**). An 11% increase was observed for both red and green signals in a localized anterior region of the alimentary canal, the proventriculus (**Fig. S1A, B**). That both the red and green signal increase is suggestive of increases in levels of mitochondrial biogenesis and impairment.

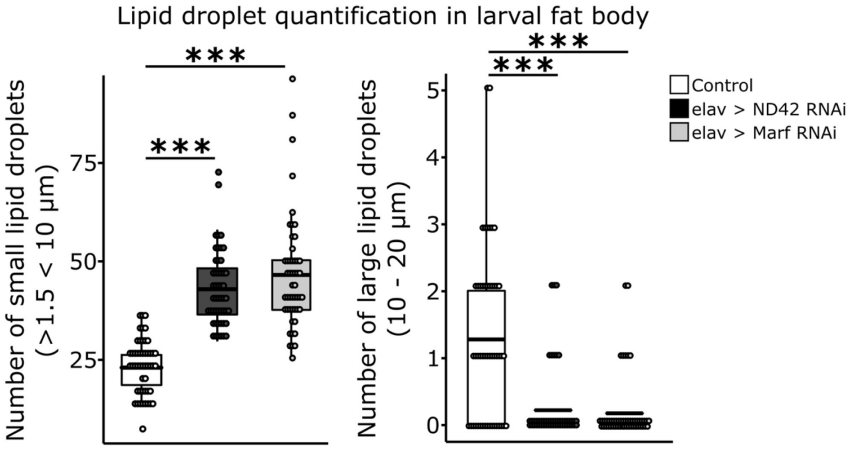

Fig. S2. Inducing ROS in the brain impacts the lipid environment of metabolic tissues. Knockdown of genes encoding mitochondrial components ND42 and Marf in neurons affected the LD dynamics in fat body (**Figure 2**). Number of small LDs (> 1.5 µm < 10 µm) (sections of 50 µm x 50 µm), and large LDs (10 µm - 20 µm) (sections of 50 µm x 50 µm) in larval fat bodies. n = 10 larvae/ group; 5 image sections/ larva. (t-test; ***P < 0.001).

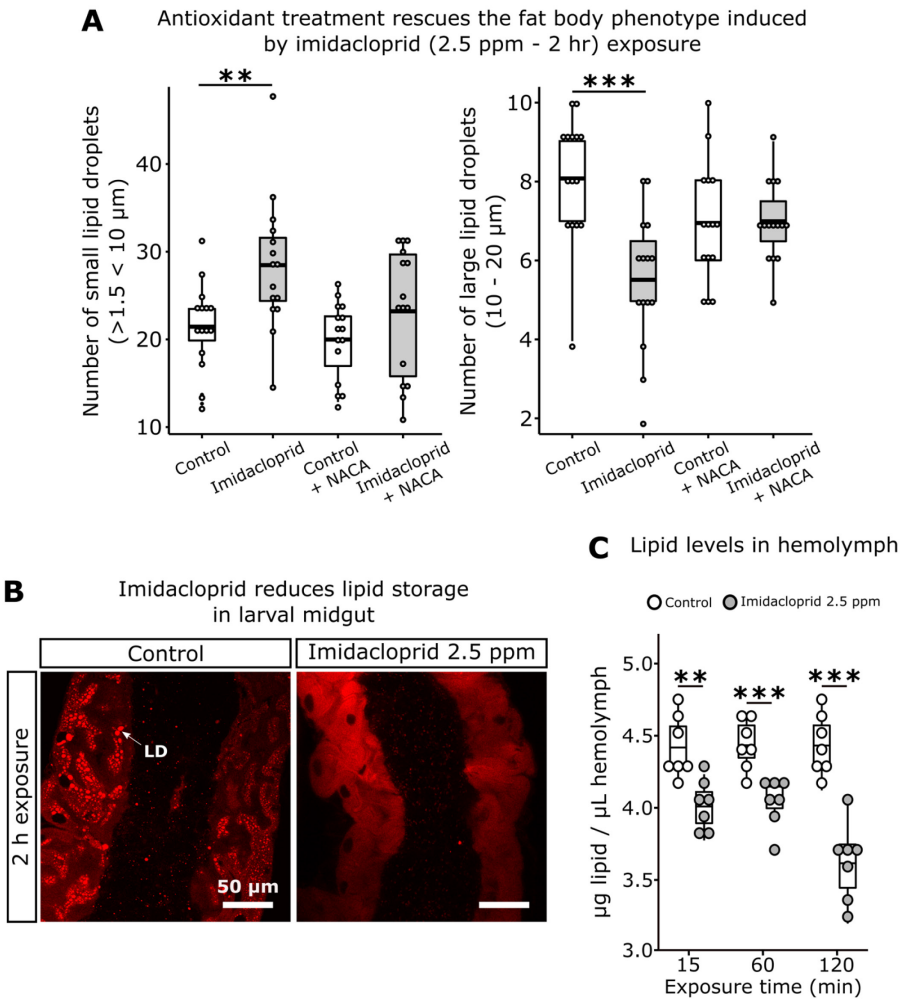

Fig. S3. Imidacloprid disturbs the lipid environment of different tissues. A, Larvae treated with 75 µg/mL of antioxidant NACA for 5 hr prior to a 2 hr exposure to 2.5 ppm imidacloprid show no significant changes in the area occupied by LDs in fat body compared with the control (**Figure 3A**). Number of small LDs (> 1.5 µm < 10 µm) (sections of 50 µm x 50 µm), and large LDs (10 µm - 20 µm) (sections of 50 µm x 50 µm) in larval fat bodies (n = 3 larvae/ group; 5 image sections/ larva). **B**, Reduced number of LDs in posterior midgut of larvae exposed to imidacloprid. White arrow indicates a LD. Zones with LD accumulation were only found in non-exposed animals (n = 3 larva/ treatment). Nile Red staining, images obtained in Leica SP5 Laser Scanning Confocal Microscope, 400x magnification. **C,** Amount of lipid in hemolymph (µg/µL) of larvae exposed to imidacloprid for 15 minutes, 1 hr, or 2 hr measured using the colorimetric vanillin assay (n = 8 replicates/ treatment/ time point; 30 larvae/ replicate). The hemolymph lipid levels are lower in exposed larvae. t-test; **P < 0.01; ***P < 0.001.

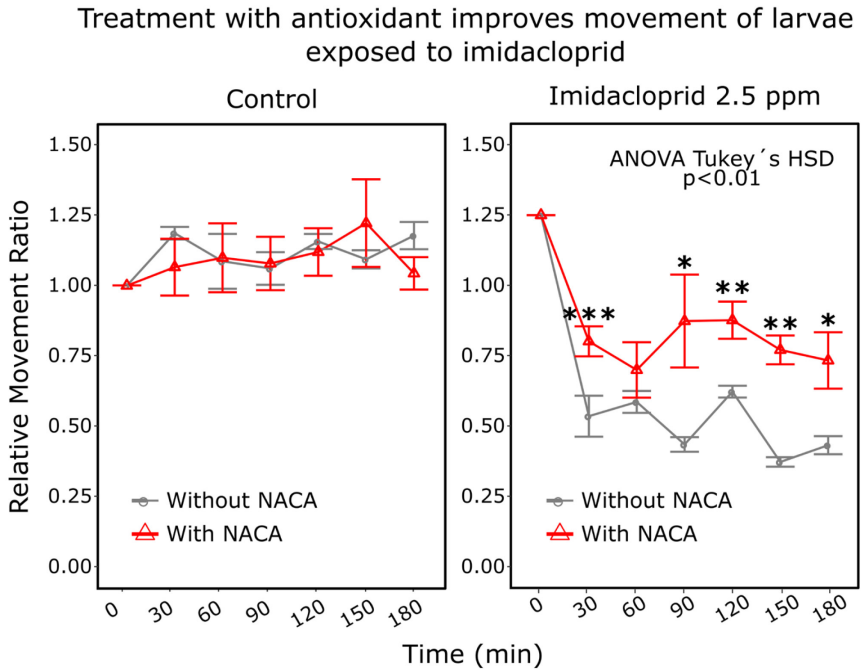

Fig. S4. Antioxidant treatment ameliorates the impact of imidacloprid on larval movement. Larvae treated with 75 µg/mL of the antioxidant N-acetylcysteine amide (NACA) for 5 hrs prior to the exposure to 2.5 ppm of imidacloprid. Dose response to insecticide by Wiggle Index analysis. Results are expressed in terms of Relative Movement Ratio (RMR) values over exposure time in minutes (n = 25 flies/ replicate; 4 replicates/ treatment). All points correspond to the mean RMR values with standard error (t-test; *P < 0.05; **P < 0.01; ***P < 0.001).

