Development of a new microarray-based diagnostic tool to detect novel viral pathogens involved in potentially devastating animal diseases.

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Introduction

Identification of virus involved in a disease

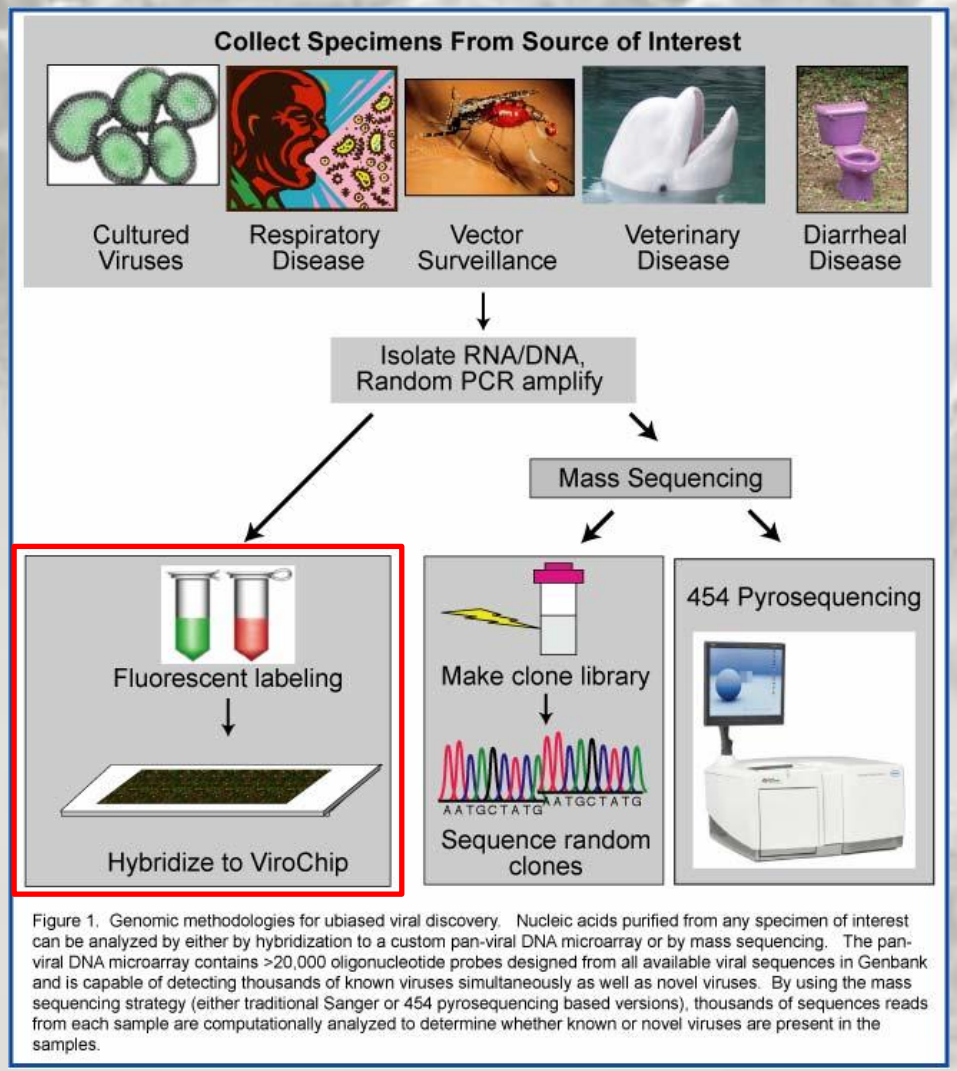


Figure 1. Genomic methodologies for ubiased viral discovery. Nucleic acids purified from any specimen of interest can be analyzed by either by hybridization to a custom pan-viral DNA microarray or by mass sequencing. The pan-viral DNA microarray contains >20,000 oligonucleotide probes designed from all available viral sequences in Genbank and is capable of detecting thousands of known viruses simultaneously as well as novel viruses. By using the mass sequencing strategy (either traditional Sanger or 454 pyrosequencing based versions), thousands of sequences reads from each sample are computationally analyzed to determine whether known or novel viruses are present in the samples.

Proven method!

