0:00:00 –> 0:00:02.54 Funding for Yale Cancer Answers

0:00:02.54 –> 0:00:05.08 is provided by Smilow Cancer

0:00:05.167 –> 0:00:07.367 Hospital and AstraZeneca.

0:00:07.37 –> 0:00:09.404 Welcome to Yale Cancer Answers with

0:00:09.404 –> 0:00:11.818 your host doctor Anees Chagpar.

0:00:11.82 –> 0:00:13.69 Yale Cancer Answers features the

0:00:13.69 –> 0:00:15.985 latest information on cancer care by

0:00:15.985 –> 0:00:17.457 welcoming oncologists and specialists

0:00:17.457 –> 0:00:19.903 who are on the forefront of the

0:00:19.903 –> 0:00:21.682 battle to fight cancer. This week,

0:00:21.682 –> 0:00:23.387 it's a conversation about the

0:00:23.387 –> 0:00:25.217 role of pathology and cancer

0:00:25.217 –> 0:00:26.705 with Doctor Angelique Levi.

0:00:26.71 –> 0:00:28.873 Dr. Levi is an associate professor of

0:00:28.873 –> 0:00:31.26 pathology at the Yale School of Medicine,

0:00:31.26 –> 0:00:33.27 where Doctor Chagpar is a

0:00:33.27 –> 0:00:34.61 professor of surgical oncology.

0:00:36 –> 0:00:37.614 Angelique, maybe we can start off

0:00:37.614 –> 0:00:39.72 by you telling us a little bit about

0:00:39.72 –> 0:00:41.39 yourself and what it is you do.

0:00:41.82 –> 0:00:44.865 So as a pathologist I am anatomic

0:00:44.865 –> 0:00:46.72 and clinical pathology trained

0:00:46.72 –> 0:00:50.196 so a PCP for short and

0:00:50.196 –> 0:00:52.048 have received fellowship training

0:00:52.048 –> 0:00:54.74 and in Cytopathology,

0:00:54.74 –> 0:00:57.9 a subspecialty of the discipline.

0:00:57.9 –> 0:01:00.81 I have also received some extra

0:01:00.81 –> 0:01:04.03 training and expertise in GU pathology,

0:01:04.03 –> 0:01:06.02 all of which I did

0:01:06.02 –> 0:01:09.54 way back at Hopkins and

0:01:09.54 –> 0:01:12.62 it's a combined program.

1

0:01:12.62 –> 0:01:14.5 If you do both anatomic

0:01:14.5 –> 0:01:15.628 and clinical pathology

0:01:15.63 –> 0:01:17.75 it used to be five years and now is

0:01:17.75 –> 0:01:20.394 4 but you can do one of the two

0:01:20.394 –> 0:01:22.77 disciplines for a little less time now.

0:01:22.77 –> 0:01:26.508 And the anatomic focuses

0:01:26.508 –> 0:01:29.544 mostly on the study of tissue

0:01:29.544 –> 0:01:31.484 and working with a microscope,

0:01:31.49 –> 0:01:33.041 fluids and cells,

0:01:33.041 –> 0:01:35.626 whereas the clinical pathology focuses

0:01:35.626 –> 0:01:38.748 a bit more on laboratory testing,

0:01:38.75 –> 0:01:41 blood tests for example.

0:01:41.27 –> 0:01:43.682 So let's dive a little bit more into that.

0:01:43.69 –> 0:01:46.712 I mean, when we think about the role

0:01:46.712 –> 0:01:49.067 of pathology and cancer automatically,

0:01:49.07 –> 0:01:51.778 our brain kind of goes to, Oh yeah,

0:01:51.778 –> 0:01:53.198 it's the pathologists who kind

0:01:53.198 –> 0:01:55.112 of look at the biopsy and tell

0:01:55.112 –> 0:01:57.07 me whether or not I have cancer.

0:01:57.07 –> 0:01:59.016 Can you flesh out a little bit

0:01:59.016 –> 0:02:01.039 more about what it is you do and

0:02:01.039 –> 0:02:02.949 how you come up with that answer?

0:02:02.95 –> 0:02:06.846 I mean everything hinges on what you say,

0:02:06.85 –> 0:02:08.51 how much pressure is that,

0:02:08.51 –> 0:02:09.842 and how do you actually come

0:02:09.842 –> 0:02:11.24 up with the correct diagnosis?

0:02:12.51 –> 0:02:14.74 It's certainly a team

0:02:14.74 –> 0:02:16.524 from the very beginning,

0:02:16.53 –> 0:02:19.49 patients will go to either a hospital

0:02:19.49 –> 0:02:22.587 or a physician office and will have

0:02:22.587 –> 0:02:25.428 a procedure done so the procedure

0:02:25.428 –> 0:02:28.572 could be either a Pap test,

0:02:28.572 –> 0:02:30.687 screening test for cervical cancer,

0:02:30.69 –> 0:02:32.574 it could be a fine needle

0:02:32.574 –> 0:02:33.83 aspiration of a breast mass,

0:02:33.83 –> 0:02:36.742 or it could be a surgical procedure

0:02:36.742 –> 0:02:39.414 in the operating room where

0:02:39.414 –> 0:02:42.597 a tumor or an organ is removed, so

0:02:42.597 –> 0:02:46.674 all of those tissues come to the lab from

0:02:46.674 –> 0:02:50.54 those scenarios and in the lab, the

0:02:50.54 –> 0:02:54.7 histology component is where that

0:02:54.7 –> 0:02:58.06 tissue is transformed into a medium

0:02:58.06 –> 0:03:03.024 where it is put onto a glass slide and

0:03:03.024 –> 0:03:06.032 that process itself is quite intense.

0:03:06.032 –> 0:03:08.708 We have pathology assistants who help

0:03:08.708 –> 0:03:11.374 in the gross examination of these

0:03:11.374 –> 0:03:14.3 tissues when they come to the lab,

0:03:14.3 –> 0:03:17.264 especially the larger ones where they

0:03:17.264 –> 0:03:21.489 may note sizes of lesions they may sample.

0:03:21.49 –> 0:03:23.058 Areas that are critical,

0:03:23.058 –> 0:03:24.744 close to margins, etc.