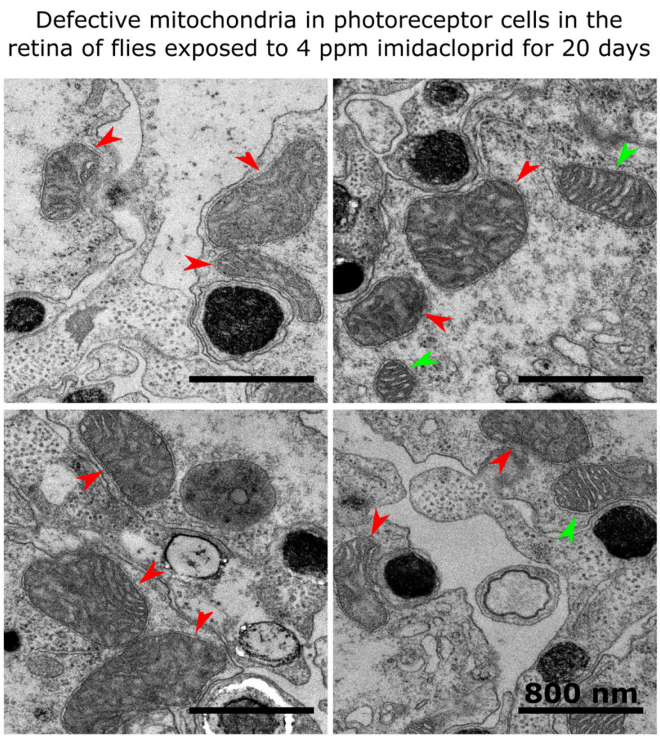

Fig. S5. Defective mitochondria in photoreceptor cells in the retina of flies exposed to 4 ppm imidacloprid for 20 days. Red arrowheads point to defective mitochondria, green arrowheads point to normal mitochondria. Transmission electron microscopy, scale bar 800 nm.

Table S1. Impact of imidacloprid on the lipidomic profile. Lipidomic profile of larvae exposed to 2.5 ppm imidacloprid or control (equivalent dose of DMSO) for 2 hr as detected by LC-MS. Values are expressed as peak intensity area normalized to sample weight.

Lipid species	Control 1	Control 2	Control 3	Imidacloprid 1	Imidacloprid 2	Imidacloprid 3	ANOVA, Tukey's HSD (p-adj)	F-value
2HPOT keto 34:2-PE-/16:0	123795.62	163589.74	219673.91	165096.1538	181774.1935	170781.25	0.9065272	0.016
2HPOT keto 34:2-PG-/16:0	90656.9	67008.5	89021.7	88942.3	109758.1	121328.1	0.114785	4.041
2HPOT keto 34:3-PC-/16:0	77372.3	33076.9	58043.5	34326.9	39032.3	45000	0.2738579	1.606
2HPOT keto 34:3-PE-/16:0	933065.69	952820.51	1215326.1	1117980.769	1093467.742	1306093.75	0.2870201	1.506
2HPOT keto 34:3-PG-/16:0	778321.2	873846.2	713152.2	777692.3	1070241.9	1170000	0.1609466	2.951
2HPOT keto 36:4-PC-/2HPOT keto 36:4	754744.5	938119.7	916087	705096.2	956612.9	1015390.6	0.8482946	0.042
2HPOT keto 36:4-PE-/18:1	2131167.9	2425726.5	2663478.3	2619134.615	2679596.774	2752500	0.1559206	3.045
2HPOT keto 36:4-PE-/18:2	1160292	1192649.6	1200434.8	1141346.154	1230161.29	1948359.375	0.3743883	0.998
2HPOT keto 36:4-PG-/18:1	1165255.5	1236239.3	1200108.7	1057115.4	1464274.2	1623437.5	0.3465024	1.136
2HPOT keto 36:4-PG-/18:2	667737.2	667435.9	531521.7	478365.4	774838.7	1163046.9	0.4186368	0.811
2HPOT keto 36:5-PC-/18:3	680438	810940.2	648260.9	747884.6	909919.4	774218.8	0.2399503	1.902
2HPOT keto 36:5-PE-/18:2	488905.11	508205.13	590434.78	453846.1538	571370.9677	770234.375	0.51622	0.506
2HPOT keto 36:5-PG-/18:2	271678.8	318461.5	243152.2	236346.2	359354.8	552656.3	0.329349	1.231
2HPOT keto 36:6-PC-/18:3	51824.8	27094	31521.7	56346.2	71371	28046.9	0.365296	1.041
CE 14:0	146788.3	242136.8	283695.7	239423.1	265967.7	197734.4	0.8327819	0.051
CE 16:0	188102.2	186153.8	236195.7	416826.9	259112.9	56328.1	0.7201948	0.148
CE 16:1	725912.4	732393.2	986195.7	1230096.2	502016.1	584453.1	0.8705959	0.03
CE 18:1	3085839.4	3167435.9	3113043.5	3411153.8	1750887.1	2330937.5	0.2690833	1.644
CE 18:2	9927	79059.8	35978.3	24326.9	56693.5	16406.3	0.7174165	0.151
CL 62:3	37606.838	41282.051	23152.174	15096.15385	12903.22581	27968.75	0.1018561	4.475
CL 64:3	152820.51	159059.83	116304.35	33365.38462	89193.54839	81093.75	0.02697661	11.64
CL 64:4	1155726.5	1217948.7	898260.87	330961.5385	586532.2581	653281.25	0.01497685	16.73
CL 64:6	20341.88	18717.949	34239.13	28365.38462	12500	17812.5	0.5121275	0.516
CL 65:0	10341.88	13589.744	11847.826	9038.461538	5564.516129	12031.25	0.2186034	2.126
CL 66:0	12478.632	12905.983	10000	14326.92308	9112.903226	16484.375	0.5575995	0.408
CL 66:3	101538.46	129487.18	48152.174	8076.923077	52258.06452	22187.5	0.07344596	5.815
CL 66:4	575811.97	634786.32	513260.87	168076.9231	333790.3226	461562.5	0.05097258	7.605
CL 66:6	44017.094	35470.085	30760.87	17115.38462	21290.32258	22734.375	0.01799371	14.98
CL 67:0	123247.86	114358.97	86413.043	40384.61538	46612.90323	94531.25	0.08030337	5.426
CL 68:10	36495.727	32649.573	34347.826	34903.84615	18306.45161	29843.75	0.2475009	1.83
CL 68:11	19743.59	23931.624	12934.783	2884.615385	7258.064516	546.875	0.01520946	16.57
CL 68:3	24871.795	21111.111	23913.043	20288.46154	19193.54839	29921.875	0.9657504	0.002
CL 68:4	90854.701	82564.103	43695.652	6730.769231	39112.90323	28046.875	0.05142733	7.557
CL 68:6	1092222.2	1137692.3	817934.78	150384.6154	576774.1935	536328.125	0.02429935	12.44
CL 69:0	636495.73	660000	430108.7	55961.53846	312903.2258	294140.625	0.03248173	10.33
CL 70:0	62136.752	79914.53	57173.913	58076.92308	57661.29032	69453.125	0.5860943	0.35
CL 70:10	111880.34	130085.47	100326.09	101057.6923	83629.03226	115703.125	0.3327475	1.212

CL 70:2	97179.487	114871.79	105652.17	93365.38462	76129.03226	113593.75	0.389713	0.929
CL 70:4	5811.9658	14102.564	13369.565	6538.461538	9758.064516	12421.875	0.6541253	0.234
CL 70:6	113675.21	110512.82	45760.87	12019.23077	47741.93548	37968.75	0.07963051	5.426
CL 72:10	30427.35	39658.12	21521.739	19230.76923	18467.74194	27109.375	0.2057904	2.277
CL 72:11	52307.692	75555.556	58260.87	42500	33467.74194	68906.25	0.3403353	1.17
CL 72:4	214871.79	201452.99	188913.04	156346.1538	147338.7097	182265.625	0.03663744	9.537
CL 74:7	100341.88	94957.265	50217.391	47596.15385	41935.48387	74218.75	0.2196609	2.114
DG 28:0 -(14:0)	41232263	43517778	56964783	114516730.8	45045403.2	100118593.8	0.1446323	3.274
DG 30:0 -(14:0)	20333869	16738120	33330544	27939134.6	21435967.7	8719296.9	0.6164652	0.294
DG 30:0 -(15:0)	222116.8	189145.3	224782.6	59038.5	111371	103125	0.003702807	36.94
DG 30:0 -(16:0)	31792482	28049829	52891848	42590000	32173951.6	24357265.6	0.6533128	0.235
DG 30:1 -(14:0)	112222774	95524615	144444891	137996153.8	101023871	88472812.5	0.7106886	0.159
DG 30:1 -(14:1)	13757883	11986325	20162065	13815673.1	11538951.6	11552421.9	0.3121899	1.335
DG 30:1 -(16:0)	12133212	11247180	18532283	13936923.1	10795564.5	9536562.5	0.3894348	0.93
DG 30:1 -(16:1)	141050292	119525299	179823044	175566250	121591935.5	108164687.5	0.6886004	0.186
DG 32:0 -(14:0)	1981678.8	2075042.7	2994347.8	3262019.2	2035725.8	1740156.3	0.994194	0
DG 32:0 -(16:0)	28784891	24649402	42998804	43127980.8	26091612.9	21555937.5	0.8372062	0.048
DG 32:0 -(18:0)	4620875.9	3709059.8	6845978.3	6698846.2	4243790.3	4440625	0.9575369	0.003
DG 32:1 -(14:0)	119655329	117577436	153631848	155256442.3	106307903.2	96085390.6	0.636464	0.261
DG 32:1 -(14:1)	1084744.5	1191111.1	2034456.5	1517211.5	1253467.7	937187.5	0.5907516	0.341
DG 32:1 -(16:0)	93221387	88162821	125805978	126053750	84295887.1	77518359.4	0.7543883	0.112
DG 32:1 -(16:1)	112397080	104677350	148316522	151328076.9	99041774.2	91196406.3	0.7490657	0.117
DG 32:1 -(18:0)	892335.8	1543418.8	2525978.3	2264423.1	1165161.3	1734687.5	0.9116005	0.014
DG 32:1 -(18:1)	137173577	129496667	183220326	181773942.3	121549596.8	107640468.8	0.6700384	0.211
DG 32:2 -(14:0)	8099197.1	7010427.4	9596304.3	7751923.1	5868709.7	8843437.5	0.5504082	0.424
DG 32:2 -(14:1)	16463504	14628974	23230109	17034807.7	14066693.5	12871640.6	0.2990523	1.421
DG 32:2 -(16:1)	204709270	186125812	293435000	250646442.3	200716048.4	165087421.9	0.613857	0.299
DG 32:2 -(18:1)	13110438	11873162	17568261	15491538.5	12767983.9	11868359.4	0.7127766	0.156
DG 32:2 -(18:2)	12836788	11616068	18780326	12521826.9	11220080.6	13048437.5	0.3992975	0.888
DG 34:0 -(14:0)	180729.9	139743.6	273369.6	293942.3	125887.1	147656.3	0.9004185	0.018
DG 34:0 -(16:0)	5460729.9	4198547	7729239.1	6830096.2	4721935.5	4397734.4	0.7277024	0.14
DG 34:0 -(18:0)	6165255.5	4886837.6	9138369.6	9939519.2	4819677.4	4652890.6	0.9095122	0.015
DG 34:0 -(20:0)	236496.4	342649.6	233587	438942.3	121693.5	31093.8	0.5978174	0.327
DG 34:1 -(16:1)	9410802.9	5651282.1	12105761	11474230.8	5501612.9	7322656.3	0.7290748	0.138
DG 34:1 -(18:0)	7627445.3	4759401.7	7893369.6	10085576.9	6521774.2	5677734.4	0.7115175	0.158
DG 34:1 -(18:1)	167782993	140669658	246624239	211294615.4	158396532.3	124938906.3	0.6450908	0.247
DG 34:1 -(20:0)	131751.8	324615.4	272826.1	117884.6	342580.6	183203.1	0.7626448	0.105
DG 34:2 -(16:0)	8007518.2	6161880.3	9911739.1	6500288.5	5472500	6101875	0.1492177	3.178
DG 34:2 -(16:1)	84736861	76823846	118052283	107352307.7	75306451.6	65580703.1	0.5895332	0.343
DG 34:2 -(18:1)	139355183	128887265	202773261	186866057.7	131831935.5	110240000	0.6878778	0.187
DG 34:2 -(18:2)	10302044	8617435.9	13534022	9174423.1	8951935.5	9436406.3	0.3235876	1.265