Coronavirus implicated in SARS outbreak (2003)

Rota et al, 2003, Science 300(5624): 1394-1399

Detection of pH1N1 (2010)

Greninger et al, 2010, PLoS One 5(10): e13381

Others…

Diagnostic Service

Affordable

Fast Results

Expertise

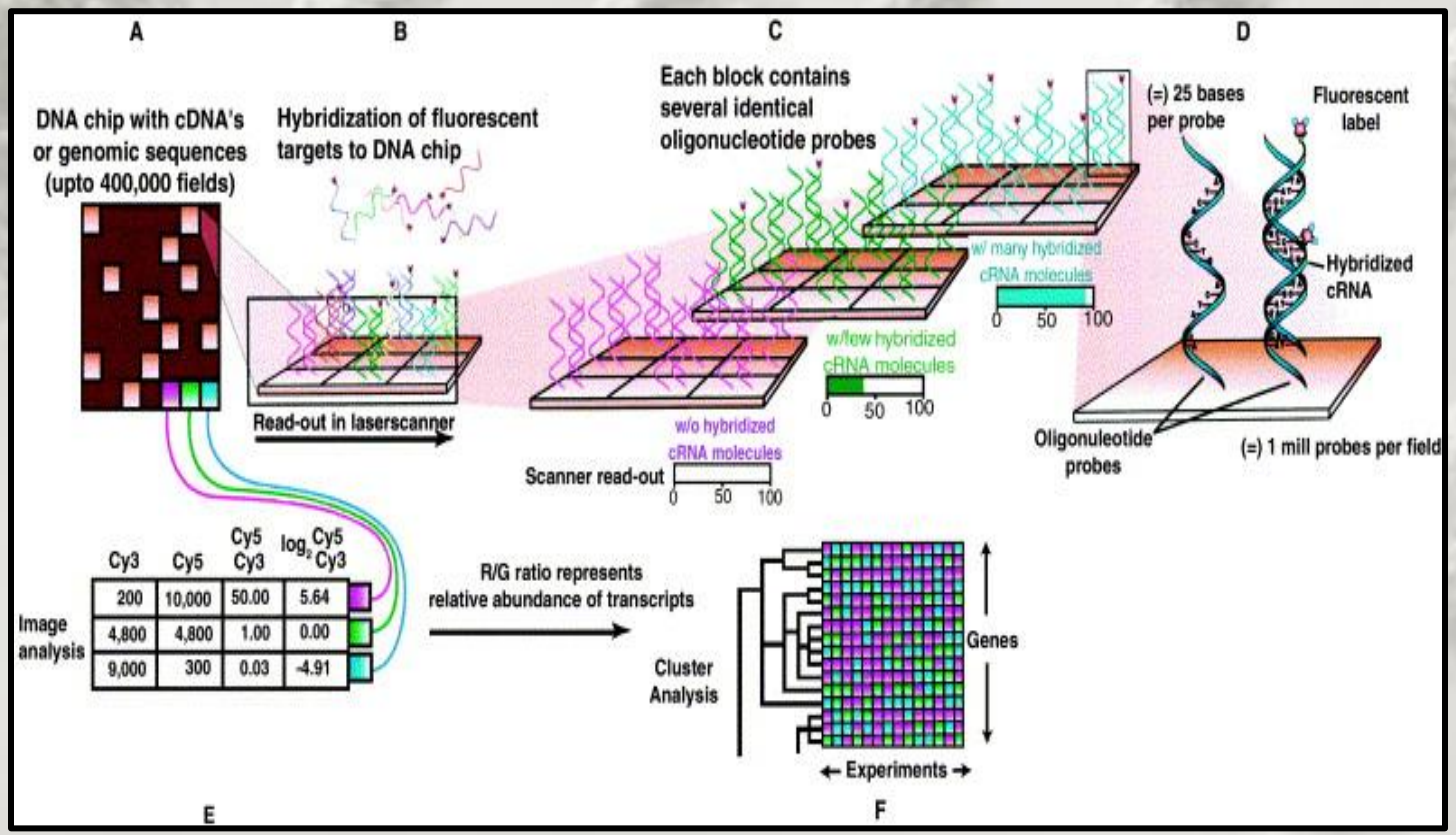
The DNA chip

How does it working?