0:03:24.744 –> 0:03:27.264 And those sections are then

0:03:27.264 –> 0:03:30.23 submitted in cassettes and processed,

0:03:30.23 –> 0:03:33.206 in an automated lab in a way that

0:03:33.206 –> 0:03:36.66 they are sliced and stained and put

0:03:36.66 –> 0:03:39.275 on glass slides for pathologists

0:03:39.368 –> 0:03:42.98 to then review at the time of a

0:03:42.98 –> 0:03:45.35 case review and in community practice,

0:03:45.35 –> 0:03:47.387 often it is just a pathologist,

0:03:47.39 –> 0:03:50.738 but here at academic centers we

0:03:50.738 –> 0:03:52.412 have trainees, residents,

0:03:52.42 –> 0:03:54.238 who are involved in that process.

0:03:54.24 –> 0:03:57.607 We have many sets of eyes that

0:03:57.61 –> 0:03:59.782 we call preview slides and then

0:03:59.782 –> 0:04:01.874 the pathologist sits down at a

0:04:01.874 –> 0:04:03.432 microscope to sign out.

0:04:03.432 –> 0:04:05.08 And that's actually transforming as well.

0:04:05.08 –> 0:04:06.837 Soon we might say we don't sit

0:04:06.837 –> 0:04:09.099 down at a microscope to sign out,

0:04:09.1 –> 0:04:12.636 but we may sit at a computer screen

0:04:12.636 –> 0:04:16.032 if we transform into the digital era,

0:04:16.032 –> 0:04:18.18 but we're not quite there yet.

0:04:22.46 –> 0:04:26.16 Then with a microscope is where we

0:04:26.16 –> 0:04:28.22 really do what we were trained to do,

0:04:28.22 –> 0:04:31.972 and you use your trained eye to look

0:04:31.972 –> 0:04:34.856 at the morphology of the tissue and

0:04:34.856 –> 0:04:37.784 see where it differs from what you

0:04:37.784 –> 0:04:40.99 have trained yourself to know what's normal.

0:04:40.99 –> 0:04:43.186 So identifying what's abnormal

0:04:43.186 –> 0:04:46.48 disease and in that then deciding

0:04:46.572 –> 0:04:48.887 whether it's cancer or not.

0:04:48.89 –> 0:04:50.816 So not every disease is cancer,

0:04:50.82 –> 0:04:52.758 and it's important in some cases

0:04:52.76 –> 0:04:54.044 where the presumption clinically

0:04:54.044 –> 0:04:56.41 might be a mass because of cancer,

0:04:56.41 –> 0:04:58.702 it's a really important piece to

0:04:58.702 –> 0:05:01.337 be able to say this isn't cancer,

0:05:01.337 –> 0:05:03.92 and so therefore no treatment is necessary.

0:05:03.92 –> 0:05:05.68 But at a Cancer Center,

0:05:05.68 –> 0:05:10.16 many of the referrals that come here often

0:05:10.16 –> 0:05:12.415 perhaps already with a preliminary

0:05:12.415 –> 0:05:15.13 diagnosis on a small biopsy of

0:05:15.13 –> 0:05:17.434 cancer and then our job sometimes,

0:05:17.44 –> 0:05:19.948 as pathologists, in a larger procedure, or a

0:05:19.95 –> 0:05:24.36 resection is to then go ahead and stage that,

0:05:24.36 –> 0:05:26.765 which means assign some more

0:05:26.765 –> 0:05:28.689 parameters around that diagnosis.

0:05:28.69 –> 0:05:31.122 So not only is it cancer,

0:05:31.122 –> 0:05:33.866 but it's a type of cancer that

0:05:33.866 –> 0:05:36.868 you want to kind of classify.

0:05:36.87 –> 0:05:40.206 It's given a grade as we call it,

0:05:40.21 –> 0:05:42.694 well differentiated, poorly differentiated.

0:05:42.694 –> 0:05:45.799 It might be given certain

0:05:45.8 –> 0:05:49.37 other parameters regarding size or margin.

0:05:49.37 –> 0:05:50.778 Different cancers have different

0:05:50.778 –> 0:05:52.186 parameters that are important,

0:05:52.19 –> 0:05:55.928 and all of those details are important

0:05:55.928 –> 0:05:58.4 in prognosis prediction and then

0:05:58.4 –> 0:06:00.065 treatment and usually

0:06:00.065 –> 0:06:02.285 associated then with outcome.

0:06:03.43 –> 0:06:05.149 So I want to pick up on a few

0:06:05.149 –> 0:06:06.457 things that you said there.

0:06:06.46 –> 0:06:09.412 So one was this whole process

0:06:09.412 –> 0:06:11.99 that really goes on that

0:06:11.99 –> 0:06:14.654 many people who have never stepped into a

0:06:14.654 –> 0:06:17.207 pathology lab might not know about which is

0:06:17.21 –> 0:06:20.034 when you have a biopsy done

0:06:20.04 –> 0:06:23.36 and your surgeon, your radiologist,

0:06:23.36 –> 0:06:25.33 whoever has done the biopsy,

0:06:25.33 –> 0:06:27.706 sends that specimen away.

0:06:27.706 –> 0:06:29.476 Oftentimes, it's the greatest

0:06:29.476 –> 0:06:31.436 amount of patient anxiety waiting

0:06:31.436 –> 0:06:33.599 for that result to come back.

0:06:33.6 –> 0:06:36.28 And sometimes it can take a few days,

0:06:36.28 –> 0:06:38.926 but there is all of this

0:06:38.926 –> 0:06:41.289 preprocessing that needs to go on.

0:06:41.29 –> 0:06:44.878 Can you give us a sense of how long

0:06:44.878 –> 0:06:47.854 these biopsy results can sometimes take,

0:06:47.86 –> 0:06:50.537 and why it's important to really be

0:06:50.537 –> 0:06:52.499 patient and wait for your pathologist

0:06:52.499 –> 0:06:54.857 to give you the right answer because

0:06:54.857 –> 0:06:57.553 as you say so much of treatment really

0:06:57.553 –> 0:06:59.77 rests on what the pathologist says.

