

Evaluation of the potential role of organochlorines in the death of Raptors

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Introduction

Organochlorines (OC) are a group of pesticides that have been used throughout history to protect crops and control insect disease vectors. Organochlorines are lipophilic and hydrophobic chemicals and are difficult toxicants to break down in the body. As a result, large scale poisoning affected the bird population causing birds to lay soft-shelled eggs. Concerns about OC effects of environmental and human health led to a ban on all OC in 1990. However, the ban on organochlorines did not call for the removal of stored OC and thus they still pose a significant health and environmental hazard. Recently, dead and incapacitated raptors were found in and around the Charlotte area, several months apart. While alive, many exhibited symptoms of organochlorine poisoning, including convulsions, and tremors. The birds were eventually brought to the Carolina Raptor Center in Huntersville, North Carolina where an autopsy was performed and samples were sent to diagnostic analytical labs where OCs were found at very high concentrations.

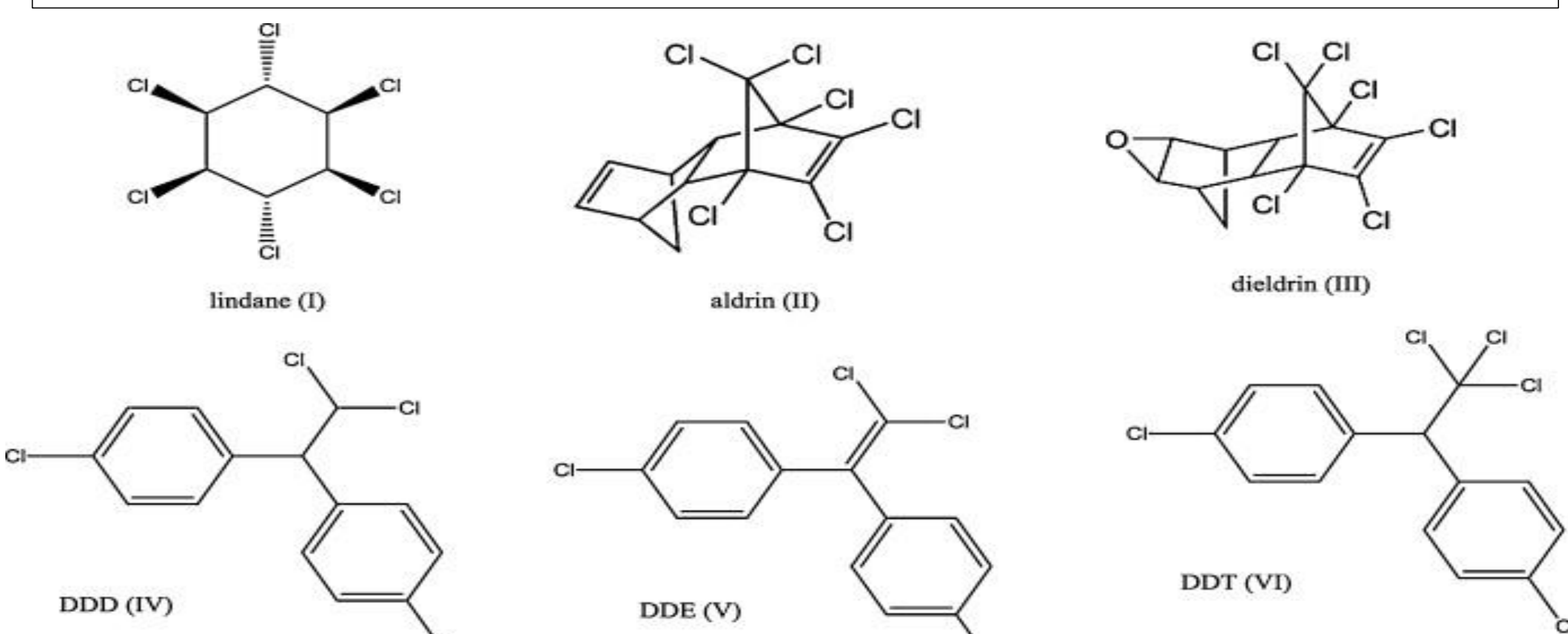


Fig. 1. Common Organochlorines



Fig 2. Red-Shouldered Hawk



Fig 3. Barred Owl

Goals/Objectives

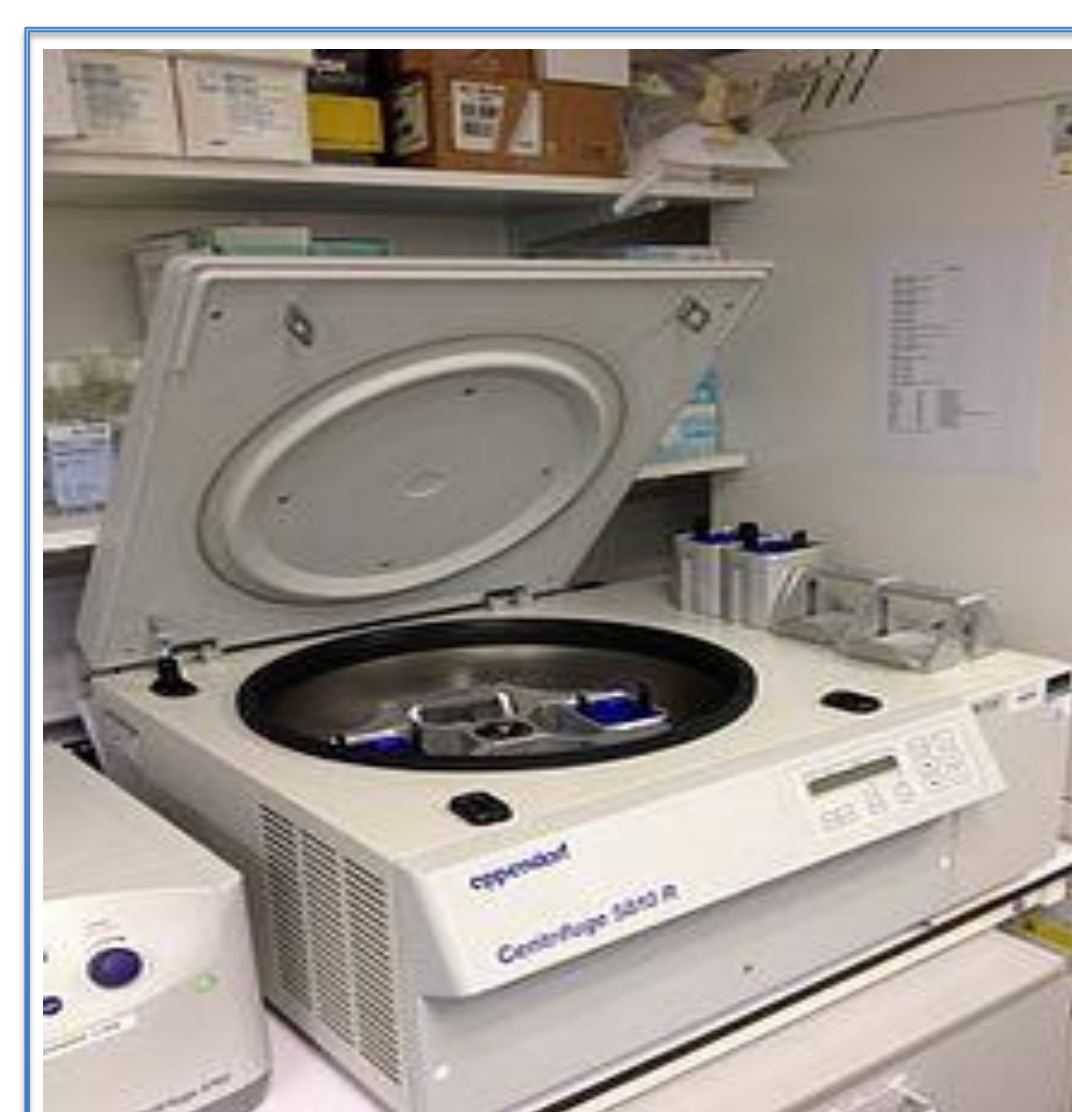
1. Produce a reliable and consistent analytical method for OC identification and quantification
2. Confirm diagnostic lab's extreme OC values
3. Investigate the source of OC by analyzing environmental samples in and around Charlotte, North Carolina

