

## From Diagnosticians to “Triageologists:” The Transformation of Modern Physicians through the Lens of a Pathologist!

There is a need to coin a new term that describes an expanding aspect of biomedical sciences: “trialogy” (from: “triage” = to sort and assign priority and “ology” = a branch of knowledge or science).

A medical triageologist acts more like a skilled distributor than a diagnostician. The trend of transforming modern physicians into triageologists is the most profound change in healthcare over the past few decades. Until recently, this trend largely affected clinicians, while pathologists enjoyed sitting at the receiving end of the triage stream. However, the growing over-reliance on molecular and genetic workups is starting to similarly transform pathologists into the new “trialogists” on the medical block. This is changing the nature of pathology and the type of medical trainees the field attracts.

Historically, students of medicine were attracted to the field of pathology for the joy of serving as the diagnosticians of last resort, or the “Sherlock Holmes” of complex cases and, yes, out of a fascination with images and patterns.

There is joy in solving puzzles and a remarkable sense of achievement in applying patterns to unlock clinical mysteries. For many decades, the diagnostic “buck” stopped under the magnifying lens of a microscope. Morphological patterns gave a pathologist robust visual data, less prone to subjectivity in comparison to clinical data. Seeing was believing. The joy of being a needed “decider” was powerful enough to compensate the pathologist for the loneliness of working behind the scenes, without patient interaction. Learning morphological patterns and applying that skill to clinical questions constituted the science and art of the profession.

Deciphering patterns can be fun. Patterns represent order, and order has an inherent appeal. Human tendency is to admire order and dislike disorder, so patterns are naturally likable. Patterns, visual or

otherwise, appeal to our senses. Our auditory sense favors sound with a pattern (music) over sounds that largely lack a pattern (noise). At the visual level, we see beauty in symmetry, one of the most straightforward patterns. Images of asymmetric shapes and random discordance may be amusing in Picasso’s paintings, but they do not share many similarities with images of beauty pageant winners.

Patterns have a survival advantage because they are easier to transmit over time and decoded using a rule. Nature favors and communicates in patterns and codes (DNA and RNA are examples). Ancient odysseys coined into rhymes were more likely to be remembered and hence survived. Dr. Seuss’s stories would not have had the same appeal were they not for the repetitive rhymes and patterns. The most remembered message in American history – Paul Revere’s signal “one if by land, two if by sea” – described a simple pattern that was easy to remember. Patterns enabled Champollion to decipher the Hieroglyphic on the Rosetta Stone and unlock ancient Egyptian history.

Physicians, in general, and pathologists, in particular, enjoy deciphering patterns. Even in the absence of a specific pattern, astute pathologists still find much to say when faced with a “patternless” pattern (as in undifferentiated “small blue cell tumors”!).

Of course, the value in microscopic patterns lies in its application to the greater context at the clinical level. This is one primary reason that pathologists-to-be are recruited from graduating medical student classes, not fine art studios.

Medicine is changing rapidly; medical decisions and diagnoses are increasingly becoming linked to molecular findings and expanding genetic catalog. Molecule-targeting therapies are accelerating this trend. Molecular similarities often matter more than traditional patterns. In light of these tremendous advancements, it is tempting to relegate time-honored fundamentals to the back

seat. Nevertheless, the evidence still shows that the morphological context still matters, but it is necessary to give the molecular and genetic data context. This is analogous to the way clinical context traditionally guided microscopic interpretations.

In incorporating such advancements, the medical community should attempt to maximize their benefits while minimizing the disruptions. As guidance, we can find lessons learned from the past, when clinicians first transformed into “triageologists.” Here are a few:

- The diagnostic process requires a “maestro” who triages, seeks, gathers, and integrates morphologic, molecular, and genetic data into meaningful interpretation. The optimal triage is best when assigned to the person who has a plan anchored in sound clinical judgment and solid morphologic skills. The individual most fit for this role remains the pathologist. In the absence of such a maestro, the diagnostic process may lose focus or even degenerate into a costly gathering of incoherent data
- A specimen for a pathologist is analogous to a patient for a clinician. At the specimen level, “do no harm” translates to “do not mishandle or misdirect parts of the specimen out of morphologic or clinical context.” It also means, do not complicate unnecessarily by “shot-gun testing.” Unguided testing is not only costly but may also precipitate harmful distractions and perpetual paralysis. Finally, “do no harm” can also mean “do not become the overly gun-shy diagnostician who needs every possible ancillary test before rendering a diagnosis”
- The morphology will go out of fashion only when clinical physical examination goes out of fashion (i.e., never!). Despite all advances, it is difficult to excel as a “triageologist” without being an excellent morphologist, just as one cannot be a great basketball player without being a great athlete. While photographic memory is no match for big data, there will always be conditions where morphology holds the most important answer. The “big picture,” which is now (ironically) microscopic, will always matter.

### The trend is clear

The diagnostic “buck” that used to stop under the microscope of a shy, reserved pathologist may have to travel the extra distance in search of the remote and recluse molecular geneticist. The line of clinicians waiting for answers at the door of pathologists will gradually shorten, while the line at the door of molecular genetics specialists will grow. The last line will often include pathologists who mastered their role as “triageologists.”

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