0:07:00.52 –> 0:07:02.232 Absolutely, that pre-analytical phase

0:07:02.232 –> 0:07:05.483 that you're talking about is a big part

0:07:05.483 –> 0:07:07.923 of our processing in the lab and

0:07:07.992 –> 0:07:10.404 that's kind of a traditional laboratory

0:07:10.404 –> 0:07:12.568 setting where you know pathologists when

0:07:12.568 –> 0:07:14.76 we talk about where do you work,

0:07:14.76 –> 0:07:16.084 you work in the lab, well no,

0:07:16.084 –> 0:07:17.708 we actually work mostly in our offices,

0:07:17.71 –> 0:07:19.09 but much of what's happening

0:07:19.09 –> 0:07:20.85 before we even see that glass slide.

0:07:29.425 –> 0:07:32.05 An Accessioner is the first person in the

0:07:32.05 –> 0:07:34.358 laboratory that basically does the

0:07:34.358 –> 0:07:38.17 patient registration that assigns that

0:07:38.17 –> 0:07:39.658 specimen a unique number.

0:07:39.658 –> 0:07:42.246 Every specimen in pathology is assigned a

0:07:42.246 –> 0:07:44.59 unique number and that's how we identify it.

0:07:45.046 –> 0:07:46.414 The patient information,

0:07:46.414 –> 0:07:48.694 clinical identifiers are then entered,

0:07:48.7 –> 0:07:51.535 and that's a really important step in

0:07:51.535 –> 0:07:53.771 terms of specimens being identified

0:07:53.771 –> 0:07:57.089 properly and assigned to the right person.

0:07:57.09 –> 0:08:00.219 That is the first thing that happens and

0:08:00.22 –> 0:08:04.532 the next step is it goes to the gross

0:08:04.532 –> 0:08:08.517 Histology bench and so for small biopsies

0:08:08.52 –> 0:08:11.256 that are cores or maybe liquid,

0:08:11.26 –> 0:08:12.756 or a pap smear,

0:08:12.756 –> 0:08:13.878 just single cells,

0:08:13.88 –> 0:08:15.76 fixation is something that

0:08:15.76 –> 0:08:17.64 doesn't take as long,

0:08:17.64 –> 0:08:20.065 so fixation is something that

0:08:20.065 –> 0:08:23.058 happens in different chemicals,

0:08:23.058 –> 0:08:26.193 alcohol and or formalin.

0:08:26.2 –> 0:08:28.606 Now when these tissues are larger,

0:08:28.61 –> 0:08:31.306 as in the case of a large tumor

0:08:31.306 –> 0:08:33.369 or resection or a large organ,

0:08:33.37 –> 0:08:36.618 that fixation process can

0:08:36.618 –> 0:08:39.01 happen over a 12 hour period.

0:08:39.01 –> 0:08:39.754 Sometimes overnight,

0:08:39.754 –> 0:08:40.87 so for example,

0:08:40.87 –> 0:08:44.206 a prostate that is removed whole

0:08:44.206 –> 0:08:47.55 or a large breast excision,

0:08:47.55 –> 0:08:49.488 those are examples of tissues that

0:08:49.488 –> 0:08:52.05 take a long time to fix in formalin.

0:08:52.05 –> 0:08:54.458 So before those sections can even be

0:08:54.458 –> 0:08:57.25 taken to embed in those paraffin blocks,

0:08:57.25 –> 0:08:59 that process has to happen,

0:08:59 –> 0:09:00.755 and it's critically important for

0:09:00.755 –> 0:09:03.099 that process to happen

0:09:03.1 –> 0:09:05.656 because these tissues need to be

0:09:05.66 –> 0:09:07.676 able to be examined in sections

0:09:07.676 –> 0:09:09.96 in a way where the margins

0:09:09.96 –> 0:09:12.005 and all of those distinctions

0:09:12.005 –> 0:09:14.05 between things that are critically

0:09:14.114 –> 0:09:15.838 important for patient care,

0:09:15.84 –> 0:09:17.855 whether the person gets radiation

0:09:17.855 –> 0:09:20.62 or not is the margin positive.

0:09:20.62 –> 0:09:22.76 Those delineations are critically

0:09:22.76 –> 0:09:25.435 dependent on that fixation step,

0:09:25.44 –> 0:09:28.072 and that step is where we really

0:09:28.072 –> 0:09:30.32 need to wait, and we can't rush it.

0:09:30.32 –> 0:09:33.239 So we have some technologies,

0:09:33.24 –> 0:09:35.18 microwave assistance and other things,

0:09:35.18 –> 0:09:38.558 but in that process there

0:09:38.558 –> 0:09:40.81 are still very manual

0:09:40.81 –> 0:09:43.492 pieces that take time and then

0:09:43.492 –> 0:09:46.898 by the time that slide comes out,

0:09:46.9 –> 0:09:48.664 if the surgery was on a Monday,

0:09:48.67 –> 0:09:51.256 that glass slide may not even

0:09:51.256 –> 0:09:54.253 come to a pathologist's desk until

0:09:54.253 –> 0:09:56.029 the following afternoon.

0:09:56.03 –> 0:09:57.735 And if that following afternoon

0:09:57.735 –> 0:09:59.899 is the first time a pathologist

0:09:59.899 –> 0:10:01.849 is looking at a cancer,

0:10:01.85 –> 0:10:04.906 whether it's a complicated case or even

0:10:06.04 –> 0:10:08.865 a standard morphologic diagnosis of,

0:10:08.87 –> 0:10:11.18 let's say, breast cancer, there are still

0:10:11.18 –> 0:10:13.668 additional tests that will have to get done,

0:10:13.67 –> 0:10:16.328 and so those tests will include

0:10:16.328 –> 0:10:18.1 immunostains and other markers

0:10:18.175 –> 0:10:20.401 that are all very important that

0:10:20.401 –> 0:10:23.067 need to be included in the report.

