



# Implementing AI and Aquagenx Gel Accuracy in Well Water Testing



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## Introduction

Private well owners are responsible for assessing the quality of their own drinking water. The possible contaminants of well drinking water include, but are not limited to:

- E coli – leads to gastrointestinal illness<sup>2</sup>
- Lead – overexposure leads to health effects
- Arsenic – overexposure leads to health effects

Private well owners are at an increased risk to E coli exposure. The cost of testing and lack of knowledge has led to disparities in the quality of drinking water. There is a need for a low cost and accurate method of testing for E coli for private well owners<sup>1</sup>.

The EPA tests water for E Coli. using membrane filtration method 1603. Another EQUIPP lab group previously identified that Aquagenx was the most, affordable, accurate, and user friendly at home test.

## Goals

Develop an approach to facilitate the interpretation of at home results through UNC's WellAware App for

## Method

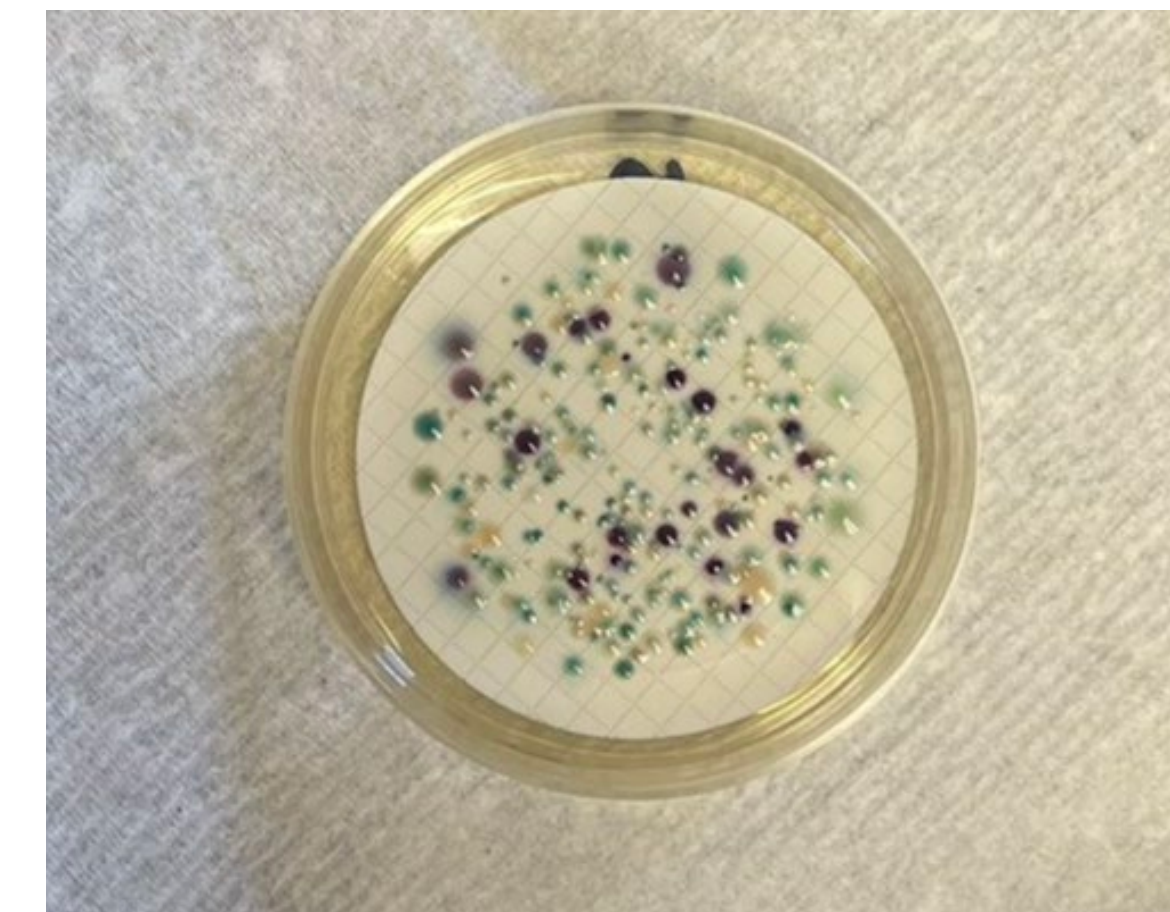
The Aquagenx gel test to was compared membrane filtration. The number of colony forming units was measured for both using Image J software. technology and in lab testing.

