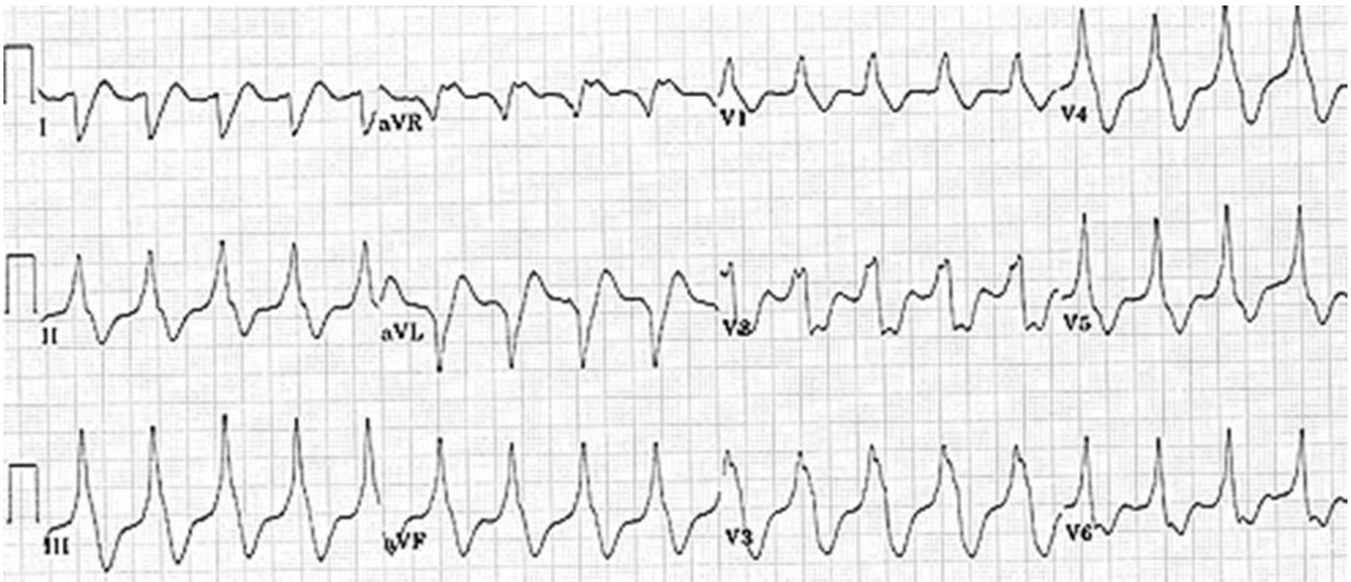
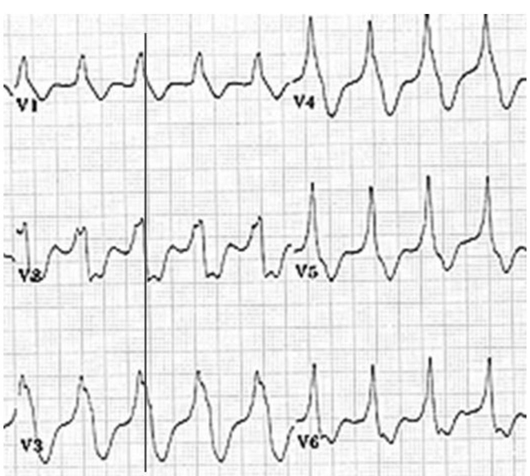
Never Begin With a Pre-Conceived Diagnosis… and Then Try To Prove It!