DNA: complementary double strand →

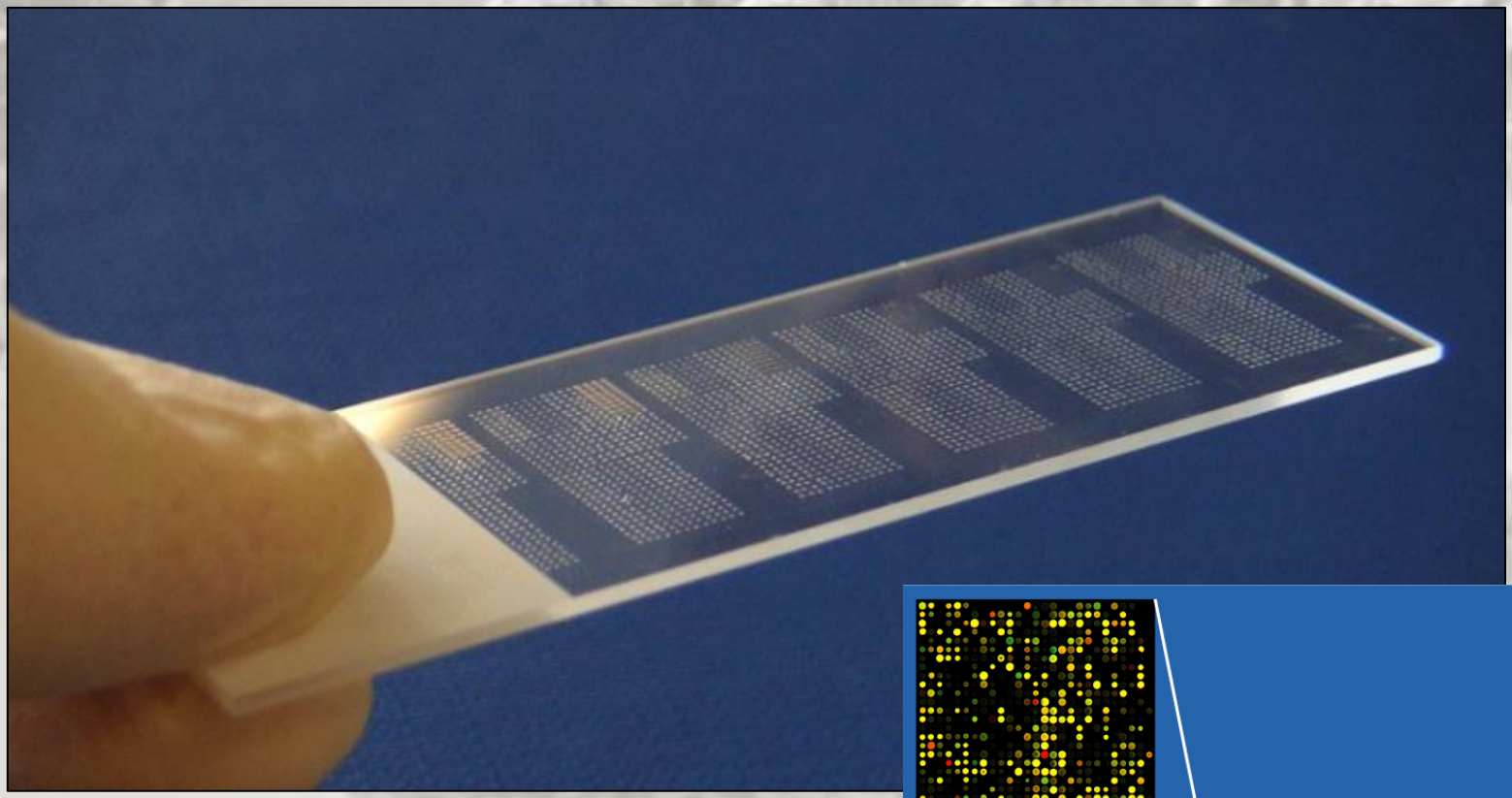
By knowing one of the two strands:

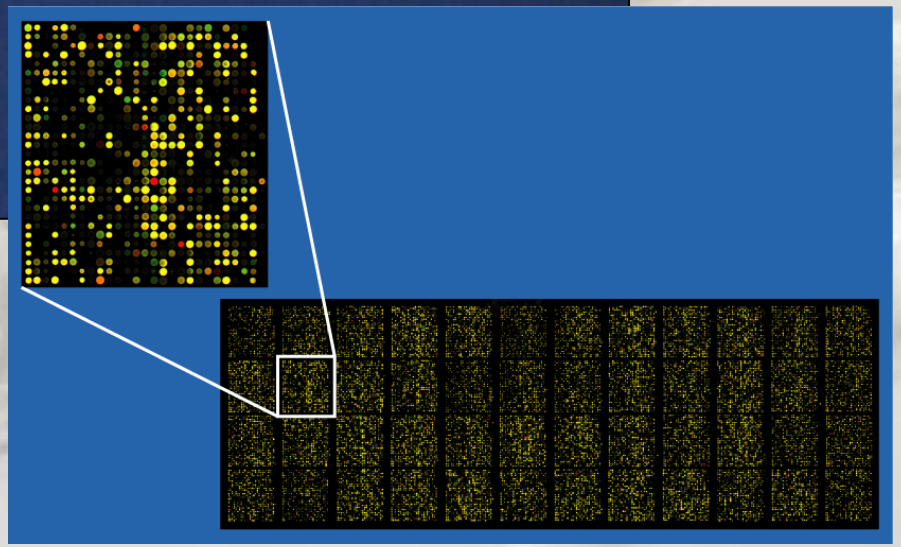
We are able to identify any DNA strand that will interact to it!



The DNA chip

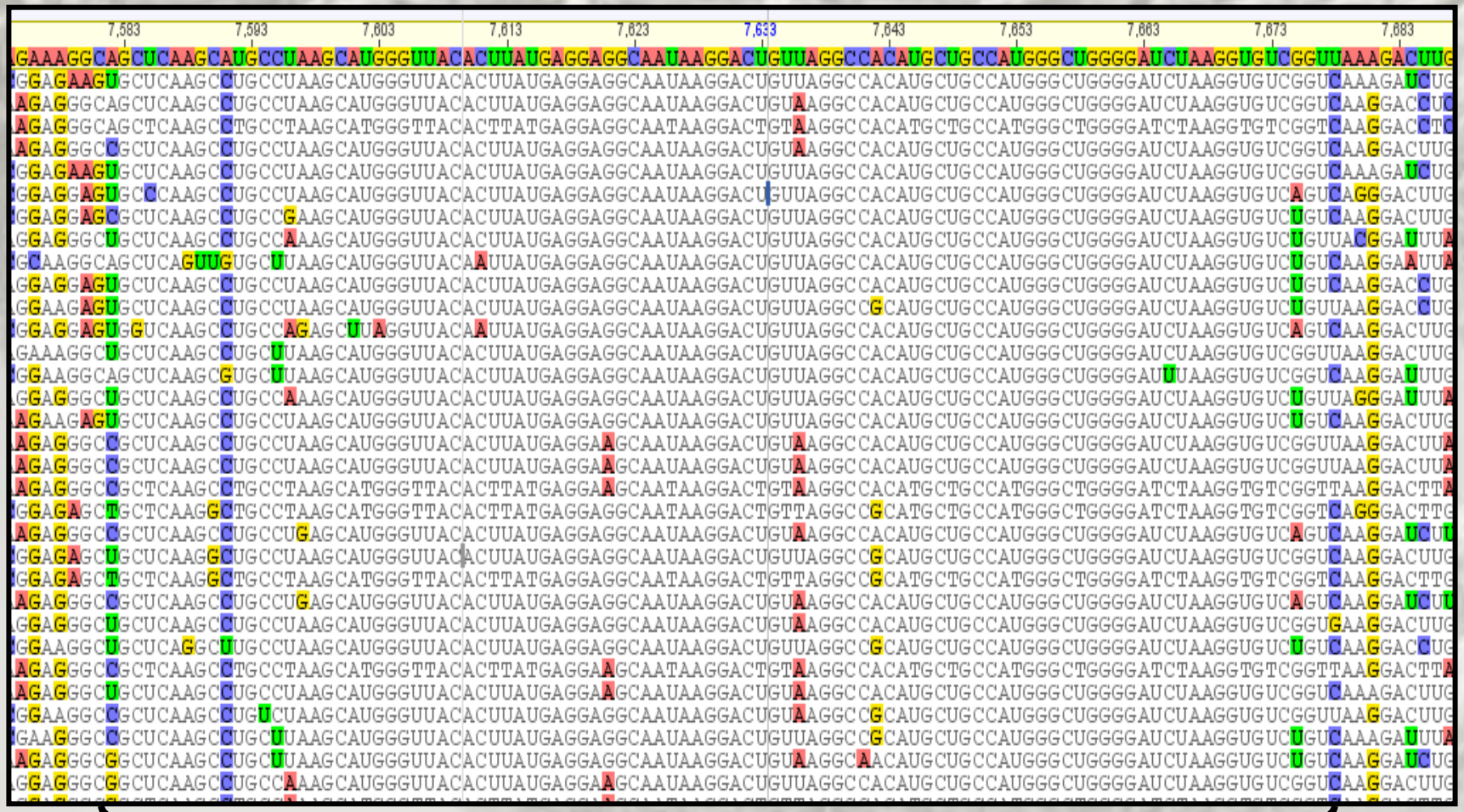
How does it working?