DG 36:0 -(16:0)	188102.2	186153.8	236195.7	416826.9	259112.9	52890.6	0.7301063	0.137
DG 36:0 -(18:0)	1768759.1	1696837.6	2512173.9	1986057.7	1312741.9	1251875	0.2469064	1.836
DG 36:0 -(20:0)	269416.1	275213.7	423804.3	373557.7	182661.3	132343.8	0.3544919	1.095
DG 36:1 -(16:1)	725912.4	732393.2	986195.7	1262115.4	502016.1	584453.1	0.9064899	0.016
DG 36:1 -(18:0)	8194452.6	3938803.4	14448696	13465000	7254677.4	5233515.6	0.9600325	0.003
DG 36:1 -(18:1)	10549781	11541026	15197283	15181250	10267096.8	7618593.8	0.6207398	0.287
DG 36:1 -(20:0)	800875.9	728547	360000	958750	668629	473828.1	0.7371453	0.13
DG 36:2 -(18:0)	999051.1	484017.1	1448913	1169134.6	611290.3	1012031.3	0.8929574	0.021
DG 36:2 -(18:1)	37264964	35416752	49351413	51339230.8	31780887.1	29779531.3	0.7276272	0.14
DG 36:2 -(18:2)	800583.9	786752.1	1056195.7	785480.8	846209.7	859453.1	0.6046068	0.315
DG 36:3 -(16:0)	12043.8	25555.6	0	0	0	16640.6	0.491381	0.573
DG 36:3 -(18:0)	146131.4	88547	71630.4	16346.2	107822.6	46093.8	0.2663152	1.666
DG 36:3 -(18:1)	4758467.2	4183418.8	4991304.3	4005961.5	3206612.9	3770781.3	0.04352331	8.489
DG 36:3 -(18:2)	5452335.8	4341111.1	6264891.3	6278076.9	3778629	4492578.1	0.617006	0.293
DG 36:3 -(18:3)	128686.1	168803.4	82173.9	173653.8	183871	129921.9	0.2972519	1.434
DG 36:4 -(18:1)	304452.6	177265	181304.3	287980.8	85887.1	119921.9	0.494508	0.564
DG 36:4 -(18:2)	1052992.7	797008.5	930652.2	282019.2	749758.1	1145000	0.4822437	0.599
DG 36:4 -(18:3)	409051.1	301965.8	489565.2	439230.8	365483.9	291093.8	0.6400569	0.255
DG 38:1 -(18:1)	3085839.4	3167435.9	3113043.5	3411153.8	1750887.1	2330937.5	0.2690833	1.644
DG 38:1 -(20:0)	680948.9	401367.5	922391.3	605961.5	679193.5	470703.1	0.636519	0.261
DG 38:4 -(20:3)	27226.3	15042.7	17391.3	15384.6	85887.1	5000	0.5778294	0.366
DG 38:5 -(16:0)	14306.6	28290.6	27826.1	24519.2	11935.5	6953.1	0.2649846	1.677
DG 38:5 -(20:3)	166642.3	108803.4	97826.1	113461.5	148790.3	152343.8	0.6066816	0.311
DG 38:5 -(22:5)	47080.3	27179.5	35760.9	64326.9	73387.1	57890.6	0.01749149	15.24
DG 38:6 -(16:0)	464525.5	914359	253152.2	1140288.5	916129	259687.5	0.5256447	0.482
DG 38:6 -(22:5)	7299.3	20341.9	49021.7	12019.2	6048.4	0	0.2017883	2.328
dhCer 16:0	259416.1	110427.4	237826.1	295769.2	68548.4	275390.6	0.9073678	0.015
dhCer 18:0	27810.2	26410.3	13152.2	81730.8	21854.8	45000	0.2079963	2.25
dhCer 20:0	18832.1	47350.4	2934.8	14519.2	14516.1	0	0.3898028	0.929
HOD 34:2-PC-/16:0	874160.6	350854.7	220869.6	363173.1	205483.9	339140.6	0.432224	0.761
HOD 34:3-PC-/16:0	20799051	20560769	20739457	20967596.2	18727661.3	21112734.4	0.6083498	0.308
HOD 34:3-PE-/16:0	50000	66581.2	12608.7	8461.5	66451.6	85000	0.7334211	0.133
HOD 34:3-PG-/HOT 34:2 PG	163503.6	172051.3	45434.8	70865.4	240080.6	344218.8	0.3650133	1.042
HOD 36:4-PC-/18:1	1337518.2	1207777.8	1465108.7	1142596.2	1130080.6	1591406.3	0.7871519	0.083
HOD 36:4-PC-/18:2	1069854	672393.2	978478.3	1150192.3	759112.9	1247500	0.490348	0.575
HOD 36:4-PE-/18:1	55401.5	81794.9	18260.9	34423.1	108225.8	121093.8	0.3314895	1.219
HOD 36:4-PG-/18:1	643211.7	651453	213913	293750	803871	990312.5	0.4884876	0.581
HOD 36:5-PC-/18:2	5985.4	4529.9	652.2	5096.2	1048.4	4687.5	0.9590547	0.003
HOD 36:5-PC-/18:3	374890.5	550256.4	403260.9	469423.1	607258.1	570156.3	0.1945369	2.423
HOD 36:5-PG-/HOT 36:4 PG	89854	52564.1	37391.3	36730.8	90645.2	109062.5	0.51888	0.499
HOD 36:6-PC-/18:3	301824.8	122478.6	134239.1	88557.7	118871	233046.9	0.6171649	0.293