Jerry W. Jones, MD FACEP FAAEM



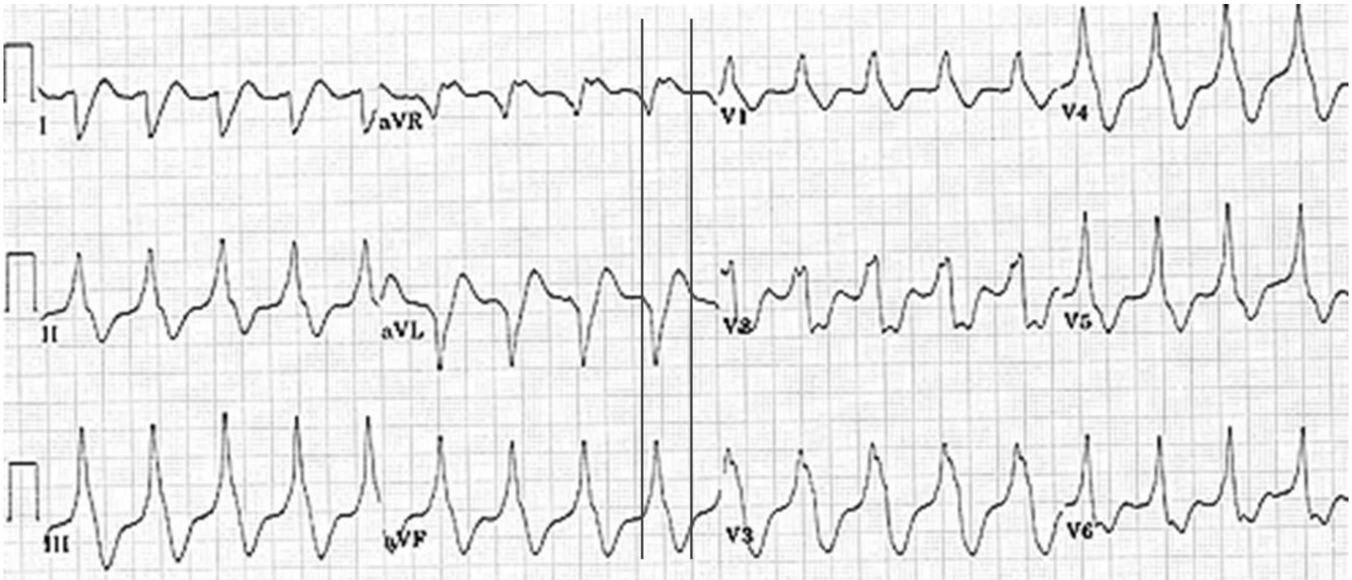
Inspect Lead V1. It is a very positive, upright QRS so that means the origin of this WCT – if it isn't an SVT with a widened QRS – is located in the left ventricle. Let's focus on the QRS complex in Lead V1 for a moment. Is that an RS complex or a monophasic R with an inverted T wave? If you think you are seeing an RS complex or a QR complex, you must always be able to specifically identify the T wave! Remember: you can do without a Q wave, you can do without an R wave and you can do without an S wave… but you absolutely ***MUST HAVE A T WAVE!*** It is a monophasic R wave with an inverted T wave. How can I say that with confidence? Well, it could be because I have almost 40 years of experience… or it could be because I know a little "trick" that you don't.



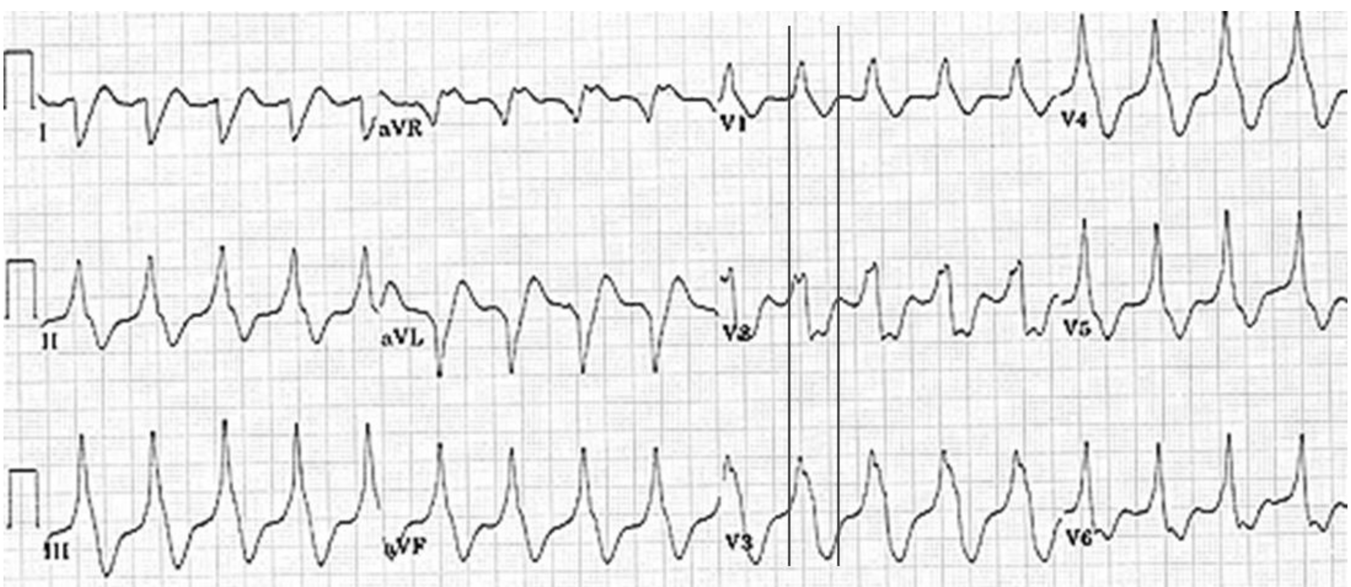
Let's draw a straight line from what appears to be the end of the QRS in Lead V1. Does that help? Well, maybe a *little*. It's starting to look a bit like a monophasic R with an inverted T wave, but I'm still not sure.