0:10:24.54 –> 0:10:27.699 So a lot of those those markers are

0:10:27.699 –> 0:10:30.38 things that we have to then order,

0:10:30.38 –> 0:10:32.54 and again it's another day

0:10:32.54 –> 0:10:33.836 or overnight processing,

0:10:33.84 –> 0:10:36.612 and so each of these steps

0:10:36.612 –> 0:10:39.12 requires kind of another decision

0:10:39.12 –> 0:10:41.596 and potentially another test

0:10:41.6 –> 0:10:44.51 or stain or molecular marker, for example.

0:10:45.12 –> 0:10:47.633 So important for people not

0:10:47.633 –> 0:10:49.955 to rush the pathologist because as

0:10:49.955 –> 0:10:53.08 I tell my patients,

0:10:53.08 –> 0:10:55.81 everything rests on what they say.

0:10:55.81 –> 0:10:57.81 But having said that,

0:10:57.81 –> 0:11:00.722 many people nowadays are

0:11:00.722 –> 0:11:02.634 talking about second opinions,

0:11:02.64 –> 0:11:04.232 either a second opinion

0:11:04.232 –> 0:11:05.426 from their clinician,

0:11:05.43 –> 0:11:07.548 but also getting their pathology that

0:11:07.548 –> 0:11:10.22 may have been reviewed at one institution

0:11:10.22 –> 0:11:12.21 re-reviewed at another institution.

0:11:12.21 –> 0:11:13.122 So for example,

0:11:13.122 –> 0:11:14.946 if they get a second opinion,

0:11:14.95 –> 0:11:18.968 their outside pathology is often re reviewed.

0:11:18.97 –> 0:11:21.426 So can you talk about the importance of

0:11:21.426 –> 0:11:24.348 that and how often do pathologists disagree?

0:11:24.35 –> 0:11:25.955 I mean, are these diagnoses

0:11:25.955 –> 0:11:27.99 things that are black and white?

0:11:27.99 –> 0:11:29.58 That is pretty crystal clear when

0:11:29.58 –> 0:11:31.708 you see a cancer that it's a cancer.

0:11:31.71 –> 0:11:34.188 Or are there some nuances that

0:11:34.188 –> 0:11:36.37 allow for some variability in

0:11:36.37 –> 0:11:38.17 terms of pathologic opinion?

0:11:38.41 –> 0:11:42.323 I'll start by saying second opinions within

0:11:42.323 –> 0:11:45.987 any scenario are always a good thing.

0:11:45.99 –> 0:11:48.118 I think for another set of eyes to

0:11:48.118 –> 0:11:53.82 take a look at a cancer case is

0:11:53.82 –> 0:11:57.096 always good and in the vast majority of

0:11:57.096 –> 0:12:00.136 cases a confirmation is what you'll find.

0:12:00.14 –> 0:12:03.698 The confirmation of the original diagnosis.

0:12:03.7 –> 0:12:06.526 It becomes more important in certain

0:12:06.526 –> 0:12:10.078 scenarios, so certain cancers

0:12:10.08 –> 0:12:12.672 have required subspecialty training

0:12:12.672 –> 0:12:15.912 that not all pathologists have,

0:12:15.92 –> 0:12:18.356 where you practice,

0:12:18.36 –> 0:12:19.503 where you've trained,

0:12:19.503 –> 0:12:21.789 and what you've become an expert

0:12:21.789 –> 0:12:24.483 in really does matter and standards

0:12:24.483 –> 0:12:26.723 are different for different places.

0:12:26.796 –> 0:12:28.468 In the community setting,

0:12:28.47 –> 0:12:30.205 while there's very high

0:12:30.205 –> 0:12:31.593 standards of care there,

0:12:31.6 –> 0:12:35.704 they may not always see all of the unique

0:12:35.704 –> 0:12:40.492 rare tumors that we might have in a tertiary

0:12:40.492 –> 0:12:41.66 academic center.

0:12:41.66 –> 0:12:44.6 Whereas in an academic center like Yale

0:12:44.6 –> 0:12:48.42 we would be able to kind of explain a bit

0:12:48.42 –> 0:12:51.456 more if there are nuances to a tumor.

0:12:51.46 –> 0:12:52.724 So black and white,

0:12:52.724 –> 0:12:54.066 yes cancer or not,

0:12:54.066 –> 0:12:56.118 in the vast majority of cases.

0:12:56.12 –> 0:12:58.26 But for challenging cases,

0:12:58.26 –> 0:13:01.47 I think second opinions are definitely

0:13:01.554 –> 0:13:04.926 helpful with expert review and consensus.

0:13:04.93 –> 0:13:06.826 Daily Conference is something

0:13:06.826 –> 0:13:09.67 that is part of our routine,

0:13:09.67 –> 0:13:11.33 not always in all practices.

0:13:11.64 –> 0:13:14.496 So it's important to kind of

0:13:14.496 –> 0:13:16.759 understand the nuances of pathology.

0:13:16.76 –> 0:13:18.506 We're going to pick up this

0:13:18.506 –> 0:13:20.251 conversation right after we take a

0:13:20.251 –> 0:13:21.835 short break for a medical minute.

0:13:21.84 –> 0:13:23.856 Please stay tuned to learn more about

0:13:23.856 –> 0:13:25.806 the role of pathology in cancer

0:13:25.806 –> 0:13:27.846 with my guest Dr. Angelique Levi.

0:13:28.3 –> 0:13:30.29 Support for Yale Cancer Answers

0:13:30.29 –> 0:13:32.28 comes from Smilow Cancer Hospital,

0:13:32.28 –> 0:13:33.995 where a dedicated team approach

0:13:33.995 –> 0:13:36.144 is used to diagnose liver cancer

0:13:36.144 –> 0:13:38.346 early when treatment is optimal and

0:13:38.346 –> 0:13:40.283 new, more effective treatments are

0:13:40.283 –> 0:13:42.587 being developed. To learn more visit

0:13:44.69 –> 0:13:47.934 Yalecancercenter.org/liver

0:13:47.934 –> 0:13:50.526 Over 230,000 Americans will be diagnosed with lung

0:13:50.526 –> 0:13:52.957 cancer this year and in Connecticut

0:13:52.957 –> 0:13:56.392 alone there will be over 2700 new cases.

