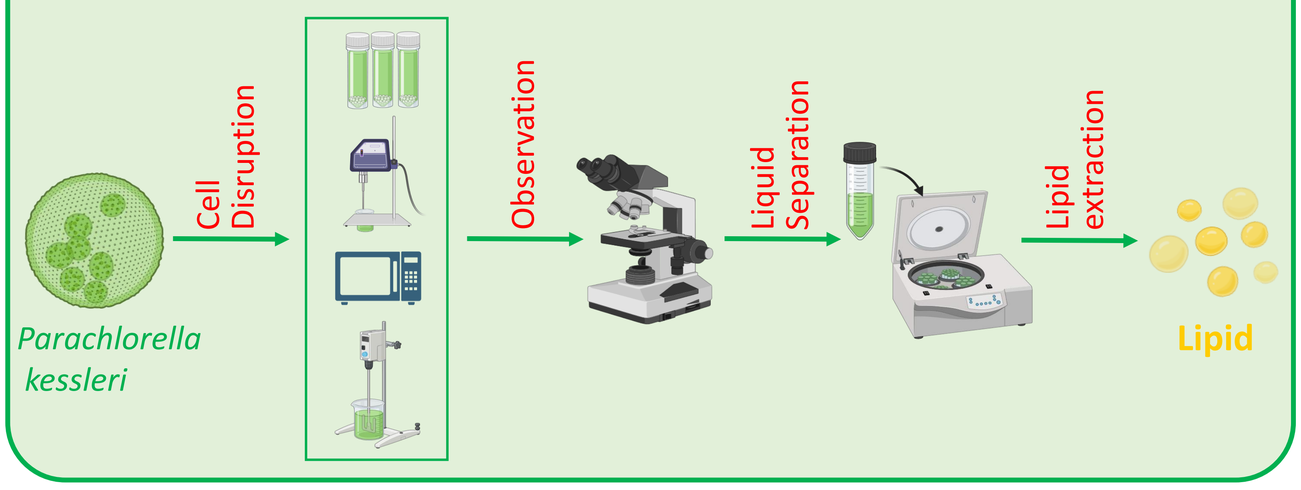
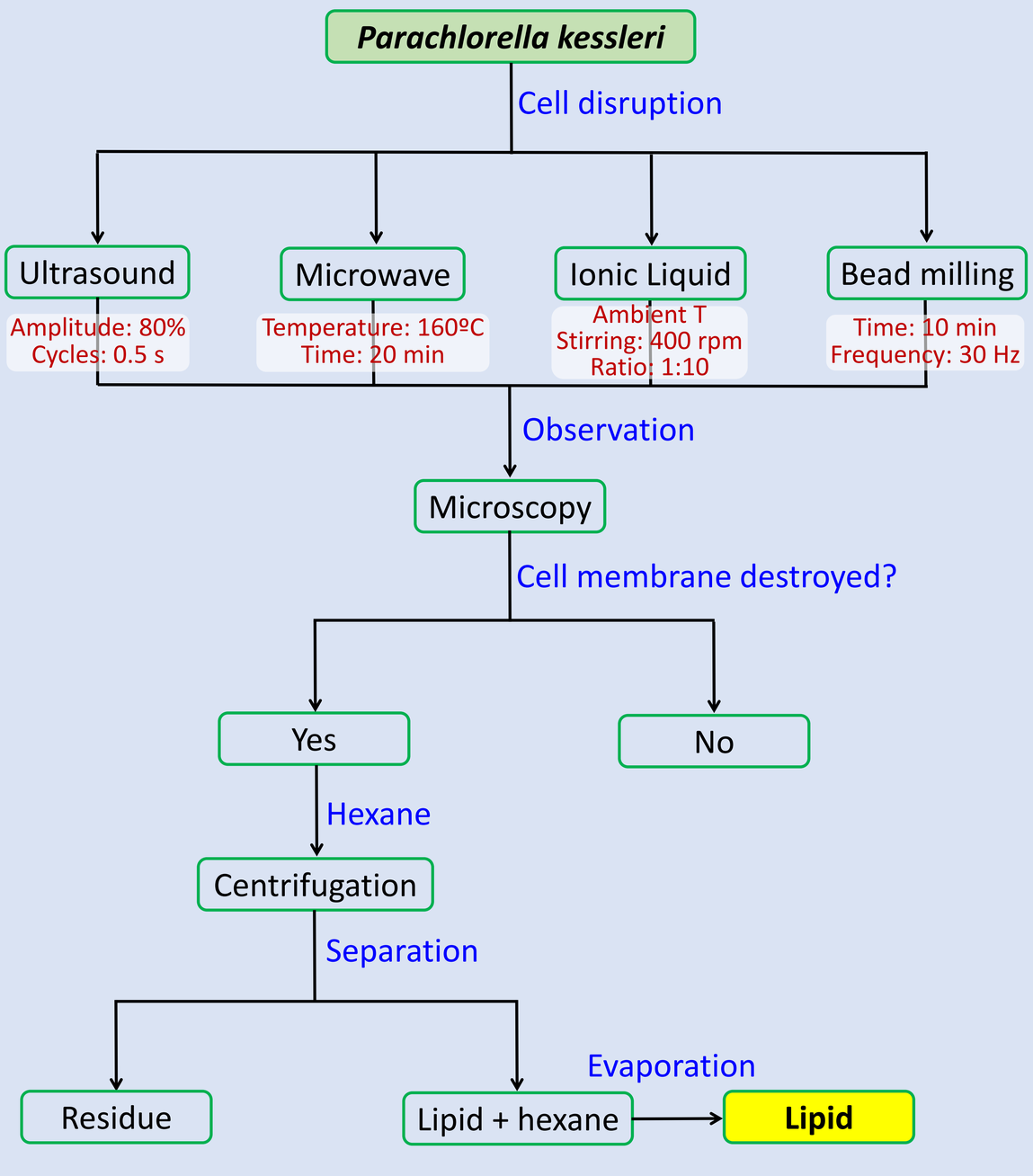
Cell Membrane Disruption of Starved *Parachlorella Kessleri* for Lipid Extraction Using Different Techniques