OK… that wasn't the trick! Here comes the trick…

Let's try to find a lead in which a QRS and its T wave are more obvious. Look in Lead aVL. There it is – a QS wave with an upright T wave! Let's draw straight lines that enclose the R wave and the following T wave. Now we can see exactly how wide this QRS-T is.



Next, we move it over to Lead V1 and see how it compares with our known QS-T complex…



OK… it fits perfectly! So now we have proof that the morphology in Lead V1 is indeed a monophasic R wave followed by an inverted T wave. You could do exactly the same thing just by using your ECG calipers. Uh… you DO have some ECG calipers, don't you?

Take a look at Leads V1 – V6… notice anything? All the QRS complexes are actually monophasic R waves! We *know* that after our measurements. There are no Q waves and no S waves. We call this POSITIVE CONCORDANCE. CONCORDANT because all the monophasic R waves are on the *same side of the baseline*. POSITIVE because all the complexes are located ABOVE the baseline. NEGATIVE CONCORDANCE would be monophasic QS waves BELOW the baseline in all the precordial leads. Many authors alter the definition so their examples "comply" with the rules of concordance. Don't be one of them! The definition I have given you is the *original* definition.

What does concordance tell us?

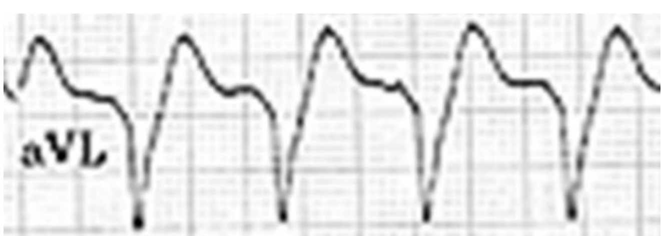
First, it tells us that the *origin of the impulse is in the ventricle*. A supraventricular impulse conducting down through the AV node and the His-Purkinje system cannot produce this pattern *except under the most extreme and unusual circumstances*.*

Second, it strongly suggests that the origin of the impulse is *focal*.

*There *is* an issue, however. A tachycardia with definite *negative* concordance *according to the original definition* was found in a young man experiencing a documented supraventricular tachycardia (SVT). However, he had a profound pectus excavatum as well as congenital heart disease. I read the journal article about him and reviewed the printed copy of the ECG. He did, in fact, manifest *classic* negative concordance with an SVT. You should never say "never" in medicine!

So, *in the entire history of mankind*, we found ONE case of an SVT with negative concordance. Unfortunately, there is something else that can also (and more *frequently*) allow SVTs to manifest with *positive* concordance… *ventricular pre-excitation*.