0:13:56.392 –> 0:13:58.912 More than 85% of lung cancer

0:13:58.912 –> 0:14:01.12 diagnosis are related to smoking and

0:14:01.193 –> 0:14:03.761 quitting even after decades of use

0:14:03.761 –> 0:14:05.951 can significantly reduce your risk

0:14:05.951 –> 0:14:08.25 of developing lung cancer. Each day,

0:14:08.25 –> 0:14:10.32 patients with lung cancer are surviving

0:14:10.32 –> 0:14:12.822 thanks to increased access to advanced

0:14:12.822 –> 0:14:14.574 therapies and specialized care,

0:14:14.58 –> 0:14:16.265 new treatment options and surgical

0:14:16.265 –> 0:14:17.95 techniques are giving lung cancer

0:14:17.95 –> 0:14:19.63 survivors more hope than they

0:14:19.63 –> 0:14:20.974 have ever had before.

0:14:20.98 –> 0:14:22.896 Clinical trials are currently

0:14:22.896 –> 0:14:24.812 underway at federally designated

0:14:24.812 –> 0:14:26.29 Comprehensive cancer centers,

0:14:26.29 –> 0:14:28.502 such as the battle two trial at

0:14:28.502 –> 0:14:30.129 Yale Cancer Center and Smilow

0:14:30.129 –> 0:14:32.257 Cancer Hospital to learn if a drug

0:14:32.257 –> 0:14:34.555 or combination of drugs based on

0:14:34.555 –> 0:14:36.485 personal biomarkers can help to

0:14:36.49 –> 0:14:39.22 control non small cell lung cancer.

0:14:39.22 –> 0:14:42.21 More information is available at

0:14:42.21 –> 0:14:43.98 yalecancercenter.org. You're listening

0:14:43.98 –> 0:14:46.34 to Connecticut Public Radio.

0:14:46.84 –> 0:14:48.56 Welcome back to Yale Cancer Answers.

0:14:48.56 –> 0:14:50.387 This is doctor Anees Chagpar

0:14:50.387 –> 0:14:52.255 and I'm joined tonight by my

0:14:52.255 –> 0:14:53.619 guest doctor Angelique Levi.

0:14:53.62 –> 0:14:56.05 We're talking about the role of

0:14:56.05 –> 0:14:58.48 pathology in cancer and Angelique,

0:14:58.48 –> 0:15:00.44 you know one of the things that you

0:15:00.44 –> 0:15:01.843 mentioned before the break that I

0:15:01.843 –> 0:15:03.43 was interested in is that you said

0:15:03.43 –> 0:15:05.886 we are getting close to a

0:15:05.886 –> 0:15:08.5 time when pathologists might not be

0:15:08.5 –> 0:15:10.905 looking down the microscope anymore.

0:15:10.91 –> 0:15:13.297 They might be looking at a computer

0:15:13.297 –> 0:15:15.585 screen and that brought to mind

0:15:15.585 –> 0:15:17.53 this whole concept of digital

0:15:17.606 –> 0:15:20.201 pathology and potentially the role

0:15:20.201 –> 0:15:22.796 of artificial intelligence in helping

0:15:22.87 –> 0:15:25.25 pathologists make that diagnosis.

0:15:25.25 –> 0:15:27.35 You talked a little bit before the

0:15:27.35 –> 0:15:29.198 break about some of the nuances.

0:15:29.2 –> 0:15:31.664 Can you talk a little bit about

0:15:31.67 –> 0:15:34.856 where you see digital pathology and

0:15:34.86 –> 0:15:37.079 the role of AI kind of playing

0:15:37.079 –> 0:15:39.089 into pathology as we move forward?

0:15:39.44 –> 0:15:44.389 Absolutely, the landscape is already

0:15:44.389 –> 0:15:50.476 changing and the field is rapidly evolving.

0:15:50.48 –> 0:15:53.78 And pathologists, I think are

0:15:53.78 –> 0:15:57.868 definitely stepping up and wanting to

0:15:57.868 –> 0:16:03.378 not just join this era of digital and

0:16:03.378 –> 0:16:05.318 artificial intelligence as you say,

0:16:05.32 –> 0:16:07.685 machine learning, but hopefully

0:16:07.685 –> 0:16:11.2 also take a role in leading that

0:16:11.2 –> 0:16:13.84 charge and for pathology there are

0:16:13.84 –> 0:16:16.246 so many potential applications as

0:16:16.246 –> 0:16:19.258 with everything AI is everywhere.

0:16:19.26 –> 0:16:20.692 We don't necessarily appreciate

0:16:20.692 –> 0:16:23.22 it from our phones and our apps,

0:16:23.22 –> 0:16:26.64 or for many the interfaces we do each day,

0:16:26.64 –> 0:16:29.706 but it's a tool no different

0:16:29.706 –> 0:16:31.948 than for pathology,

0:16:31.948 –> 0:16:33.676 maybe an immunostain and

0:16:33.676 –> 0:16:35.339 molecular marker or genetic

0:16:35.34 –> 0:16:38.706 profile and how we use that tool

0:16:38.706 –> 0:16:42.135 is largely dependent on

0:16:42.14 –> 0:16:44.78 what help or guidance a particular

0:16:44.78 –> 0:16:47.654 practice might be looking for.

0:16:47.654 –> 0:16:50.51 One example of AI and pathology as

0:16:50.51 –> 0:16:53.079 you mentioned or alluded to would be,

0:16:53.08 –> 0:16:55.838 helping to make a diagnosis

13

0:16:55.838 –> 0:16:59.06 or grading a tumor.

0:16:59.06 –> 0:17:03.391 So an area of study that I

0:17:03.391 –> 0:17:06.076 have pursued in GU pathology

0:17:06.08 –> 0:17:07.481 and in prostate cancer

0:17:07.481 –> 0:17:10.992 this is a common application now

0:17:10.992 –> 0:17:15.097 and there are already software

0:17:15.097 –> 0:17:18.96 companies that are promoting

0:17:18.96 –> 0:17:22.596 AI programs and software that can

0:17:22.596 –> 0:17:25.742 reliably help predict grades or

0:17:25.742 –> 0:17:28.837 Gleason scoring of prostate cancer.

0:17:28.84 –> 0:17:33.57 But it's not that simple.