HOT 34:2-PC-/16:0	16493723	19311880	20449348	20967596.2	14758467.7	8265859.4	0.3483035	1.127
HOT 34:3-PC-/16:0	16770073	16078120	16163696	15545673.1	14276371	18657031.3	0.8994234	0.018
HOT 34:3-PG-/16:0	66058.394	80000	24239.13	43173.07692	131370.9677	146406.25	0.2387063	1.914
HOT 36:4-PC-/18:1	24306.569	25555.556	11847.826	15673.07692	31935.48387	26875	0.5481246	0.429
HOT 36:4-PC-/18:2	374890.5	550256.4	403260.9	469423.1	607258.1	570156.3	0.1945369	2.423
HOT 36:4-PG-/18:1	175328.47	196410.26	52608.696	79134.61538	212096.7742	238671.875	0.6256169	0.278
HOT 36:5-PG-/oPDA 36:4 PG	21532.8	28119.7	5978.3	1538.5	18709.7	3828.1	0.2830665	1.535
HOT 36:6-PC-/18:3	48686.1	50000	47065.2	21153.8	34677.4	21171.9	0.007495624	24.99
HPOD keto 34:2-PC-/16:0	34817.5	111025.6	36847.8	33461.5	62016.1	72968.8	0.8722163	0.029
HPOD keto 34:2-PC-/16:0	172627.7	164188	222826.1	154038.5	238548.4	249296.9	0.4801317	0.605
HPOD keto 34:2-PE-/16:0	75109.5	98717.9	65326.1	93173.1	84838.7	89921.9	0.4003391	0.884
HPOD keto 34:2-PG-/16:0	39416.1	43076.9	21847.8	26923.1	33709.7	33906.3	0.6624345	0.221
HPOD keto 34:3-PC-/16:0	6820073	6517350.4	5980000	5741057.7	6025725.8	6015781.3	0.1233615	3.791
HPOD keto 34:3-PC-/16:0	660802.9	655982.9	600760.9	556826.9	821129	1137265.6	0.3035019	1.392
HPOD keto 34:3-PC-/18:3	2117226.3	2741880.3	4474565.2	3675865.4	1355161.3	4686562.5	0.9210131	0.011
HPOD keto 34:3-PE-/HPOT keto 34:2 PE	627591.2	662735	574130.4	575480.8	792822.6	816875	0.257241	1.743
HPOD keto 34:3-PG-/16:0	537591.24	621196.58	576847.83	729807.6923	662177.4194	728281.25	0.01752741	15.22
HPOD keto 36:4-PC-/18:1	2698686.1	1997948.7	2249891.3	1623365.4	2136532.3	2636250	0.6344728	0.264
HPOD keto 36:4-PC-/18:1	459416.1	482991.5	421739.1	433846.2	455806.5	748828.1	0.4251614	0.787
HPOD keto 36:4-PC-/18:2	1645985.4	1309743.6	1104565.2	515192.3	1307096.8	1726015.6	0.6831533	0.193
HPOD keto 36:4-PC-/18:2	262408.8	321709.4	255108.7	204326.9	389112.9	459062.5	0.4182887	0.813
HPOD keto 36:4-PE-/18:1	724671.5	889572.6	579565.2	690096.2	858629	783515.6	0.6743194	0.205
HPOD keto 36:4-PE-/18:2	232992.7	253589.7	254782.6	256346.2	265322.6	331953.1	0.2069389	2.263
HPOD keto 36:4-PE-/18:3	138832.12	154786.32	113913.04	111250	115080.6452	173203.125	0.9144434	0.013
HPOD keto 36:4-PG-/18:1	565328.47	751623.93	824673.91	805288.4615	872903.2258	748593.75	0.3268752	1.246
HPOD keto 36:4-PG-/18:2	153868.61	155128.21	189130.43	138653.8462	199919.3548	304921.875	0.3865296	0.943
HPOD keto 36:5-PC-/18:2	252700.7	283247.9	224782.6	211730.8	282983.9	413125	0.4687603	0.639
HPOD keto 36:5-PC-/18:3	3274233.6	2904786.3	2831630.4	2173269.2	2315725.8	3266796.9	0.3209553	1.281
HPOD keto 36:5-PC-/18:3	24598.5	28461.5	20000	33269.2	19193.5	39453.1	0.3866157	0.942
HPOD keto 36:5-PE-/18:3	49927.007	57777.778	56956.522	31826.92308	90887.09677	73437.5	0.5849512	0.352
HPOD keto 36:5-PE-/HPOT keto 36:4 PE	254525.5	265384.6	203478.3	201826.9	254677.4	430468.8	0.4892982	0.578
HPOD keto 36:5-PG-/18:2	259562.04	325982.91	254021.74	302884.6154	316935.4839	437890.625	0.2096325	2.23
HPOD keto 36:6-PC-/18:3	947080.3	694871.8	864673.9	770480.8	701935.5	1219687.5	0.7465773	0.12
HPOT keto 34:2-PC-/16:0	660802.9	655982.9	600760.9	556826.9	821129	1137265.6	0.3035019	1.392
HPOT keto 34:2-PG-/16:0	526934.31	618632.48	576847.83	732500	682580.6452	732031.25	0.01058198	20.52
HPOT keto 34:3-PC-/16:0	53047518	49862906	44425326	41148942.3	48108387.1	52577500	0.682885	0.193
HPOT keto 34:3-PC-/16:0	117299.3	132307.7	78478.3	62596.2	138387.1	180000	0.6661597	0.216
HPOT keto 34:3-PE-/16:0	25839.416	28547.009	47934.783	22596.15385	64919.35484	60859.375	0.36885	1.024
HPOT keto 34:3-PG-/16:0	151240.88	178034.19	220652.17	208942.3077	206451.6129	221875	0.2335822	1.965
HPOT keto 36:4-PC-/18:1	193795.6	193418.8	154239.1	117307.7	195645.2	294609.4	0.6986443	0.173
HPOT keto 36:4-PC-/18:2	3274233.6	2904786.3	1378804.3	422019.2	2315725.8	1617656.3	0.2536904	1.774

HPOT keto 36:4-PE-/18:1	56861.314	53076.923	55869.565	40192.30769	55483.87097	88515.625	0.6904244	0.184
HPOT keto 36:4-PG-/18:1	261970.8	358888.89	328695.65	320192.3077	400725.8065	352265.625	0.327596	1.242
HPOT keto 36:4-PG-/18:2	144452.55	310940.17	125326.09	157692.3077	195645.1613	369218.75	0.618918	0.29
HPOT keto 36:5-PG-/18:2	35839.416	57521.368	42934.783	20288.46154	56693.54839	62500	0.9457594	0.005
HPOT keto 36:6-PC-/18:3	34525.5	48974.4	30108.7	3461.5	31290.3	27734.4	0.1778365	2.666
LPC 13:0	49416.1	163675.2	314565.2	191730.8	75887.1	133125	0.6400351	0.255
LPC 14:0	8076642.3	4993162.4	14069457	10941538.5	6463387.1	6693593.8	0.7552877	0.111
LPC 15:0	746496.4	650170.9	1462826.1	1036923.1	539274.2	793593.8	0.6081647	0.309
LPC 16:0	14026788	10416923	20962717	16870480.8	8984919.4	11537109.4	0.5279266	0.477
LPC 16:1	39893796	28366752	63312174	53965096.2	27167983.9	31067734.4	0.6515142	0.238
LPC 18:0	1140583.9	729145.3	1611195.7	1163173.1	510645.2	776406.3	0.3401147	1.171
LPC 18:1	39195839	26416581	60837391	51469038.5	25766612.9	28421796.9	0.620696	0.287
LPC 18:2	14800365	10596752	18063478	15866057.7	8931048.4	12340234.4	0.5138633	0.512
LPC 18:3	392700.7	422991.5	452391.3	712884.6	400161.3	160859.4	0.9909462	0
LPC 20:0	15401.5	25470.1	14565.2	43076.9	75564.5	84375	0.01955038	14.24
LPC 20:1	97153.3	23333.3	20326.1	27019.2	53064.5	45156.3	0.8530452	0.039
LPC 20:2	16569.3	9230.8	16847.8	12596.2	19838.7	63750	0.3318111	1.217
LPC 20:3	27956.2	28034.2	16521.7	8846.2	22983.9	26328.1	0.5075717	0.528
LPC 20:5	5839.4	72649.6	21739.1	9615.4	0	18437.5	0.3126247	1.333
LPC 22:1	20146	9658.1	34565.2	23461.5	12903.2	20468.8	0.7656736	0.102
LPC 22:6	9635	16410.3	19891.3	25000	1693.5	0	0.4976534	0.555
LPC 26:0	135328.5	96495.7	0	99711.5	0	88593.8	0.7906898	0.081
LPC(O-16:0)	406204.4	106495.7	664021.7	761250	235806.5	486796.9	0.6676876	0.214
LPC(O-18:0	344744.5	134871.8	777065.2	531442.3	243951.6	201796.9	0.6878912	0.187
LPC(O-18:1)	344890.5	322051.3	674565.2	439903.8	255080.6	386953.1	0.5314136	0.468
LPC(O-20:1)	145839.4	77692.3	196304.3	175769.2	65806.5	147031.3	0.8375785	0.048
LPC(O-24:2)	94379.6	58205.1	67608.7	68557.7	32822.6	74375	0.4306657	0.767
LPE(14:0))	1097737.2	777094	1574673.9	815673.1	1118387.1	1215312.5	0.7210949	0.147
LPE(16:0)	24217007	19993504	26377500	22880288.5	16988871	18787656.3	0.1952422	2.414
LPE(18:0)	3360438	2230769.2	3450869.6	2034134.6	2117338.7	985546.9	0.07189622	5.91
LPE(18:1)	37572555	32011197	50273696	43582596.2	28193871	30753593.8	0.4675249	0.643
LPE(18:2)	5296277.4	4930341.9	6888587	7194230.8	4311532.3	5856406.3	0.9399711	0.006
M34:2-PC-/16:0	395180876	363748034	351048261	332364134.6	355669758.1	409978671.9	0.8875373	0.023
M34:2-PC-/16:0	394306.57	407094.02	522282.61	448846.1538	417661.2903	634687.5	0.4956493	0.561
M34:2-PC-/18:2	1160292	1162991.5	1193260.9	1134038.462	1230161.29	1948359.375	0.3604301	1.065
M34:2-PE-/16:0	428978.1	411452.99	599347.83	536153.8462	543870.9677	675078.125	0.2336303	1.965
M34:2-PE-/18:2	431970.8	490854.7	535434.78	596538.4615	598225.8065	730078.125	0.04363361	8.474
M34:2-PG-/16:0	87080.3	50598.3	86087	50192.3	79758.1	133750	0.6507248	0.239
M34:2-PG-/18:2	84525.5	75897.4	59456.5	62403.8	91854.8	135390.6	0.3585377	1.074
M34:3-PC-/16:0	205288248	179579316	164971304	147003076.9	174619112.9	242252500	0.8860663	0.023
M34:3-PE-/16:0	31751.825	14102.564	43260.87	27115.38462	36048.3871	55625	0.4543207	0.685