The DNA chip

The development – Selection of conserved region



The DNA chip

The development – Validation

1- Validate the probes selection with the GenBank database (“blast”)

2- Supervise the DNA Chip preparation

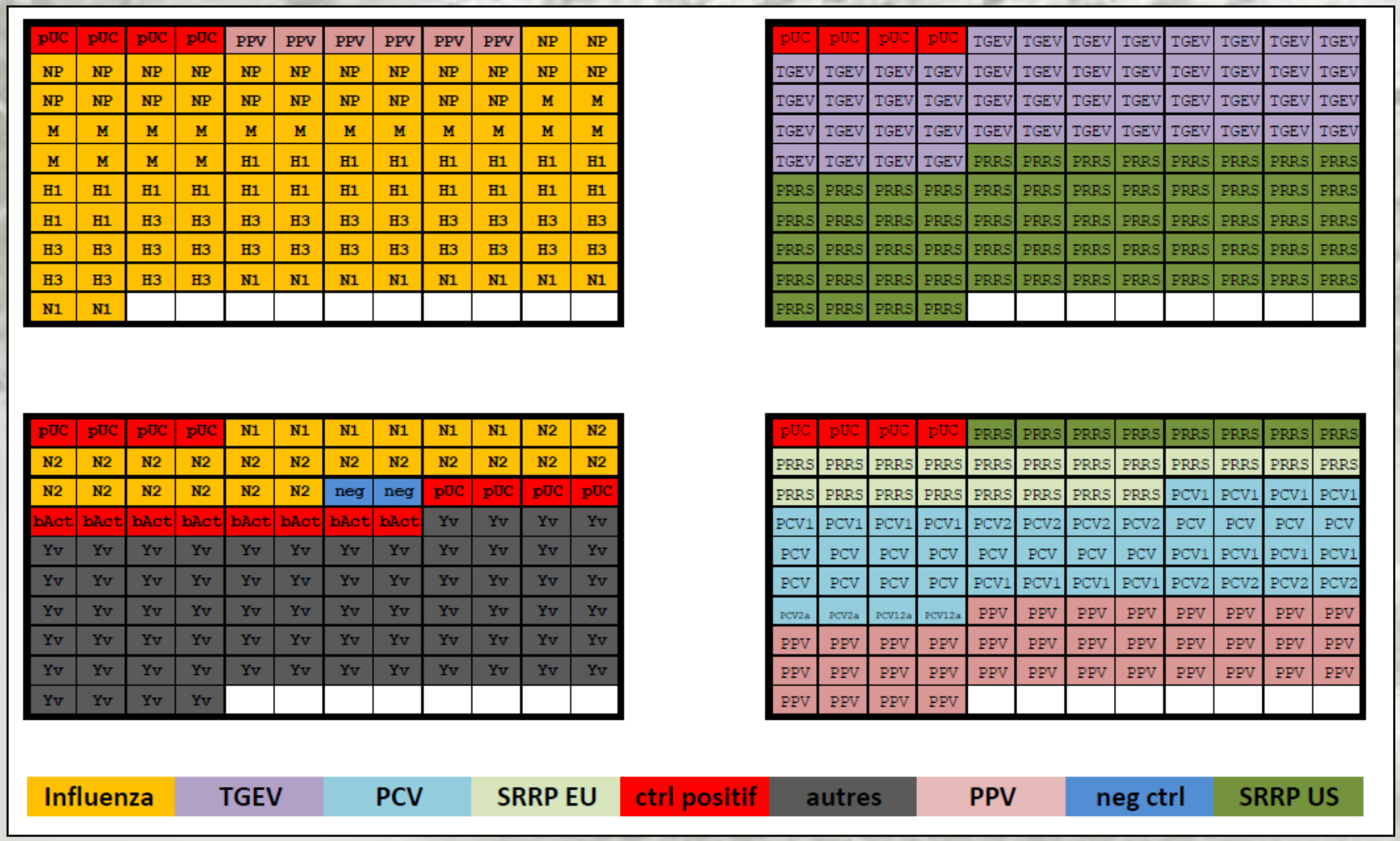
- Probes synthesis
- Probes impression on the glass slide support