0:17:33.57 –> 0:17:38.085 Depending on the cancers that might be

0:17:38.09 –> 0:17:40.43 seen in a given institution,

0:17:40.43 –> 0:17:42.728 whether it's more common,

0:17:42.73 –> 0:17:46.178 lower grade, or in a tertiary care center,

0:17:46.18 –> 0:17:47.506 much more complicated,

0:17:47.506 –> 0:17:49.304 higher grade,

0:17:49.304 –> 0:17:52.47 algorithms are kind of taught to

0:17:52.47 –> 0:17:55.11 answer a specific question or grade.

0:17:55.11 –> 0:17:58.27 So if you're looking for well differentiated

0:17:58.27 –> 0:18:01.385 prostate cancer 3 + 3 Gleason score,

0:18:01.39 –> 0:18:03.688 that might be one training set,

0:18:03.69 –> 0:18:06.725 whereas if you're looking for

0:18:06.725 –> 0:18:09.153 high grade prostate cancer,

0:18:09.16 –> 0:18:11.164 that is

0:18:11.164 –> 0:18:13.168 amenable not to resection,

0:18:13.17 –> 0:18:14.433 but further treatment,

0:18:14.433 –> 0:18:16.538 that might be another training

0:18:16.538 –> 0:18:18.269 software kind of algorithm,

0:18:18.27 –> 0:18:20.502 so much depends on

0:18:20.502 –> 0:18:21.99 the question being asked,

14

0:18:21.99 –> 0:18:24.419 and it's not just help in grading,

0:18:24.42 –> 0:18:27.768 but it could also just be help in detection,

0:18:27.77 –> 0:18:30.63 so different programs can be

0:18:30.63 –> 0:18:34.22 taught how to do different tasks,

0:18:34.22 –> 0:18:36.518 and another program might be in

0:18:36.518 –> 0:18:38.87 a better setting for community

0:18:38.87 –> 0:18:41.696 practice not to miss cancer

0:18:41.696 –> 0:18:43.896 as much as

0:18:43.896 –> 0:18:46.647 focusing on the grade because

0:18:46.65 –> 0:18:48.898 detection and preventing false

0:18:48.898 –> 0:18:52.27 negatives would really be the key

0:18:52.878 –> 0:18:54.398 perhaps in a Community setting

0:18:54.398 –> 0:18:56.07 with a lower cancer rate,

0:18:56.07 –> 0:18:58.92 whereas at the tertiary setting something

0:18:58.92 –> 0:19:03.05 that would be more helpful is perhaps

0:19:03.05 –> 0:19:05.918 an AI software algorithm that not

0:19:05.918 –> 0:19:08.639 just helps with detection or grade,

0:19:08.64 –> 0:19:10.216 but maybe with prognosis.

0:19:10.216 –> 0:19:12.991 And that's really the key,

0:19:12.991 –> 0:19:15.639 trying to discern what this AI can help

0:19:15.639 –> 0:19:18.158 with and how we'd like to apply it,

0:19:21.01 –> 0:19:22.459 tailoring the solution to the problem.

0:19:22.46 –> 0:19:25.886 But one of the questions is this.

0:19:25.886 –> 0:19:28.184 Are these technologies in use now?

0:19:28.19 –> 0:19:30.71 And is there a way for patients to

0:19:30.71 –> 0:19:32.742 know whether a particular pathology

0:19:32.742 –> 0:19:35.262 department is using that or not?

0:19:35.27 –> 0:19:36.155 For example,

0:19:36.155 –> 0:19:39.242 if I just had a biopsy at my

0:19:39.242 –> 0:19:41.454 Community Hospital and I want to make

0:19:41.528 –> 0:19:44.055 sure that they didn't miss a cancer,

0:19:44.06 –> 0:19:47.75 should I expect that they have that kind of

0:19:47.75 –> 0:19:50.598 technology that can help the pathologists?

0:19:50.6 –> 0:19:52.35 And if I'm not sure,

0:19:52.35 –> 0:19:53.519 is there a way to find out?

0:19:53.75 –> 0:19:55.864 There's always a way to find

0:19:55.864 –> 0:19:57.886 out and certainly just calling that

0:19:57.886 –> 0:19:59.992 pathologist on the bottom of the

0:19:59.992 –> 0:20:01.89 report would be the first step.

0:20:04.64 –> 0:20:07.028 Or wherever those procedures are done would

0:20:07.028 –> 0:20:09.35 certainly know within the department,

0:20:09.35 –> 0:20:12.519 I would say we're still on the cusp.

0:20:18.41 –> 0:20:21.834 I think right now in tertiary care centers,

0:20:21.84 –> 0:20:25.256 there are many kinds of testing and

0:20:25.256 –> 0:20:27.496 research scenarios and these

0:20:27.496 –> 0:20:30.392 are all kind of sprouting

0:20:30.392 –> 0:20:33.46 up now and it's not to

0:20:33.46 –> 0:20:35.8 be expected I would say because

0:20:35.8 –> 0:20:39.226 it requires so much investment and

0:20:39.226 –> 0:20:43.038 infrastructure.

0:20:46.523 –> 0:20:50.814 Whether it's cloud based

0:20:50.814 –> 0:20:54.52 memory or machine or human time,

0:20:54.52 –> 0:20:57.861 we can't expect that to all be there.

0:20:57.861 –> 0:21:01.298 Now I would say you know,

0:21:01.298 –> 0:21:03.496 in the future 5 to 10 years,

0:21:03.5 –> 0:21:05.198 10 to 15 years, I think

0:21:05.2 –> 0:21:07.208 then we can start

0:21:07.208 –> 0:21:09.89 to see where these

0:21:09.89 –> 0:21:12.23 applications are best suited,

0:21:12.23 –> 0:21:16.579 and imagine with all of this investment

0:21:16.579 –> 0:21:21.34 it would probably be helpful as a QC measure.

0:21:21.34 –> 0:21:24.322 You know there are always reimbursement

0:21:24.322 –> 0:21:26.848 codes for things that are additive,

0:21:26.848 –> 0:21:28.758 whether it's a stain or

0:21:28.758 –> 0:21:30.279 whether it's AI assisted.