M36:4-PC-/18:1	39896058	35002821	33049022	26358557.7	31632903.2	53491640.6	0.8970629	0.019
M36:4-PC-/18:2	332481.75	404358.97	355434.78	311057.6923	325645.1613	709843.75	0.5565416	0.411
M36:4-PE-/18:2	489416.06	420000	553913.04	417692.3077	466935.4839	738593.75	0.6445739	0.248
M36:4-PG-/18:2	39708	70683.8	51304.3	33173.1	60241.9	135078.1	0.5222382	0.491
M36:5-PC-/18:3	2145036.5	1607948.7	1478695.7	1056634.6	1535564.5	2535156.3	0.945831	0.005
M36:6-PC-/18:3	26277.4	21453	5543.5	30673.1	33387.1	6093.8	0.6269439	0.276
modPC 540.5/0.78	92481.8	23418.8	154347.8	58461.5	22822.6	7109.4	0.2111002	2.213
modPC 666.4/1.90	46058.4	71282.1	126413	55192.3	55645.2	127031.3	0.9563193	0.003
modPC 843.6/7.10	3430.7	17265	20108.7	34423.1	14193.5	13906.3	0.4435579	0.721
oddPC 29:0	10380073	9096923.1	10458044	9726634.6	8943709.7	9653359.4	0.3491653	1.122
oddPC 31:0	25436788	24147863	24158913	23461634.6	21318709.7	22074765.6	0.03903004	9.141
oddPC 31:1	66959489	67651880	65388370	55181250	62067338.7	63983125	0.08566317	5.156
oddPC 33:0	6205985.4	6853675.2	7004782.6	6891923.1	5202983.9	5678437.5	0.243886	1.864
oddPC 33:1	66628613	67228889	62993696	66121538.5	55719193.5	60257031.3	0.2091639	2.236
oddPC 33:2	42559051	42484274	38779783	35635480.8	34974758.1	43585625	0.3499738	1.118
oddPC 33:3	4135255.5	3081453	3306304.3	2647884.6	3446371	0	0.2469712	1.835
oddPC 35:1	20165620	21617180	21501196	20525961.5	18299112.9	18380312.5	0.07920856	5.485
oddPC 35:3	7914817.5	8185128.2	7362500	4861923.1	5697419.4	10053828.1	0.5908673	0.34
oddPC 35:4	474233.6	471623.9	595543.5	239230.8	420241.9	1050703.1	0.8325308	0.051
oddPC 35:5	112481.8	20427.4	53369.6	27884.6	59596.8	102265.6	0.9748668	0.001
oddPC 37:4	176350.4	205384.6	149239.1	348846.2	161854.8	241406.3	0.262396	1.699
oddPC 37:6	93795.6	115641	150000	147019.2	168225.8	123671.9	0.2719778	1.62
oddPC 39:5	47591.2	30769.2	0	26442.3	49677.4	30546.9	0.5794488	0.363
oddPC 39:6	148613.1	95726.5	29673.9	18653.8	16532.3	33437.5	0.1206402	3.867
oddPC 39:7	796496.4	665213.7	629347.8	694711.5	531774.2	1041875	0.7285925	0.139
oPDA 34:2-PG-/16:0	48613.139	69743.59	24239.13	21057.69231	131370.9677	119687.5	0.3123435	1.334
oPDA 34:3-PC-/18:3	2557007.3	2462136.8	2601630.4	2084134.6	2328548.4	3817187.5	0.7275069	0.14
PC 26:0	9043576.6	8403247.9	9340543.5	7276634.6	8011693.5	8646484.4	0.1202697	3.878
PC 28:0	41012336	38012051	37600978	28992211.5	33738709.7	36033125	0.06335058	6.499
PC 30:0	49890511	48509658	48320435	40638557.7	47943548.4	53560390.6	0.7065953	0.164
PC 32:0	64124964	47951880	51744348	47173076.9	54628951.6	55100468.8	0.6974004	0.175
PC 32:1	1.096E+09	949320598	894489891	819761826.9	927632258.1	968639843.8	0.3747053	0.996
PC 32:2	714605766	759194103	686336957	629249230.8	738787338.7	630831875	0.2697605	1.638
PC 32:3	7523941.6	6919572.6	6176195.7	4207596.2	6124596.8	8223281.3	0.6038387	0.316
PC 34:0	39407080	29774872	29731848	26825192.3	30185887.1	29894609.4	0.3034586	1.392
PC 34:1	526784234	455642650	418366196	385011153.8	405425000	452535625	0.2339858	1.961
PC 34:2	722742263	662743419	590456739	549145961.5	573667822.6	629394531.3	0.1728997	2.745
PC 34:3	111489927	97736410	81599783	72965192.3	72353548.4	113077578.1	0.5364438	0.456
PC 34:4	16517445	12425128	12039022	10403269.2	12059677.4	15622890.6	0.6701336	0.211
PC 34:5	22481.8	79572.6	27500	30000	25887.1	48125	0.6847411	0.191
PC 36:0	4284744.5	3784273.5	3380760.9	2626826.9	3460322.6	2722968.8	0.07670556	5.623

PC 36:1	39466496	36233504	31654891	29765865.4	30244193.5	34262812.5	0.1787157	2.653
PC 36:2	208114891	182903077	166959674	161271538.5	160861048.4	160381484.4	0.103754	4.406
PC 36:3	60267372	49016838	44360544	39237500	44748467.7	50383984.4	0.3237315	1.264
PC 36:4	111821752	81995385	71465109	59663942.3	76267580.6	107281640.6	0.7106216	0.159
PC 36:5	109263723	87146325	78250870	63162403.8	74520080.6	112915312.5	0.6731074	0.206
PC 36:6	168394.2	262393.2	85652.2	102692.3	0	126328.1	0.2093816	2.233
PC 38:2	1659708	1375641	980543.5	966153.8	936209.7	1217500	0.2392567	1.909
PC 38:3	193868.6	91025.6	146087	69134.6	127096.8	88046.9	0.2267088	2.037
PC 38:4	18686.1	22478.6	45760.9	39903.8	10887.1	73203.1	0.5681697	0.386
PC 38:5	48175.2	31709.4	0	21250	16209.7	4062.5	0.4427953	0.724
PC 38:6	160948.9	104615.4	73913	300288.5	187741.9	94218.8	0.2797895	1.56
PC 38:7	287810.2	223418.8	296739.1	105673.1	167500	179062.5	0.02167337	13.36
PC 40:5	40583.9	20341.9	12500	55288.5	12096.8	18437.5	0.8072185	0.068
PC 40:6	45401.5	35299.1	30543.5	87115.4	94032.3	26640.6	0.2147541	2.17
PC 40:7	98467.2	96068.4	136739.1	44711.5	142822.6	97187.5	0.6456232	0.246
PC(O-32:2)	7722043.8	8168803.4	6812500	5444615.4	6158145.2	8610312.5	0.4688551	0.639
PC(O-34:4)	485839.4	265384.6	352065.2	219423.1	234758.1	384218.8	0.3469196	1.134
PC(O-36:0)	3907080.3	2801880.3	2993478.3	2430000	2031693.5	2240078.1	0.04984525	7.725
PC(O-36:2)	18313796	17914872	14745870	14877788.5	14659919.4	17010156.3	0.3373895	1.186
PC(P-30:0)	4440365	4291880.3	4975543.5	3158557.7	4311129	4763203.1	0.3986822	0.891
PC(P-36:5)	735109.5	575128.2	514782.6	578653.8	753871	802343.8	0.3359919	1.194
PE 32:0	17247956	17929487	16842717	15858942.3	15376371	15761875	0.008721286	22.93
PE 32:1	237484818	243279658	244171196	231442403.8	214786209.7	213220625	0.0243811	12.41
PE 34:0	43958759	41572137	46956413	37729903.8	36855403.2	37856328.1	0.01364306	17.68
PE 34:1	401046861	389968291	434603696	361227307.7	343832822.6	358428671.9	0.02017383	13.96
PE 34:2	346979051	334245214	380795217	320874807.7	302802338.7	305419687.5	0.04173252	8.736
PE 34:3	76113577	64712650	72089130	54544038.5	61941129	67815546.9	0.1340985	3.515
PE 35:1	12525256	12132992	15209565	15624423.1	10242741.9	9846406.3	0.5455462	0.435
PE 35:2	25839416	27483932	32513044	27298942.3	23905161.3	22257187.5	0.1738139	2.73
PE 36:0	5636861.3	4813076.9	5885652.2	4701826.9	4596209.7	4878203.1	0.09770534	4.633
PE 36:1	57491971	52846325	60681196	50672115.4	48055403.2	51657265.6	0.05222834	7.475
PE 36:2	157669051	159036154	181564891	152664519.2	141082661.3	142857031.3	0.0738816	5.788
PE 36:3	70605110	68882992	78503370	60265000	59292258.1	66234531.3	0.04310714	8.545
PE 36:4	20607299	18850513	20995326	15521634.6	15551774.2	20285546.9	0.1518665	3.124
PE 36:5	2020438	1528205.1	1512608.7	1171923.1	1306209.7	1505468.8	0.1359737	3.47
PE 38:3	563649.6	759829.1	684347.8	557500	340806.5	515859.4	0.08674489	5.105
PE 38:4	24598.5	13846.2	23587	13846.2	3467.7	15312.5	0.1250373	3.746
PE 40:7	37153.3	43846.2	14130.4	44807.7	19032.3	19453.1	0.7661612	0.101
PE(O-18:1/18:2)	9493868.6	7559401.7	11073152	9691826.9	7764354.8	8626406.3	0.5882176	0.346
PE(O-18:2/18:2)	41897.8	153418.8	193369.6	32019.2	93548.4	100000	0.3399839	1.171
PE(O-34:1)	8661386.9	8199914.5	10076630	10124038.5	7471209.7	6830234.4	0.5087314	0.525