1. Create range of dilutions (  $10^{-10}$ - $10^{-3}$ ) of raw wastewater provided by OWASA
2. Test using membrane filtration and the Aquagenx Gel Kit
3. Take photos of the results using a cellular device
4. Count colonies by human eye and by using the ImageJ software.
5. Create linear regression to demonstrate levels of accuracy between tests and method of counting

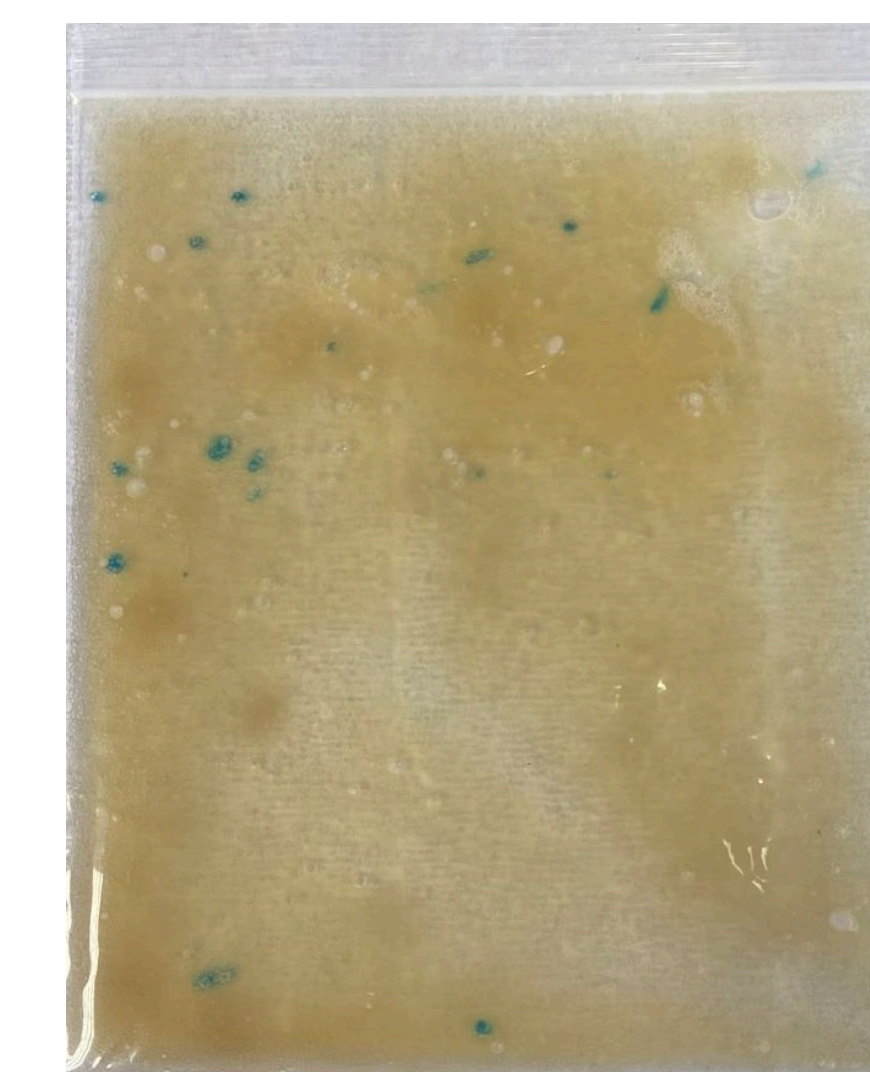
## WellAware

The WellAware App was developed at the UNC Gilling School of public health to help private well owners have greater accessibility to at-home testing.

## Results



10 <sup>-5</sup> E.coli colony			
Area	Mean	Min	Max
1	144	256	255
2	325	256	255
3	329	256	255
4	535	256	255
5	198	256	255
6	309	256	255
7	432	256	255
8	108	256	255
9	229	256	255
10	596	256	255
11	879	256	255
12	287	256	255
13	181	256	255
14	536	256	255
15	477	256	255
16	283	256	255
17	416	256	255
18	78	256	255
19	158	256	255
20	382	256	255
21	84	256	255
22	81	256	255
23	88	256	255



Count	Area
1	335
2	4506
3	16
4	3962
5	26
6	1021
7	52
8	4
9	673
10	611
11	115
12	167
13	961
14	25
15	1227
16	1983
17	200
18	1025
19	9
20	47
21	1216

## Discussion

We hope to continue gathering data and eventually implement our results into the WellAware app. Our team faced several challenges over the course of this past semester. Every member needed to complete higher lab certification, learn new technological skills, and perform under time constraints.

The team came together by the end of the semester to collect consistent data and be able to analyze the results. The analysis using ImageJ demonstrated that by using technology, the identification of E coli in water can be simplified to the use of a phone and an at home test. Clean water is essential for everyone, and at home testing can become more accessible using the WellAware App and Gel Testing.

## References:

1. Latchmore T, Hynds PD, Brown RS, McDermott K, Majury A. Assessing the risk of acute gastrointestinal illness attributable to three enteric pathogens from contaminated private water wells in Ontario. *International Journal of Hygiene and Environmental Health*. 2023;248:114077. doi:[10.1016/j.ijheh.2022.114077](https://doi.org/10.1016/j.ijheh.2022.114077)
2. Bain R, Bartram J, Elliott M, et al. A summary catalogue of microbial drinking water tests for low and medium resource settings. *Int J Environ Res Public Health*. 2012;9(5):1609-1625. doi:[10.3390/ijerph9051609](https://doi.org/10.3390/ijerph9051609)

Why is our focus relevant to the ECUIPP Lab's mission?

- The lab aims to alleviate and remediate environmental injustices through research and development of water quality issues and solutions.

Contributors and Special Thanks:

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