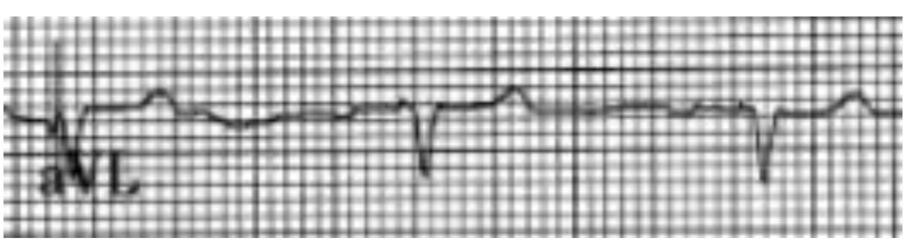
In one of my courses, ***The Masterclass in Advanced Electrocardiography***, we have what I call "Eye Exercises." These involve studying ECGs with extremely subtle findings. There are several such findings on this ECG which I immediately noticed. If you noticed them, too, then "Congratulations!" If not, there's still time to enroll in one of my classes!



Let's take a much closer look at Lead aVL again…

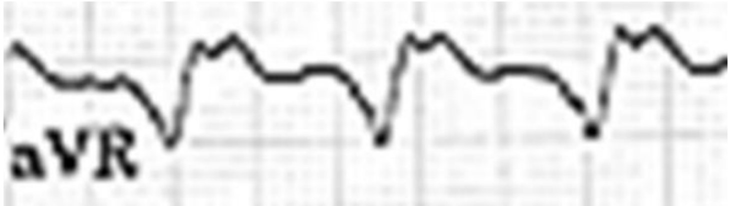
Do the QS complexes in *this* snippet (*left*) look just a little bit *unusual* to you?

Here's a more "typical" negative Lead aVL (below)…

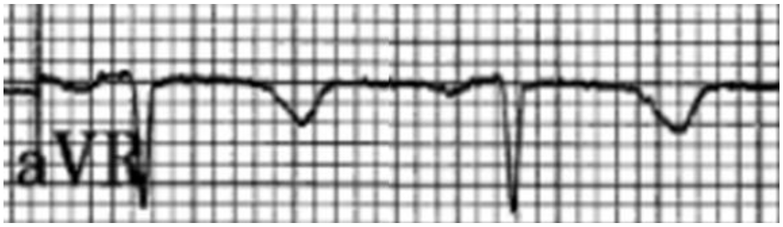


Look closely at the onset of the QS waves in this snippet (*left*) and compare it to the onset of the QS waves in the snippet (*above*). Did you notice the *slurred onset* of the QS in the snippet above whereas there is no slurring in this one?

Now let's look at Lead aVR from the 12-lead ECG…

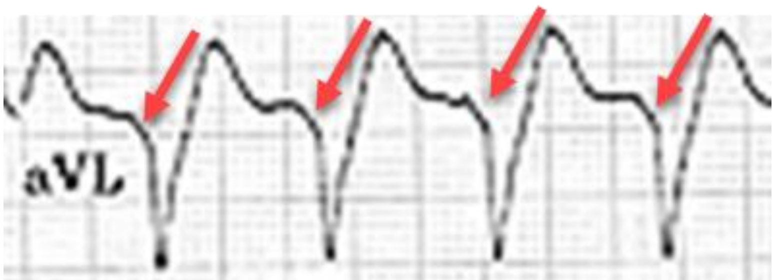


Notice how the Qr begins with a very marked slur down to its nadir? Now let's look at a normal Lead aVR…



In this normal Lead aVR there is no slurring at all.

What's happening here? Why are Leads aVR and aVL so different than normal? Let's look at Lead aVL once more, with some arrows indicating the problem…