PE(O-34:2)	6361678.8	5982649.6	7311739.1	6932403.8	6027500	6576171.9	0.9369264	0.007
PE(O-36:2)	27859562	29841624	34486087	28140673.1	24538709.7	24543046.9	0.09606844	4.698
PE(O-36:5)	19854	19914.5	41304.3	132980.8	0	86953.1	0.307767	1.364
PE(O-36:6)	832919.7	690427.4	813587	843076.9	572177.4	486640.6	0.2805778	1.554
PE(P-34:1)	6361678.8	5982649.6	7311739.1	6932403.8	6027500	6576171.9	0.9369264	0.007
PE(P-34:2)	76569.3	58717.9	24782.6	80192.3	18790.3	53515.6	0.919236	0.012
PE(P-36:1)	25839416	27483932	32513044	27298942.3	23753225.8	22257187.5	0.1705771	2.783
PE(P-36:2)	9493868.6	7559401.7	11271957	9691826.9	7764354.8	8626406.3	0.5696248	0.383
PE(P-38:5)	140219	142820.5	68804.3	105000	48064.5	61015.6	0.1975465	2.383
PE(P-38:6)	4187372.3	3996495.7	4022608.7	3060769.2	3351290.3	2979609.4	0.001825665	54.01
PE(P-40:6)	2060802.9	2177777.8	1853587	1723846.2	1638225.8	1584687.5	0.02076799	13.72
PG 34:0	1762481.8	1901623.9	1815217.4	1730480.8	1372903.2	1703906.3	0.1401258	3.374
PG 34:1	12057226	10262821	9922717.4	8525192.3	8958467.7	9219296.9	0.05598035	7.113
PG 36:1	1354744.5	1532307.7	1240108.7	1201730.8	1186209.7	1193984.4	0.09962221	4.559
PG 36:2	7116569.3	6103418.8	5485652.2	5510576.9	5698790.3	5294921.9	0.2082367	2.247
PI 32:0	3993284.7	2875555.6	2184021.7	2149230.8	2722903.2	3142890.6	0.5954946	0.332
PI 32:1	40995183	36499573	28978370	25323461.5	32839838.7	33194453.1	0.3106745	1.345
PI 34:1	36341168	31234615	26673152	23167307.7	27012016.1	29848750	0.2354724	1.946
PI 36:2	33692117	27380427	23406087	22153846.2	24469032.3	24762500	0.2327181	1.974
PI 36:3	56620584	44548974	35233044	34578365.4	37504435.5	47469062.5	0.4855577	0.589
PI 36:4	9890365	8441709.4	6787282.6	6286730.8	7046209.7	9191718.8	0.5267677	0.479
PI 38:2	784890.5	634017.1	568152.2	472211.5	715161.3	922265.6	0.7921069	0.079
PI 38:3	363065.7	291111.1	267065.2	214038.5	277983.9	105390.6	0.1364752	3.458
PI 38:4	20656.9	23931.6	3260.9	30769.2	29354.8	37109.4	0.07391704	5.786
PI 38:5	13868.6	6923.1	1087	49807.7	17419.4	4843.8	0.2948924	1.45
PS 34:0	1448175.2	1458034.2	536413	696250	1467983.9	1201250	0.9493318	0.005
PS 36:1	19808832	15226667	4062282.6	5065961.5	15080322.6	14747031.3	0.8183179	0.06
PS 36:2	47652920	38141197	11469783	15043365.4	37326935.5	40218437.5	0.9132573	0.013
PS 38:3	353211.7	206581.2	0	107596.2	152016.1	380390.6	0.8502719	0.041
PS 38:4	33138.7	51111.1	26195.7	0	18467.7	703.1	0.03357938	10.1
TG 14:0 16:0 18:2	630494526	669751966	759477391	637754903.8	588883225.8	562839140.6	0.1102426	4.184
TG 14:0 16:1 18:1	535521898	549114444	615328696	531858846.2	448805725.8	427522734.4	0.07309414	5.836
TG 14:0 16:1 18:2	74904015	76900940	93190109	62291730.8	62376854.8	28402968.8	0.07344528	5.815
TG 14:0 18:0 18:1	59737883	66918974	35529348	69723846.2	55801371	52741250	0.6468555	0.245
TG 14:0 18:2 18:2	230948.9	152906	236087	59519.2	146854.8	43828.1	0.04217791	8.673
TG 14:1 16:0 18:1	40544380	46924957	133421848	100754807.7	40597500	34360468.8	0.7024161	0.169
TG 14:1 16:1 18:0	1.567E+09	1.696E+09	1.83E+09	1588410865	1369096452	1273010078	0.07523534	5.708
TG 14:1 18:0 18:2	2523065.7	2262991.5	3556521.7	2199423.1	1661612.9	1753750	0.1011256	4.502
TG 14:1 18:1 18:1	32043.8	427350.4	108804.3	108173.1	280161.3	273828.1	0.825998	0.055
TG 15:0 18:1 16:0	108613.1	0	8587	14134.6	27500	38750	0.747536	0.119
TG 15:0 18:1 18:1	675401.5	627777.8	616087	332788.5	411612.9	335546.9	0.000894462	78.58

TG 16:0 16:0 16:0	97078540	109914957	114342283	129398269.2	105531532.3	101833125	0.636502	0.261
TG 16:0 16:0 18:0	21970365	27405043	26078370	28999134.6	24242177.4	23734453.1	0.8391386	0.047
TG 16:0 16:0 18:1	3375036.5	4664957.3	4567282.6	3939134.6	3148145.2	3569531.3	0.2416241	1.886
TG 16:0 16:0 18:2	6980365	6661111.1	20597391	7918557.7	6402419.4	6813125	0.3975101	0.896
TG 16:0 16:1 18:1	5438394.2	6583418.8	6842608.7	5585096.2	5092500	5335781.3	0.1045758	4.377
TG 16:0 18:0 18:1	59024380	108557094	58420544	89813750	76205564.5	67903906.3	0.8892403	0.022
TG 16:0 18:1 18:1	4514671.5	5233162.4	5572173.9	4865096.2	4420161.3	4185781.3	0.1710707	2.775
TG 16:0 18:1 18:2	327445.3	400085.5	417717.4	346346.2	355483.9	276093.8	0.2092685	2.235
TG 16:0 18:2 18:2	164160.6	251623.9	122717.4	41250	100161.3	264296.9	0.5952109	0.332
TG 16:1 16:1 16:1	544308905	561594786	630601957	544777980.8	444975887.1	438364921.9	0.07673957	5.622
TG 16:1 16:1 18:0	28997226	31229145	42371739	30797500	23697258.1	21328203.1	0.1500866	3.16
TG 16:1 16:1 18:1	32561314	36603248	43274783	36356057.7	31775967.7	29376015.6	0.2535037	1.776
TG 16:1 18:1 18:1	35266423	35700855	49396413	37136250	29368548.4	26151875	0.178695	2.653
TG 16:1 18:1 18:2	2711824.8	2434444.4	5661195.7	2449423.1	2541935.5	2158515.6	0.305687	1.377
TG 17:0 16:0 16:1	76938029	98935385	84180326	81295000	84004032.3	65547890.6	0.3238374	1.264
TG 17:0 16:0 18:0	3445620.4	6447008.5	3920000	2587692.3	1986129	4685546.9	0.2880586	1.499
TG 17:0 17:0 17:0	3174671.5	4165470.1	2765326.1	4411250	3235483.9	2390781.3	0.9763553	0.001
TG 17:0 18:1 14:0	19571971	24934188	21418044	27808750	21370161.3	14805703.1	0.8814796	0.025
TG 17:0 18:1 16:0	12858248	18501709	15449239	13684519.2	11267822.6	9921406.3	0.113254	4.088
TG 17:0 18:1 16:1	15497153	16956496	17988478	20767980.8	16458225.8	13196796.9	0.9979291	0
TG 17:0 18:1 18:1	855182.5	997435.9	820760.9	1041538.5	952096.8	524140.6	0.7736709	0.095
TG 17:0 18:2 16:0	27540073	32246325	28521630	22278557.7	19300645.2	14462031.3	0.01617559	15.97
TG 18:0 18:0 18:0	304525.5	271196.6	322173.9	502403.8	263790.3	398984.4	0.2760167	1.589
TG 18:0 18:0 18:1	1717080.3	3172222.2	1811195.7	3810865.4	2628548.4	3176875	0.1697553	2.797
TG 18:0 18:1 18:1	3664671.5	11226239	3179130.4	2717403.8	2973225.8	3271015.6	0.3094043	1.353
TG 18:0 18:2 18:2	40219	11282.1	34565.2	0	17096.8	178906.3	0.5597678	0.404
TG 18:1 14:0 16:0	485358029	561037949	554505326	545518653.8	516687983.9	504617890.6	0.6964439	0.176
TG 18:1 18:1 18:1	250656.9	229658.1	290760.9	332596.2	149596.8	179375	0.5724648	0.377
TG 18:1 18:1 18:2	207518.2	96666.7	62500	32115.4	87258.1	90390.6	0.3342906	1.203
TG 18:1 18:2 18:2	2992.7	37179.5	10000	45865.4	56693.5	38671.9	0.05995372	6.768
TG 48:0	46913942	52399915	47269674	48338365.4	42165806.5	40000000	0.1550304	3.062
TG 48:1	164514015	177732821	186932174	170433461.5	145803629	149075625	0.1026954	4.445
TG 48:2	80404599	76567350	85193261	73587307.7	62969838.7	57940781.3	0.03877128	9.182
TG 48:3	36990073	40431966	41958370	30483750	28832822.6	27722890.6	0.002991302	41.47
TG 49:1	6306934.3	5606068.4	6853804.3	7800576.9	5695564.5	5009687.5	0.9287522	0.009
TG 50:0	27762847	33635983	29193478	30010000	24315967.7	25390156.3	0.2184199	2.128
TG 50:1	106276204	115199915	61127609	112902115.4	95029193.5	93601015.6	0.7415893	0.125
TG 50:2	64464380	68555470	72122500	62700384.6	51560241.9	48716250	0.0430641	8.551
TG 50:3	20103723	20226239	23291739	17914134.6	16890887.1	14818359.4	0.02803587	11.36
TG 50:4	556934.3	1131880.3	1488804.3	1084423.1	804596.8	753281.3	0.5720145	0.378
TG 51:0	952116.8	1751709.4	1355434.8	1817211.5	1514354.8	810781.3	0.9449686	0.005