0:21:30.28 –> 0:21:33.4 So I imagine in the future it would also be

0:21:33.481 –> 0:21:36.601 part of a report and so you know we're not

0:21:36.61 –> 0:21:40.01 there yet, but it does take a lot of time,

0:21:40.01 –> 0:21:40.462 infrastructure,

0:21:40.462 –> 0:21:42.27 and money frankly,

0:21:42.27 –> 0:21:44.79 and so until those costs come

0:21:44.79 –> 0:21:46.85 down or those partnerships are

0:21:46.85 –> 0:21:48.682 established, things

0:21:48.682 –> 0:21:50.514 may be commercially available

0:21:53.495 –> 0:21:56.588 at a price that is affordable for you.

0:22:03.976 –> 0:22:07.649 The other thing that is here now

0:22:07.65 –> 0:22:10.226 more and more in the cancer world is

0:22:10.226 –> 0:22:12.306 this whole concept of personalized

0:22:12.306 –> 0:22:15.024 medicine and so many clinicians are

0:22:15.024 –> 0:22:17.609 really now trying to unlock and

0:22:17.609 –> 0:22:19.669 understand the genomics of cancers.

0:22:19.67 –> 0:22:22.316 And we've certainly had guests on this

0:22:22.316 –> 0:22:24.924 show who talk about doing stains that

0:22:24.924 –> 0:22:27.75 look at a number of different

0:22:27.75 –> 0:22:31.155 genetic and genomic mutations that

0:22:31.155 –> 0:22:34.195 actually help in figuring out how

0:22:34.195 –> 0:22:37.4 a particular tumor may be treated.

0:22:37.4 –> 0:22:40.48 Is that done at the local pathology lab?

0:22:40.48 –> 0:22:43.128 What's the role of the pathologist in that?

0:22:43.13 –> 0:22:45.986 How do you decide which of these

0:22:45.986 –> 0:22:48.138 markers really needs to be done?

0:22:48.14 –> 0:22:50.772 What's the cost and is that standard

0:22:50.772 –> 0:22:53.691 of care or is that something that

0:22:53.691 –> 0:22:55.881 patients need to really individualize?

0:22:56.54 –> 0:22:59.852 So at the local level I don't

0:22:59.852 –> 0:23:03.218 think it's necessarily standard of care.

0:23:03.22 –> 0:23:05.611 Certainly immunostains,

0:23:08.8 –> 0:23:11.824 certain markers that are common

0:23:11.824 –> 0:23:14.832 to lay folks would be,

0:23:14.832 –> 0:23:16.668 we talk about estrogen and progesterone

0:23:16.668 –> 0:23:18.02 receptors for breast cancer.

0:23:18.02 –> 0:23:19.571 For example, ER,

0:23:19.571 –> 0:23:22.156 PR and certain molecular markers.

0:23:22.16 –> 0:23:24.9 I think in Community practice

0:23:24.9 –> 0:23:27.092 the idea is

0:23:27.1 –> 0:23:29.112 to partner often with

0:23:29.112 –> 0:23:30.976 another lab.

0:23:30.976 –> 0:23:33.116 Whether it's a tertiary center,

0:23:33.12 –> 0:23:36.054 a commercial lab that offers those

0:23:36.054 –> 0:23:39.177 tests because they are not able to

0:23:39.177 –> 0:23:42.3 have access to all of that in house,

0:23:42.3 –> 0:23:45.324 and so a lab like

0:23:45.324 –> 0:23:47.24 ours comes into play,

0:23:47.24 –> 0:23:50.194 where if we have something to offer,

0:23:50.2 –> 0:23:53.595 we can partner with other network hospitals,

0:23:53.6 –> 0:23:54.52 community hospitals,

0:23:54.52 –> 0:23:57.74 even other labs that might not have

0:23:57.74 –> 0:24:00.132 the same volume we do in a Cancer

0:24:00.132 –> 0:24:02.884 Center to provide all of these highly

0:24:02.884 –> 0:24:05.457 specialized tests that without a certain

0:24:05.457 –> 0:24:07.959 volume it's not affordable to run.

0:24:07.96 –> 0:24:12.064 So I think the same thing holds for

0:24:12.07 –> 0:24:14.566 additional molecular assays.

0:24:14.566 –> 0:24:19.558 Panel genetic profiling those are highly

0:24:19.558 –> 0:24:23.154 specialized areas and fields that

0:24:23.154 –> 0:24:25.739 without partnering with another kind

0:24:25.739 –> 0:24:29.01 of tertiary care center or larger

0:24:29.01 –> 0:24:31.735 lab specifically geared towards that,

0:24:31.74 –> 0:24:33.792 I think it's not

0:24:33.792 –> 0:24:35.71 expected at the local level.

0:24:36.06 –> 0:24:38.562 So are the decisions about what

0:24:38.562 –> 0:24:40.9 additional tests need to be done,

0:24:40.9 –> 0:24:42.112 so additional molecular

0:24:42.112 –> 0:24:44.77 tests and so on, EGFR VEGF,

0:24:44.77 –> 0:24:46.33 various mutational panels

0:24:46.33 –> 0:24:49.6 and so on are those decisions

0:24:49.6 –> 0:24:53.05 made by the pathologist, by the

0:24:53.05 –> 0:24:55.619 treating clinician, by a group?

0:24:55.62 –> 0:24:57.268 How are those decided?

0:24:57.93 –> 0:25:00.762 I think in the Community level

0:25:00.762 –> 0:25:03.517 the oncologist drives a lot of that because

0:25:03.517 –> 0:25:06.06 the oncologist sees on that leading edge

0:25:06.06 –> 0:25:09.756 what the potential drugs that are

0:25:09.756 –> 0:25:13.631 available that are targeted to a

0:25:13.631 –> 0:25:16.746 particular molecular change, and so in

0:25:16.746 –> 0:25:19.42 the Community setting,

0:25:19.42 –> 0:25:21.85 I think the oncologist takes that

0:25:21.85 –> 0:25:25.288 role more so in asking a pathologist,

0:25:25.29 –> 0:25:28.755 hey, there's a new drug and it targets

0:25:28.76 –> 0:25:29.657 this molecular marker.