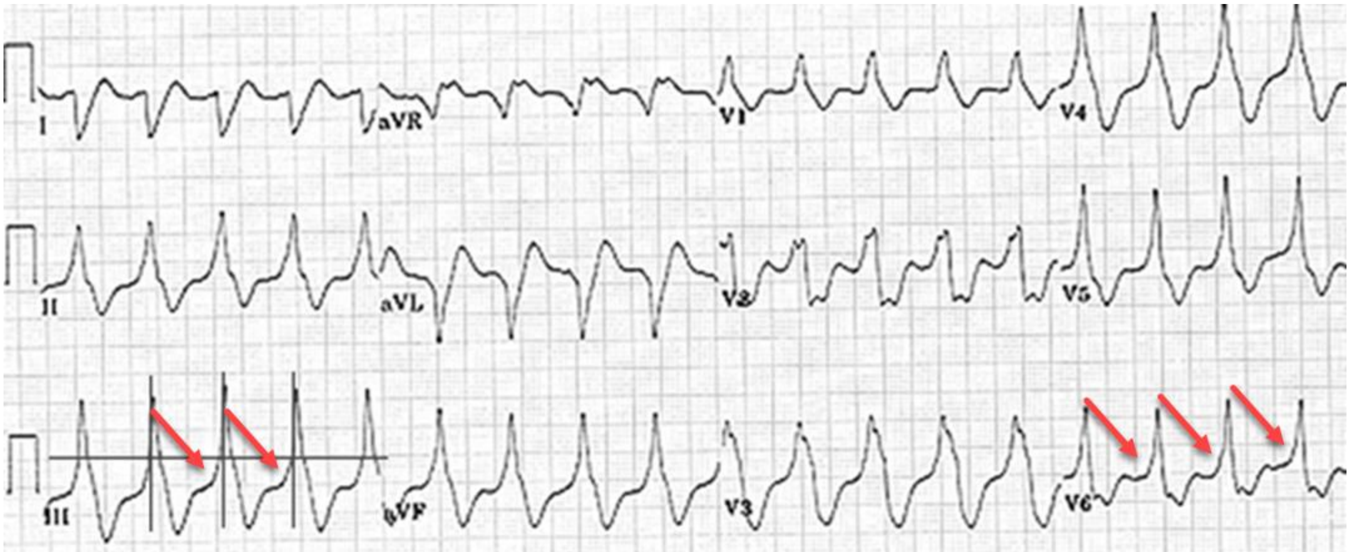


What you see here are **NEGATIVE DELTA WAVES!** The slurring into the QS waves in Lead aVL and the Qr waves in Lead aVR are *classic* **NEGATIVE DELTA WAVES.**

Here is an example of Leads aVR and aVL during a *documented* case of ventricular pre-excitation…

In this example, Lead aVR looks more like our Lead aVL and Lead aVL looks more like our Lead aVR. It doesn't matter – both are *very* typical morphologies for ventricular pre-excitation an no QRS morphology is restricted to a particular lead.

Did you not see the POSITIVE delta waves? Let's look again. With a little help…



You can see *very subtle hints* of positive delta waves on the ECG, though the negative delta waves are probably more obvious to the trained eye. The ventricular rhythm is very regular so this does not represent atrial fibrillation. Also, it is not likely to be atrial flutter. Why? If you look in leads V2 and V6 you can see retrograde P′ waves after each QRS. This would not happen with atrial flutter but it CAN happen with an antidromic AVRT! This is *ventriculoatrial association, or conduction* – ***NOT*** AV dissociation. It's quite common in BOTH supraventricular tachycardias (AVNRT, AVRT, junctional tachycardias) AND ventricular tachycardias.

There is, however, an unusual facet to this particular WCT: the presence of a delta wave implies *two* waves of depolarization within the *same ventricle* and these depolarization waves are traveling in opposite directions. It's the eventual fusion of these ventricular activations that allows the delta wave – *positive* OR *negative* – to appear: the pre-excited section first followed by the His-Purkinje activations. However, when there is only ONE source of antidromic activation, one would logically think that there would be NO delta wave because the *entire* QRS complex is essentially the "delta wave." But… that is not always the case. On occasion, one can see delta waves during an antidromic AVRT. How does that happen? I can only *speculate* that the impulse transmitted through the accessory pathway enters the regular working myocardium – proceeding with slow transmission manifesting the initial "delta wave" – but then enters fibers of the His-Purkinje system and completes the depolarization of the ventricle via the rapidly conducting His-Purkinje fibers.