Experimental Design and Data Collection

1. Add Na_2SO_4 (Desiccant) at 10x weight
2. Inject 10 μL TCMX/DCBP internal Standard
3. Grind with Mortar and Pestle until a homogenous "sandy" texture is achieved
4. Suspend in 20 mL Hexane
5. Shake 24 hrs over night



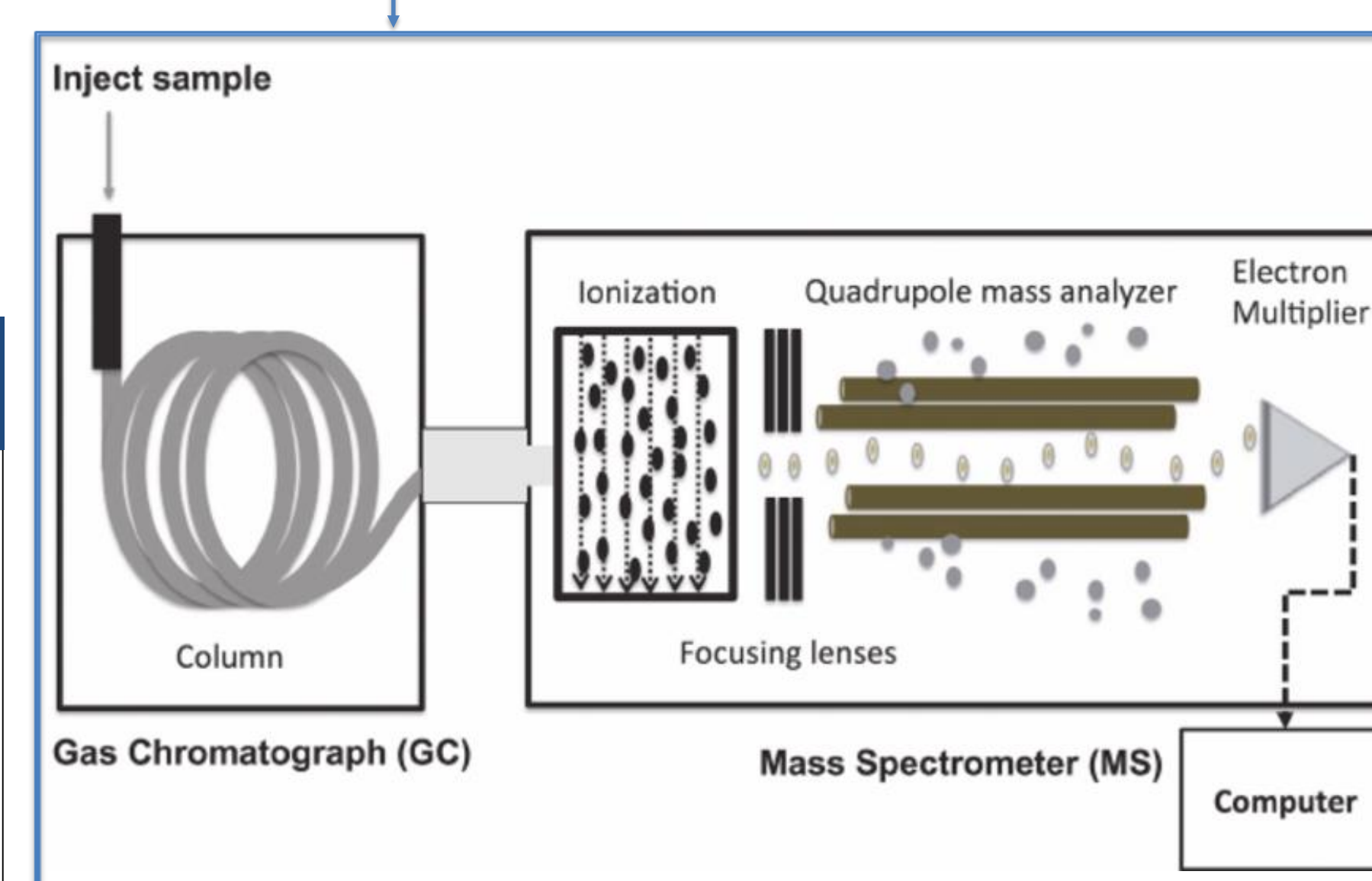
1-2 g liver