0:25:29.657 –> 0:25:32.03 Is that something you do in your lab?

0:25:33.6 –> 0:25:35.376 Or is it something we can send out for?

0:25:35.38 –> 0:25:36.8 And then you know,

0:25:36.8 –> 0:25:38.22 the pathologist facilitates that.

0:25:38.22 –> 0:25:40.033 And so that I think happens

0:25:40.033 –> 0:25:41.759 more on the Community side,

0:25:41.76 –> 0:25:44.736 whereas I think in the tertiary care setting,

0:25:44.74 –> 0:25:45.412 like here,

0:25:45.412 –> 0:25:48.28 I think it is a bit more of a

0:25:48.28 –> 0:25:50.42 collaborative effort because there

0:25:50.42 –> 0:25:53.63 are there are the pathologists

0:25:53.712 –> 0:25:56.246 here who are doing those genetic tests

0:25:56.246 –> 0:25:59.399 and so we also have our tumor boards

0:25:59.399 –> 0:26:01.376 that while they have been outside

0:26:01.376 –> 0:26:03.14 at the Community level as well,

0:26:03.14 –> 0:26:04.976 I think in a Cancer Center,

0:26:04.98 –> 0:26:06.82 the tumor boards really are

0:26:06.82 –> 0:26:08.66 putting everyone at the table.

0:26:08.66 –> 0:26:11.54 Who has that subspecialty expertise?

0:26:11.54 –> 0:26:13.38 And so I think it's a bit more

0:26:13.38 –> 0:26:15.299 of a collaborative effort.

0:26:15.3 –> 0:26:18.485 And if there's something that is

0:26:18.485 –> 0:26:20.855 clinically warranted or a new drug,

0:26:20.86 –> 0:26:24.885 I think the pathologists here in a

0:26:24.885 –> 0:26:28.32 tertiary center are able to create

0:26:28.32 –> 0:26:30.396 these answers to some of

0:26:30.396 –> 0:26:32.14 those questions or research them,

0:26:32.14 –> 0:26:35.076 or they're already a line of research here

0:26:35.08 –> 0:26:39.385 in the department or collectively.

0:26:40.73 –> 0:26:43.51 Which segues nicely into you,

0:26:43.51 –> 0:26:44.908 know, one of my last questions,

0:26:44.91 –> 0:26:47.806 which is what are the exciting areas of

0:26:47.806 –> 0:26:50.309 research in pathology and cancer?

0:26:50.31 –> 0:26:52.89 I mean, it seems like pathology

0:26:52.89 –> 0:26:55.688 is so central to what we do.

0:26:55.69 –> 0:26:57.735 Are there some exciting developments

0:26:57.735 –> 0:27:00.389 that you see coming down the Pike

0:27:00.39 –> 0:27:02.616 in terms of pathology and cancer?

0:27:03.29 –> 0:27:06.398 Well, I definitely think the

0:27:06.398 –> 0:27:08.47 digital pathology component and

0:27:08.558 –> 0:27:10.898 the artificial intelligence piece

0:27:10.9 –> 0:27:12.42 is very exciting.

0:27:13.94 –> 0:27:15.94 It's entirely a new platform

0:27:15.94 –> 0:27:18.035 and revolution, so to speak.

0:27:18.035 –> 0:27:20.225 It's something that can be applied

0:27:20.225 –> 0:27:22.866 to all of the tools that we have

0:27:22.866 –> 0:27:25.199 and then it's a tool on its own.

0:27:25.2 –> 0:27:29.394 So what I mean by that is the

0:27:29.394 –> 0:27:32.786 ability to work with digital images,

0:27:32.786 –> 0:27:35.678 whether it's radiology or

0:27:35.678 –> 0:27:38.57 scanned pathology slide and

0:27:38.57 –> 0:27:44.12 with that scan slide use metrics or

0:27:44.12 –> 0:27:47.284 segmentation to detect changes

0:27:47.284 –> 0:27:50.39 that maybe even the human eye can't.

0:27:50.39 –> 0:27:52.686 And maybe it's not just about morphology,

0:27:52.69 –> 0:27:55.636 it's just a whole other level

0:27:55.636 –> 0:27:58.24 of detection

0:27:58.24 –> 0:28:00.905 in addition to our molecular

0:28:00.905 –> 0:28:03.037 assays and genetic profiles,

0:28:03.04 –> 0:28:05.912 is something that can on its own be

0:28:05.912 –> 0:28:08.8 additive and the exciting pieces when it

0:28:08.8 –> 0:28:12.316 is also its own prognostic indicator,

0:28:12.32 –> 0:28:14.852 and so we're always interested in

0:28:14.852 –> 0:28:17.14 knowing more about the meaning of

0:28:17.14 –> 0:28:19.18 the cancer and what effect

0:28:19.18 –> 0:28:21.558 that has on outcome and prognosis,

0:28:21.56 –> 0:28:23.96 and AI really has the potential

0:28:23.96 –> 0:28:28.39 to help each of these special

0:28:28.39 –> 0:28:30.124 techniques that we use and the

0:28:30.124 –> 0:28:31.81 ability to stand on its own.

0:28:32.49 –> 0:28:34.405 Doctor Angelique Levi is an

0:28:34.405 –> 0:28:35.937 associate professor of pathology

0:28:35.937 –> 0:28:38.086 at the Yale School of Medicine.

0:28:38.09 –> 0:28:39.254 If you have questions,

0:28:39.254 –> 0:28:40.418 the address is cancer

0:28:40.42 –> 0:28:43.465 Answers at yale.edu and past editions of

0:28:43.465 –> 0:28:46.532 the program are available in audio and

0:28:46.532 –> 0:28:48.112 written form at yalecancercenter.org.

0:28:48.112 –> 0:28:50.608 We hope you'll join us next week to

0:28:50.608 –> 0:28:52.511 learn more about the fight against

0:28:52.511 –> 0:28:54.046 cancer here on Connecticut Public Radio.

0:28:54.102 –> 0:28:55.562 Funding for Yale Cancer

0:28:55.562 –> 0:28:57.022 Answers is provided by Smilow

0:28:57.03 –> 0:29:00 Cancer Hospital and AstraZeneca.