TG 51:2	4082408.8	3913247.9	4600434.8	4359230.8	3358548.4	2727187.5	0.2386174	1.915
TG 52:1	17029562	27634274	16381630	20941634.6	18247177.4	16332968.8	0.6602515	0.225
TG 52:2	18027226	19326068	22579565	18770192.3	15481854.8	16533828.1	0.1410778	3.352
TG 52:4	233941.6	283418.8	284565.2	371057.7	313629	177187.5	0.7553032	0.111
TG 53:2	16276350	28321111	18355544	20452692.3	13176451.6	12470546.9	0.2807394	1.553
TG 54:1	594087.6	828974.4	395652.2	571346.2	587661.3	662890.6	0.9937995	0
TG 54:2	9854	35299.1	7500	44807.7	65564.5	12187.5	0.2629782	1.694
TG 54:3	1263211.7	1341025.6	1254456.5	1181730.8	1023629	1365859.4	0.4033815	0.872
TG 54:4	276204.4	135213.7	39565.2	28365.4	135725.8	70859.4	0.3941196	0.91
TG 54:5	172627.7	133589.7	86630.4	136346.2	32016.1	109765.6	0.3929188	0.915
TG 54:6	199124.1	232051.3	338587	499038.5	218467.7	266953.1	0.498535	0.553
TG 56:6	76715.3	142649.6	244347.8	120192.3	21612.9	18828.1	0.1623456	2.926
TG 56:8	518978.1	423589.7	645108.7	747596.2	219354.8	414765.6	0.702093	0.169

Table S2. Imidacloprid perturbs the expression of genes involved in xenobiotic metabolism, lipid metabolism, neurodegeneration, oxidative stress, and immune response. List of genes of interest affected by 2.5 ppm imidacloprid exposure for 2 hr. Brain and fat body transcriptomic analysis (↓ gene downregulated; ↑ gene upregulated).

		Brain - Imidacloprid			Fat body - Imidacloprid		
Flybase ID	Gene	Response	Fold change	adj p-value	Response	Fold change	adj p-value
ROS generation							
FBgn0283531	*Duox*	-	-	-	-	-	-
FBgn0085428	*Nox*	↓	- 2.80	0.000243	-	-	-
FBgn0011676	*Nos*	↑	1.70	0.000000	-	-	-
Mitochondrial function							
FBgn0029870	*Marf*	↑	1.20	0.000000	-	-	-
FBgn0013679	*mt:ND1*	↑	1.20	0.005944	-	-	-
FBgn0013680	*mt:ND2*	-	-	-	-	-	-
FBgn0013681	*mt:ND3*	-	-	-	-	-	-
FBgn0262952	*mt:ND4*	↑	1.20	0.000457	-	-	-
FBgn0013684	*mt:ND5*	-	-	-	-	-	-
FBgn0013685	*mt:ND6*	-	-	-	-	-	-
FBgn0030718	*ND-20*	↑	1.10	0.006502	-	-	-
FBgn0017567	*ND-23*	↑	1.20	0.000000	-	-	-
FBgn0047038	*ND-13B*	-	-	-	-	-	-
FBgn0031771	*ND-51*	↑	1.20	0.000000	-	-	-
FBgn0031228	*ND-15*	-	-	-	-	-	-
FBgn0266582	*ND-30*	↑	1.10	0.003752	-	-	-
FBgn0035046	*ND-19*	↑	1.10	0.001247	-	-	-
FBgn0019957	*ND42*	↑	1.10	0.000006	-	-	-
FBgn0013678	*mt:Cyt-b*	↑	1.10	0.001835	-	-	-
FBgn0035600	*Cyt-c1*	↑	1.30	0.000000	-	-	-
FBgn0021906	*RFeSP*	↑	1.20	0.000000	-	-	-
FBgn0013674	*mt:CoI*	↑	1.20	0.000000	-	-	-
FBgn0013675	*mt:CoII*	-	-	-	-	-	-
FBgn0013676	*mt:CoIII*	↑	1.10	0.000138	-	-	-
FBgn0010100	*mAcon1*	↑	1.20	0.000000	-	-	-
Oxidative Stress Response							
FBgn0000229	*bsk (JNK)*	↑	1.10	0.000255	--	--	--
FBgn0010303	*Hep*	↑	1.10	0.003549	--	--	--
FBgn0001297	*kay (Fos)*	↑	1.17	0.000000	--	--	--
FBgn0038475	*Keap1*	↑	1.21	0.023706	↑	2.20	0.000210
FBgn0034534	*maf-S*	↑	1.10	0.030073	--	--	--
FBgn0010213	*Sod2*	↑	1.11	0.000120	--	--	--
FBgn0000261	*Cat*	↓	-1.08	0.002721	--	--	--
Xenobiotic metabolism (P450s)							
FBgn0035154	*Cyp9b2*	↓	-0.64	0.018314	--	--	--
FBgn0005655	*Cyp6v1*	↓	-0.76	0.000000	--	--	--
FBgn0038006	*Cyp313a2*	↑	6.67	0.001044	--	--	--
FBgn0039519	*Cyp6a18*	↑	6.40	0.000000	↑	2.39	0.000024
FBgn0033065	*Cyp6w1*	↑	3.17	0.000000	--	--	--
FBgn0000473	*Cyp6a2*	↑	2.62	0.000000	--	--	--
FBgn0013771	*Cyp6a9*	↑	2.07	0.000000	--	--	--
FBgn0013772	*Cyp6a8*	↑	1.96	0.006559	↑	2.25	0.005318
FBgn0000473	*Cyp6g2*	↑	1.91	0.000000	--	--	--

FBgn0013773	*Cyp6a22*	↑	1.80	0.011175	--	--	--
FBgn0038037	*Cyp9f2*	↑	1.47	0.000000	--	--	--
FBgn0033775	*Cyp9h1*	↑	1.46	0.000000	--	--	--
FBgn0033302	*Cyp6a14*	↑	1.41	0.028973	--	--	--
FBgn0015038	*Cyp9b1*	--	--	--	↓	-0.56	0.008736
FBgn0034053	*Cyp4aa1*	--	--	--	↑	4.92	0.035861
Glutathione-s-transferases (GSTs)							
FBgn0001149	*GstD1*	↓	-1.20	0.000000	↓	-1.95	0.002778
FBgn0010039	*GstD3*	--	--	--	↓	-3.71	0.000762
FBgn0010040	*GstD4*	--	--	--	↓	-3.80	0.000000
FBgn0010041	*GstD5*	--	--	--	↓	-2.42	0.000006
FBgn0010043	*GstD7*	↑	4.38	0.000000	--	--	--
FBgn0038020	*GstD9*	--	--	--	↓	-2.75	0.002660
FBgn0063498	*GstE2*	↑	1.19	0.019430	--	--	--
FBgn0063497	*GstE3*	↑	1.43	0.003285	--	--	--
FBgn0063496	*GstE4*	↑	2.80	0.005891	--	--	--
FBgn0063494	*GstE6*	--	--	--	↓	-3.06	0.000000
FBgn0063493	*GstE7*	--	--	--	↓	-3.63	0.012443
FBgn0063491	*GstE9*	↑	2.58	0.000000	--	--	--
FBgn0034354	*GstE11*	↓	-1.65	0.000000	↓	-1.80	0.013776
FBgn0033381	*GstE13*	↓	-1.17	0.004813	--	--	--
FBgn0035904	*GstO3*	↓	-1.41	0.000000	--	--	--
FBgn0010226	*GstS1*	↓	-1.71	0.000478	--	--	--
FBgn0050000	*GstT1*	--	--	--	↓	-1.60	0.049502
FBgn0050005	*GstT2*	--	--	--	↑	1.70	0.041407
FBgn0031117	*GstT3*	↑	1.22	0.018348	--	--	--
FBgn0030484	*GstT4*	--	--	--	↑	2.10	0.000056
Lipid metabolism and neurodegeneration							
FBgn0261283	*SREBP*	↑	1.10	0.000354	--	--	--
FBgn0011656	*Mef2*	↑	1.48	0.00000	--	--	--
FBgn0033799	*Glial lazarillo*	↑	1.56	0.000000	--	--	--
FBgn0028325	*Pdha*	↑	1.36	0.000000	--	--	--
FBgn0039635	*Pdhb*	↑	1.20	0.000000	--	--	--
FBgn0001258	*Ldh*	↑	1.41	0.000000	--	--	--
FBgn0261955	*kdn*	↑	1.44	0.000000	--	--	--
FBgn0033657	*Silnoon*	↑	1.45	0.000000	--	--	--
FBgn0261822	*Basigin*	↑	1.21	0.000000	--	--	--
FBgn0085387	*Shaking B*	↑	1.73	0.000000	--	--	--
FBgn0053087	*LRP1*	--	--	--	↑	1.58	0.048743
FBgn0087002	*apolpp*	↑	1.81	0.000000	--	--	--
FBgn0032136	*Apoltp*	↑	2.90	0.000000	--	--	--
FBgn0029994	*Ldsdh1*	↑	1.69	0.000000	--	--	--
FBgn0051092	*LpR2*	↑	1.26	0.000000	--	--	--
FBgn0066101	*LpR1*	↑	1.41	0.000000	--	--	--
FBgn0026718	*Agpat2*	↑	1.21	0.003232	--	--	--
FBgn0039114	*Lsd-1*	↑	1.64	0.000000	--	--	--
FBgn0030608	*Lsd-2*	↑	1.05	0.036574	--	--	--
FBgn0037913	*fabp*	↓	-1.59	0.000000	--	--	--
FBgn0040212	*Dhap-at*	↑	1.16	0.013088	--	--	--
FBgn0263593	*Lipin*	↑	1.12	0.000041	--	--	--
FBgn0039471	CG6295	↓	-2.91	0.000000	--	--	--
FBgn0036996	*mag*	↑	2.75	0.000000	--	--	--
FBgn0036449	*bmm*	↑	1.65	0.00000	--	--	--
FBgn0000568	*Eip75B*	↑	1.16	0.00000	--	--	--
FBgn0265187	*fatp2*	↓	-1.65	0.019004	--	--	--
Neuronal receptors							