3- Genetic material amplification and labeling method

- Select the appropriate method
- Optimize the selected method

4- Validate the Microarray

The DNA chip first version

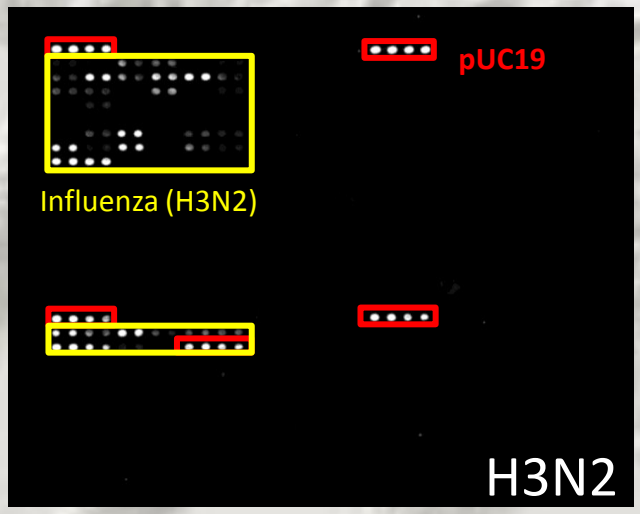


6 swine virus targeted (PRRSV, PCV, Swine Influenza, TGEV / PRCV, PPV)

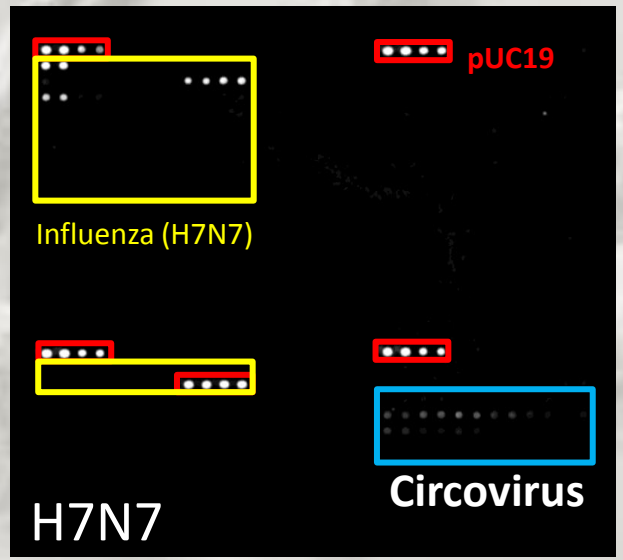
And controls…

The DNA chip first version

Influenza detection (H1N1, H3N2 et H7N7)



- Capacity to detect a virus that is not circulating anymore (H7N7)
- Capacity to detect a virus not related to swine disease (H7N7)
- Possibility to detect more than one virus in a sample (H7N7 – circovirus)
- Possibility to detect an unknown virus in a sample (circovirus)