Centrifuge and collect supernatant



1. Rotary Evaporate sample
2. Resuspend in 1 mL Hexane
3. Add sample to QuEChERS Kit

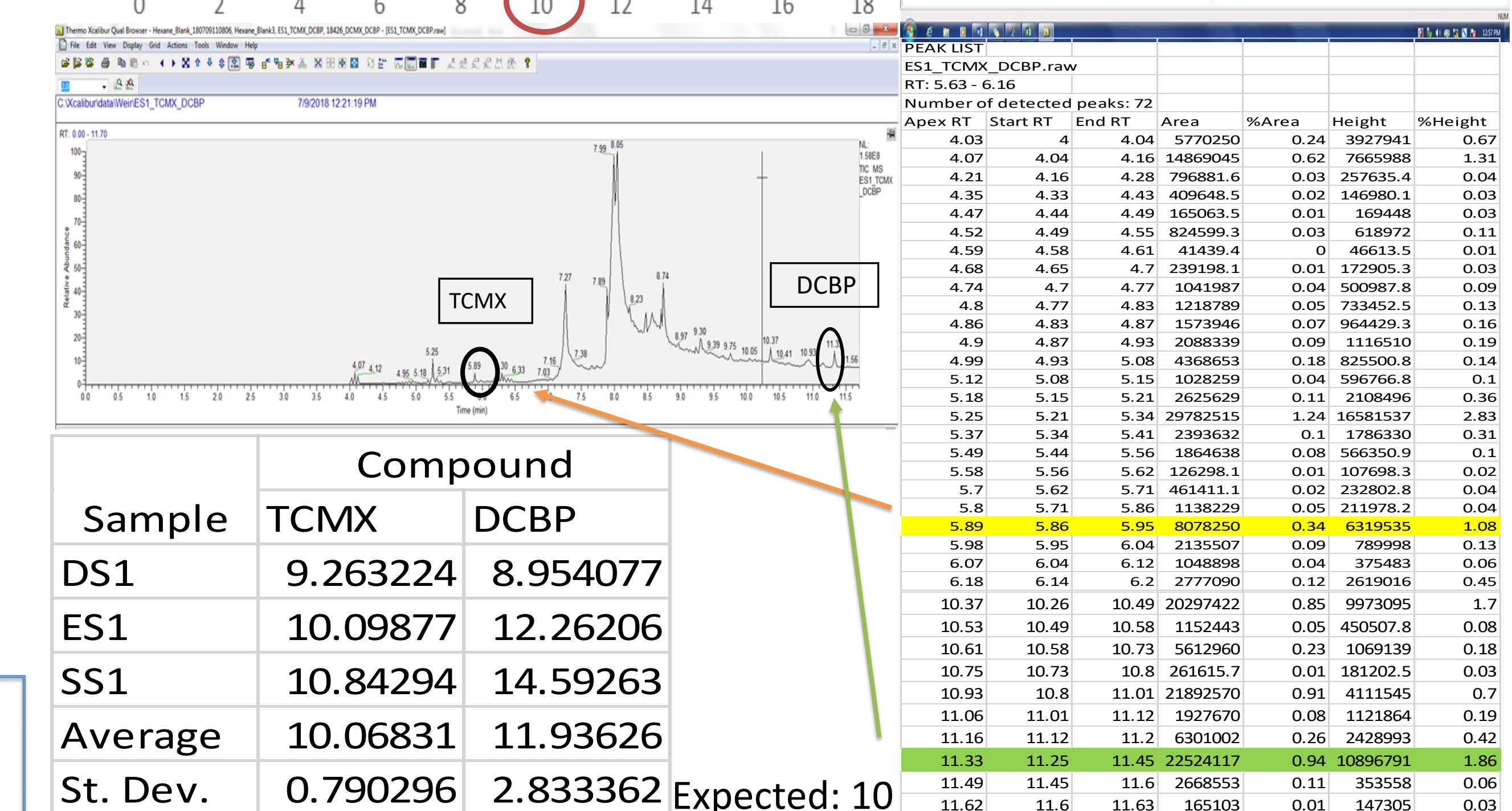
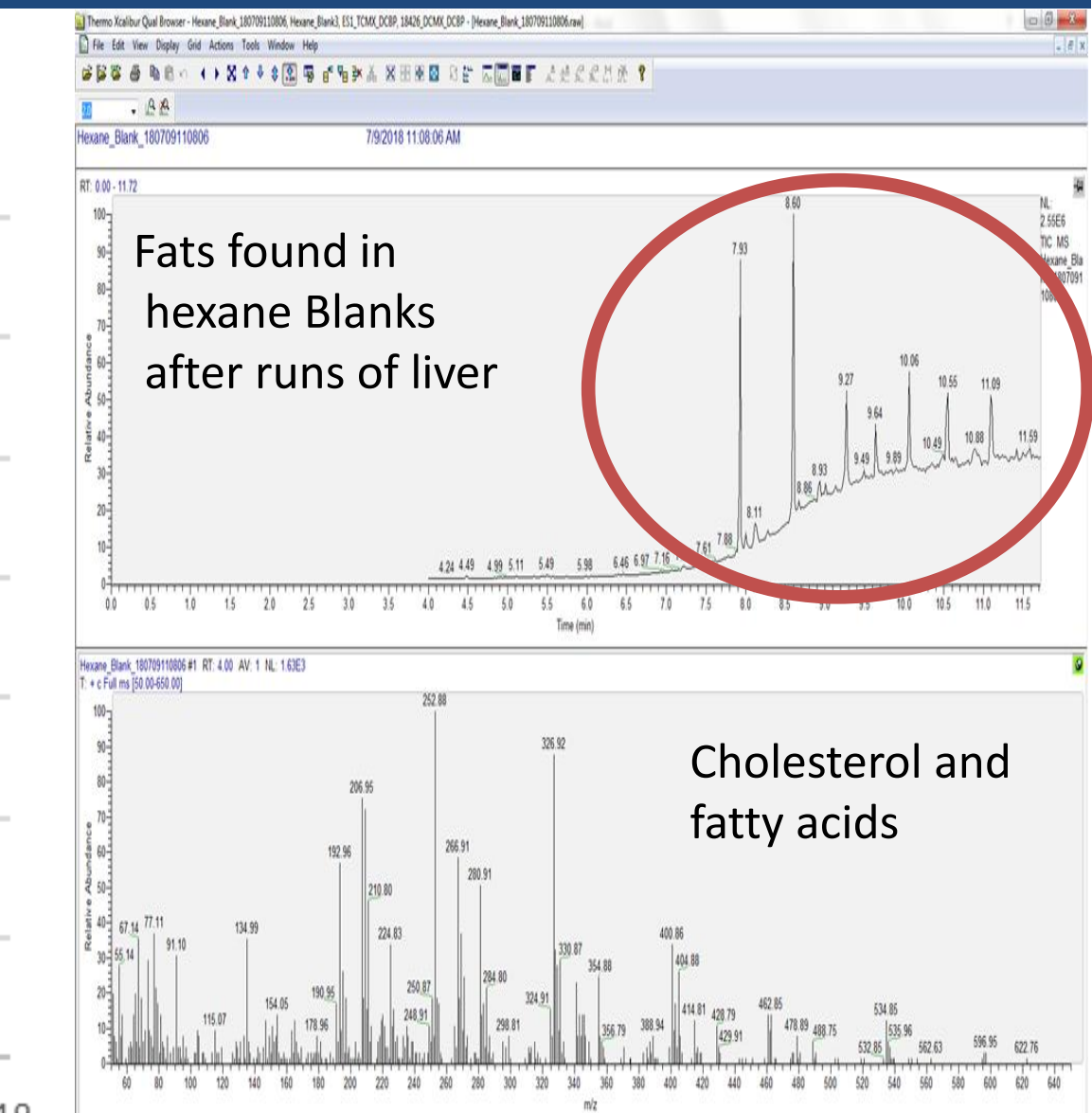
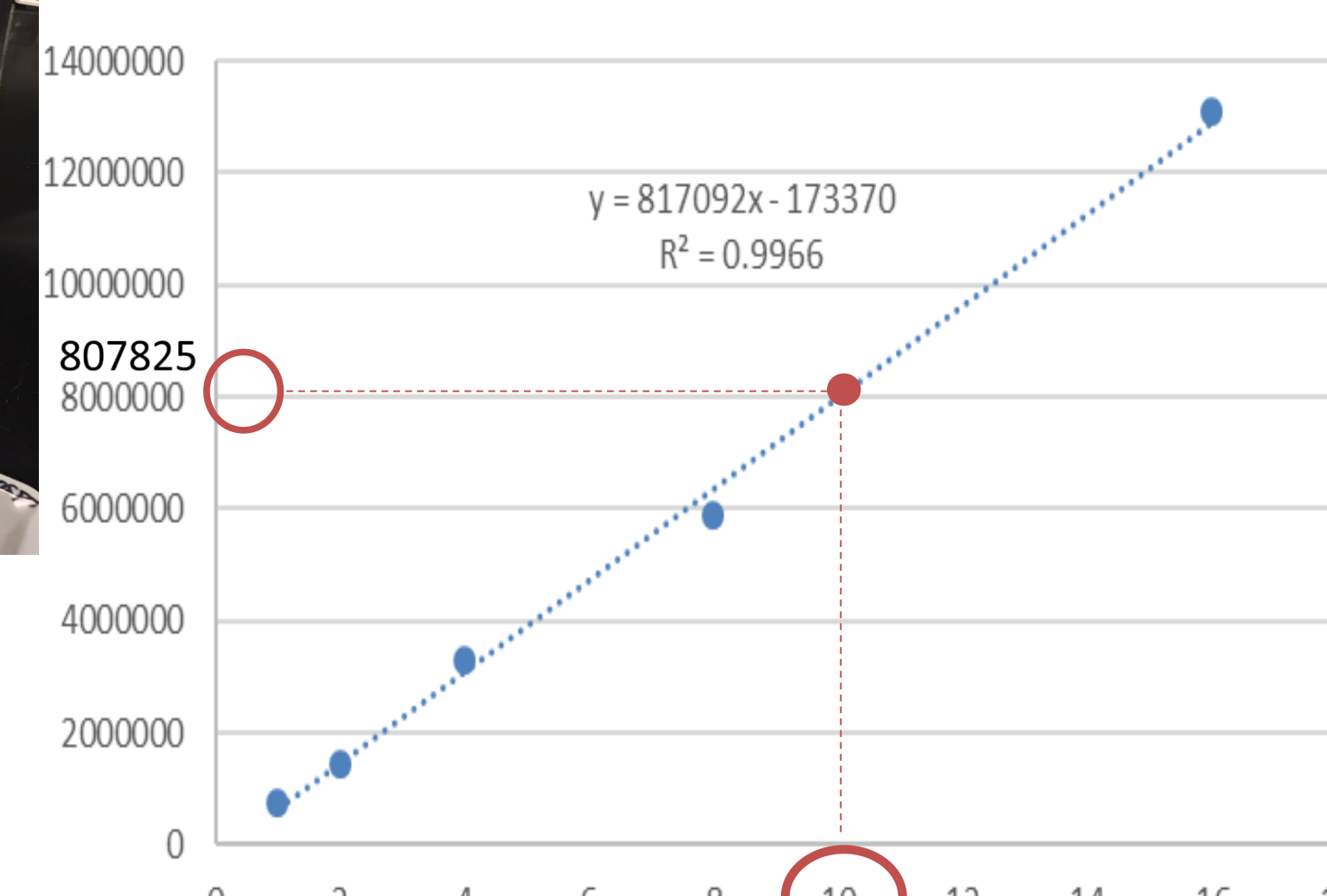


Use GC/MS for sample identification and quantification

1. Construct a calibration curve using known standards
2. Approximate concentration from constructed curve.

Results and Data Interpretation

TCMX Standard Calibration Curve



$$(807825 + 173370) / 817092 = 10.09877 \text{ (~100\% Recovery)}$$

Conclusions and Future Directions

- Results are inconsistent due to large amount of fats and fatty acids.
- Calibration curve was created successfully, however there is interference from background at lower concentrations
- Additional washes of sample were inconclusive
- Improve protocol to wash fats out of samples
- Complete goals 2 and 3 accordingly

References

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