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Introduction



Experimental procedure



Conclusions

Parachlorella kessleri is rich in organics, but has a rigid cell membrane

Cell membrane could be destroyed using different techniques

The best way is using ionic liquid at ambient temperature

The highest lipid yield, 100.76%, was obtained from Tetrabutylphosphonium hydroxide

Acknowledgements

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Experimental Results

Characterization of *Parachlorella kessleri*

Table 1. Characterization of *Parachlorella kessleri*

Ingredient	Quantity (%)
Total solids (TS), based on wet biomass	19.11
Moisture, based on wet biomass (by difference)	80.89
Ash, based on TS	2.90
Volatile solids (VS), based on TS (by difference)	97.10
Protein, based on TS	20.60
Carbohydrate, based on TS	51.00
Lipid, based on TS	22.63

Cell membrane disruption



Figure 1. Microscopy results from cell disruption: ionic liquid.



Figure 2. Microscopy results from cell disruption: microwave.

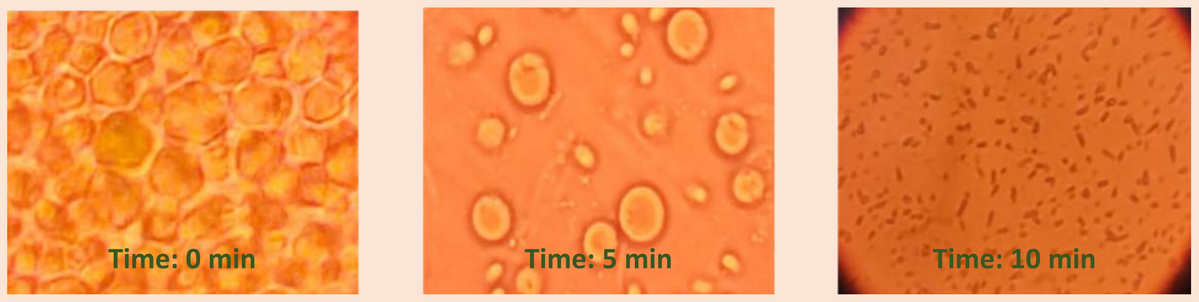


Figure 3. Microscopy results from cell disruption: Bead milling.

Lipid extraction

Table 2. Lipid extraction from *Parachlorella kessleri* pre-treated with different techniques.

Technique	Solvent	% Lipids
Ionic Liquid		
Tetrabutylphosphonium hydroxide	hexane	100.76
1-Methyl-3-n-octylimidazolium bromide	hexane	52.45
1-Ethyl-3-methylimidazolium methyl phosphate	hexane	61.57
Microwave		
5 mL of Parachlorella kessleri + 5 ml of water	hexane	65.15
4 mL of Parachlorella kessleri + 6 ml of water	hexane	41.93
3 mL of Parachlorella kessleri + 7 ml of water	hexane	39.71
Bead milling		
Time 10 min , room Temperature , 30 Hz	hexane	93.53
Time 10 min , room Temperature , 30 Hz	Chloroform:methanol (2:1)	85.76

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