The DNA chip second version

19 viral families targeted…

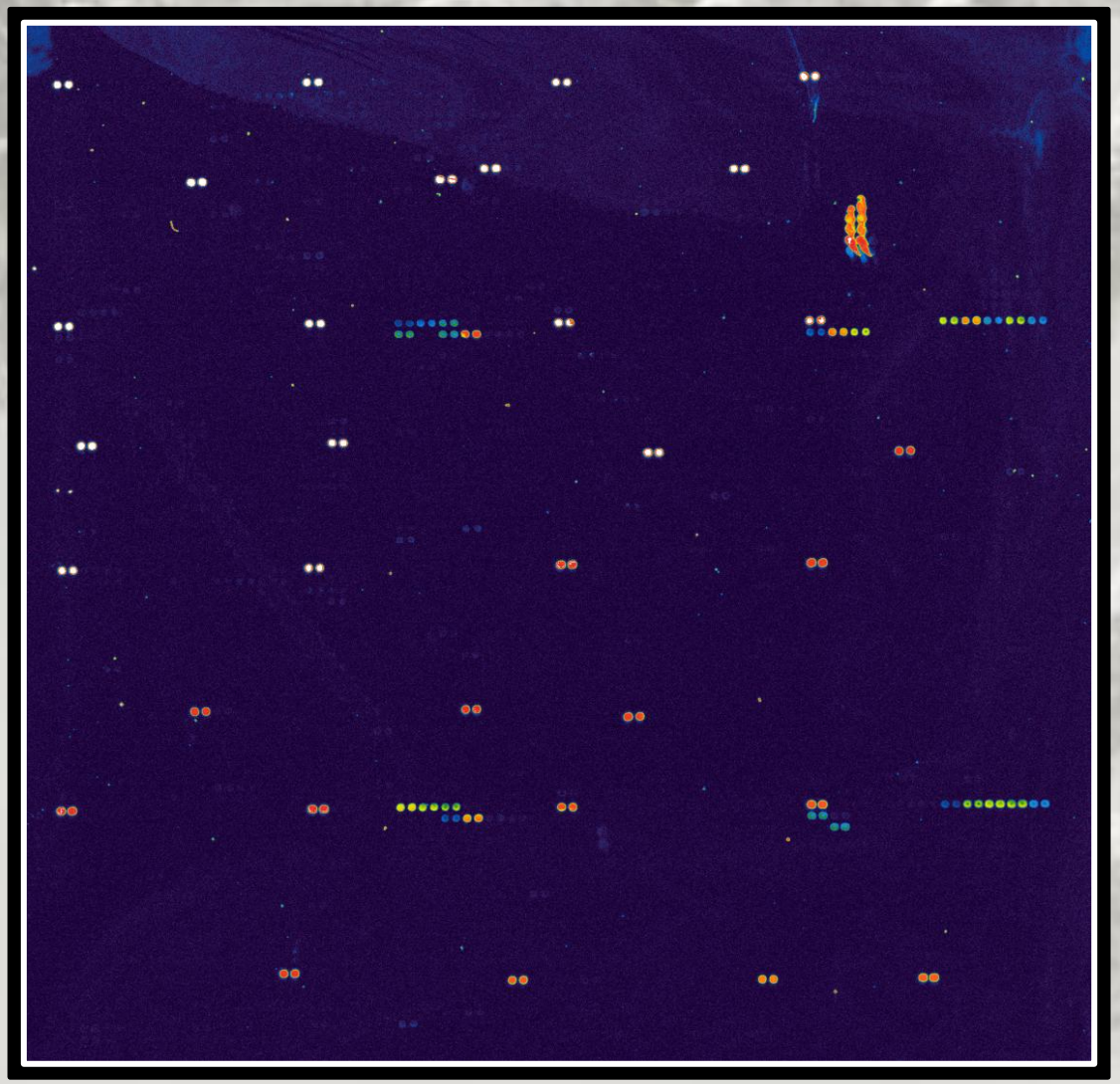
More than 360 different viruses targeted…

Virus Family	Viral genome type	Number of probes
Adenoviridae	DNA	476
Arteriviridae	RNA	71
Asfarviridae	DNA	10
Astroviridae	RNA	22
Caliciviridae	RNA	164
Circoviridae	DNA	114
Coronaviridae	RNA	300
Filoviridae	RNA	46
Flaviviridae	RNA	548
Hepeviridae	RNA	34

Virus Family	Viral genome type	Number of probes
Herpesviridae	DNA	564
Orthomyxoviridae	RNA	147
Paramyxoviridae	RNA	12
Parvoviridae	DNA	320
Picornaviridae	RNA	286
Poxviridae	DNA	156
Reoviridae	RNA	46
Retroviridae	RNA	314
Rhabdoviridae	RNA	160
	Total:	**3790**

The DNA chip second version

Influenza detection (H1N1)



What is left to do…

Validate the DNA Chip with other known viruses

Test the DNA Chip with diagnostic samples where the implicated virus is unknown

Evaluate the DNA Chip sensitivity

Conclusion

Encouraging results!

- **Allow the detection of viral strains that are no longer in circulation! (H7N7)**
- **Allow the detection of multiple viruses in the same sample (H7N7 – Circovirus)**
- **Tolerance to mutations found in emerging viruses**
- **Allow the detection of an unknown virus in a clinical sample (Circovirus)**

Affordable cost, once fully developed

Available soon!...

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Thank you!