FBgn0004168	*5-HT1A*	↑	1.65	0.000000	--	--	--
FBgn0263116	*5-HT1B*	↑	1.38	0.000000	--	--	--
FBgn0087012	*5-HT2A*	↑	1.87	0.000000	--	--	--
FBgn0261929	*5-HT2B*	↑	1.71	0.000000	--	--	--
FBgn0004573	*5-HT7*	↑	1.70	0.000000	--	--	--
FBgn0039927	*CG11155*	↑	1.47	0.000000	--	--	--
FBgn0033558	*CG12344*	↑	1.56	0.000980	--	--	--
FBgn0038653	*CG18208*	↑	1.38	0.000000	--	--	--
FBgn0038837	*CG3822*	↑	1.43	0.000000	--	--	--
FBgn0011582	*Dop1R1*	↑	1.64	0.000000	--	--	--
FBgn0266137	*Dop1R2*	↑	1.57	0.000000	--	--	--
FBgn0053517	*Dop2R*	↑	1.68	0.000000	--	--	--
FBgn0035538	*DopEcR*	↑	1.67	0.000000	--	--	--
FBgn0260446	*GABA-B-R1*	↑	1.63	0.000000	--	--	--
FBgn0027575	*GABA-B-R2*	↑	1.46	0.000000	--	--	--
FBgn0031275	*GABA-B-R3*	↑	1.67	0.000000	--	--	--
FBgn0024963	*GluClalpha*	↑	1.48	0.000000	--	--	--
FBgn0004619	*GluRIA*	↑	1.63	0.000000	--	--	--
FBgn0264000	*GluRIB*	↑	1.68	0.000000	--	--	--
FBgn0020429	*GluRIIB*	↑	2.21	0.001750	--	--	--
FBgn0046113	*GluRIIC*	↑	1.67	0.004010	--	--	--
FBgn0028422	*GluRIID*	↑	1.83	0.000020	--	--	--
FBgn0051201	*GluRIIE*	↑	1.62	0.001740	--	--	--
FBgn0001134	*Grd*	↑	1.49	0.046580	--	--	--
FBgn0010240	*Lcch3*	↑	1.39	0.000000	--	--	--
FBgn0000037	*mAChR-A*	↑	1.47	0.000000	--	--	--
FBgn0037546	*mAChR-B*	↑	1.78	0.000000	--	--	--
FBgn0000036	*nAChRalpha1*	↑	1.46	0.000000	--	--	--
FBgn0000039	*nAChRalpha2*	↑	1.40	0.000000	--	--	--
FBgn0015519	*nAChRalpha3*	↑	1.53	0.000000	--	--	--
FBgn0266347	*nAChRalpha4*	↑	1.51	0.000000	--	--	--
FBgn0028875	*nAChRalpha5*	↑	1.78	0.000000	--	--	--
FBgn0032151	*nAChRalpha6*	↑	1.42	0.000000	--	--	--
FBgn0086778	*nAChRalpha7*	↑	1.59	0.000000	--	--	--
FBgn0000038	*nAChRbeta1*	↑	1.72	0.000000	--	--	--
FBgn0004118	*nAChRbeta2*	↑	1.55	0.000000	--	--	--
FBgn0010399	*Nmdar1*	↑	1.75	0.000000	--	--	--
FBgn0053513	*Nmdar2*	↑	1.53	0.000000	--	--	--
FBgn0024944	*Oamb*	↑	1.74	0.000000	--	--	--
FBgn0004514	*Oct-TyrR*	↑	1.47	0.000000	--	--	--
FBgn0038980	*Octbeta1R*	↑	1.62	0.000000	--	--	--
FBgn0038063	*Octbeta2R*	↑	1.60	0.000000	--	--	--
FBgn0250910	*Octbeta3R*	↑	1.45	0.000000	--	--	--
FBgn0264908	*pHCl*	↑	1.84	0.000000	--	--	--
FBgn0004244	*Rdl*	↑	1.71	0.000000	--	--	--
FBgn0038542	*TyrR*	↑	1.80	0.000000	--	--	--
FBgn0038541	*TyrRII*	↑	1.80	0.000000	--	--	--
Immune Response							
FBgn0010388	*Drosocin*	↓	-12.75	0.000035	↓	-24.68	0.002660
FBgn0004240	*Diptericin A*	↓	-46.83	0.000000	↓	-249.92	0.000203
FBgn0034407	*Diptericin B*	↓	-10.98	0.008850	↓	-40.03	0.001063
FBgn0052279	*Drosomycin-like 2*	↓	-566.41	0.000000	--	--	--
FBgn0035434	*Drosomycin-like 5*	--	--	--	↓	-3.99	0.000005
FBgn0014865	*Metchnikowin*	↓	-9.69	0.007991	↓	-9.59	0.005256
FBgn0012042	*Attacin-A*	↑	4.02	0.035974	--	--	--
FBgn0041579	*Attacin-C*	↓	-1.98	0.039617	--	--	--

FBgn0014018	*Relish*	↑	1.16	0.000038	--	--	--
FBgn0260632	*dorsal*	↑	1.14	0.003056	--	--	--
FBgn0033367	*Prophenoloxidase 2*	↑	1.23	0.000000	--	--	--
FBgn0261363	*Prophenoloxidase 3*	--	--	--	↑	2.09	0.035861
FBgn0004425	*Lysozyme B*	↓	-8.93	0.000000	--	--	--
FBgn0004426	*Lysozyme C*	↓	-6.47	0.000000	--	--	--
FBgn0004427	*Lysozyme D*	↓	-6.70	0.000000	--	--	--
FBgn0004430	*Lysozyme S*	↑	1.12	0.037193	--	--	--
FBgn0004431	*Lysozyme X*	↑	8.25	0.035271	--	--	--
FBgn0043576	*PGRP-SC1a*	↓	-13.57	0.000012	↓	-22.20	0.000014
FBgn0033327	*PGRP-SC1b*	↓	-18.33	0.000000	-	-	-
FBgn0043578	*PGRP-SB1*	--	--	--	↓	-4.10	0.000000
FBgn0035806	*PGRP-SD*	--	--	--	↓	-3.47	0.000642
FBgn0043841	*vir-1*	↑	1.74	0.000000	--	--	--
FBgn0030051	*spirit*	↑	3.36	0.000000	--	--	--
FBgn0053329	*Sp212*	↑	2.27	0.026942	↑	6.20	0.000000
FBgn0034647	*pirk*	↓	-2.16	0.001338	--	--	--
FBgn0033593	*Listericin*	↓	-9.23	0.000015	--	--	--
FBgn0261560	*Thor*	↑	1.66	0.000000	--	--	--
FBgn0002930	*necrotic*	↑	2.12	0.000000	--	--	--
FBgn0040653	*IM4*	--	--	--	↑	5.23	0.000194
FBgn0031561	*IM33*	↑	2.86	0.000000	--	--	--
FBgn0005660	*Ets21C*	↑	1.57	0.000014	--	--	--
FBgn0026760	*Tehao*	↓	-3.63	0.000863	--	--	--
FBgn0016675	*Lectin-galC1*	↑	1.89	0.000000	--	--	--
FBgn0038134	*wntD*	↑	9.76	0.004648	--	--	--
FBgn0031055	*eye transformer*	↑	1.84	0.000000	--	--	--
FBgn0037515	*Serine protease 7*	↑	1.27	0.000847	--	--	--
FBgn0039494	*grass*	↑	1.56	0.000015	--	--	--
FBgn0041182	*Tep2*	↑	1.43	0.000000	--	--	--
FBgn0032638	*SPH93*	↑	2.31	0.000000	--	--	--
FBgn0243514	*eater*	↑	1.49	0.000016	--	--	--
FBgn0052185	*edin*	--	--	--	↓	-100.61	0.000363
FBgn0267339	*p38c*	--	--	--	↓	-5.05	0.000000
FBgn0014000	*Helical Factor*	↑	2.31	0.000000	--	--	--
FBgn0038973	*Pebp1*	↑	2.06	0.000000	--	--	--
FBgn0039102	*SPE*	↑	2.52	0.021559	--	--	--