Artificial Intelligence in Oncology

Alexandru G. Floares
President
Solution of Artificial Intelligence Applications
CEO
Artificial Intelligence Expert
AI Recent Evolution

AI sees a fast adoption in many industries

In the last years it saw its first superhuman medical applications

Should we be worried?

alexandru.floares@aie-op.com
Era of **Augmented Intelligence** NOT AI Era

- AI is **enhancing** not replacing human intelligence
- It's being proven that physicians and AI working together
- **Outperform** AI or Physicians working alone

alexandru.floares@aie-op.com
AI gives physicians more time for human interactions with their patients.

Patients will no longer seem like a collection of clinical, lab data, and images.

AI could enhance patients' image as human beings.
Information Technology

- Facilitated the rise of modern medicine
- Has a profound impact on medical imaging and molecular biology
- Both fields produce vast amounts of high-throughput data
- Instead of finding answers to biomedical questions we just started to formulate more meaningful ones.
Modern Medicine faces Data Science problems

Data Science problems are properly solved with AI

NOT by a conventional hypothesis-driven approach

and the old fashion statistical approach

alexandru.floares@aie-op.com
Globally, more than 8 million people die from cancer every year.

But early detected cancers can be cured.

Existing tests: invasive (surgical procedures) or non-invasive but with low accuracy.
• Treatment efficiency

• Treatment costs
Molecular vs. Imaging alterations

• Imaging methods can be used for cancer early detection.
  • e.g. mammography in breast cancer
• AI can simultaneously analyze many medical images, and YET..
• Imaging can't detect a tumor before formation
Molecular alterations related to cancer development, precede the formation of a tumor.

These methods work for a size undetectable by the imaging techniques.

Molecular vs. Imaging alterations

alexandru.floares@aie-op.com
No more pain: "Liquid biopsies"

For molecular cancer tests:

- Tissue biopsies could be replaced by "liquid biopsies," (e.g., a blood drop)

Blood circulation is like a *liquid nervous system*

These *non-invasive* tests avoid related patients':
- Fear
- Pain
- Risks

alexandru.floares@aie-op.com
Collaboration not replacement!

The best strategy is to exploit the complementarities between Human and Artificial Intelligence.

A common mistake is to use biomedical knowledge to select subsets of relevant molecular alterations from Big Data.

Or to impose a model.

Let the data speak to the AI (not to us!)

alexandru.floares@aie-op.com
AI predictive models could be very accurate (>95%).

By letting the data speak to the AI, highly accurate predictive models can be developed. These models should satisfy the **ART criteria**:

- Molecular tests for diagnosis
- Prognosis
- Response to treatment prediction

alexandru.floares@aie-op.com
The ART criteria

- Highly **Accurate**, with performance > 95%
- **Robust**, having similar accuracy for different groups of patients
- **Transparent** instead of "black-box."

alexandru.floares@aie-op.com
Our AI non-invasive multi-cancer diagnosis and early detection test

• Is the best existing test
• Working on 13 cancer types.
• Accuracy greater than 99%.
• Non-invasive, starts from a blood drop ("liquid biopsy").
Solution: Our multi-cancer early-detection test

Diagnosis for 13 cancer types

Accuracy > 99%!
**Comparison with the competition**

Our test:

- Has the highest accuracy (>99%)
- Works on more cancer types (13)
- Successfully discriminates between malign and benign tumors
- Was validated on a higher number of cases

| Company   | Cancer types | Median accuracy | Lowest accuracy | Number of cases |
|-----------|--------------|-----------------|-----------------|-----------------|
| AIE       | 13           | >99%            | 99%             | >6000           |
| CancerSEEK| 8            | ~77%            | 33%             | ~1000           |
| Delfi     | 7            | ~73%            | 57%             | 208             |
Ethical problems and Benefits

AI applications pose new and complex ethical problems.

Yet they can be solved with a clear and pragmatic approach.

Despite this, the benefits to the:

- Patients
- Physicians
- Healthcare systems

can be enormous!
The real issue

Considering all the benefits,

It would be unethical not to use AI to revolutionize medicine.