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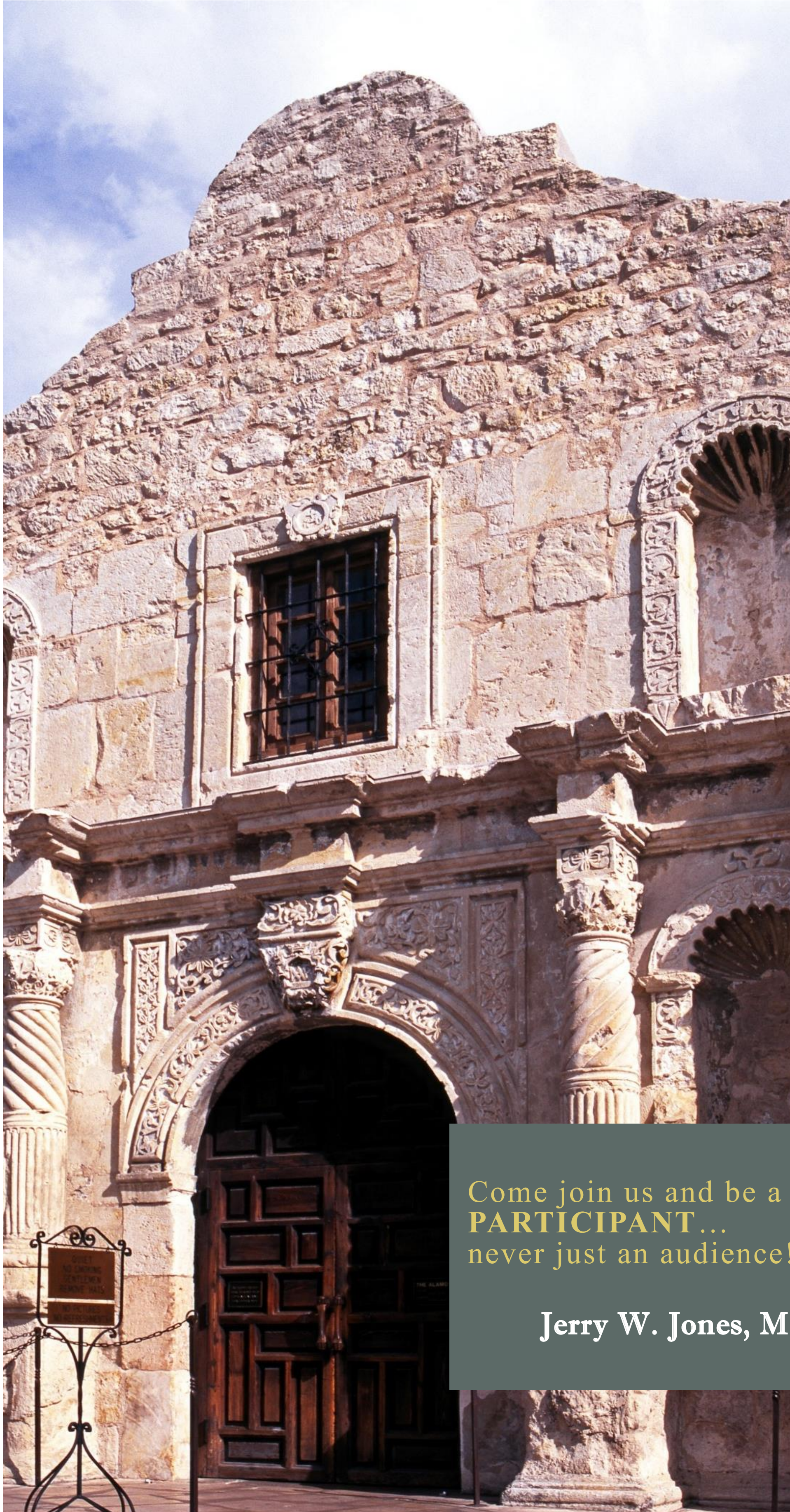

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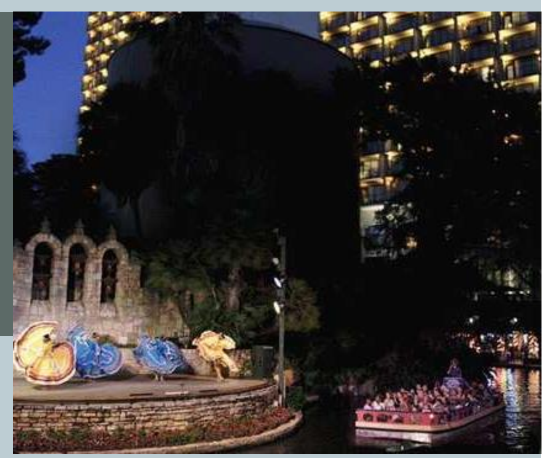

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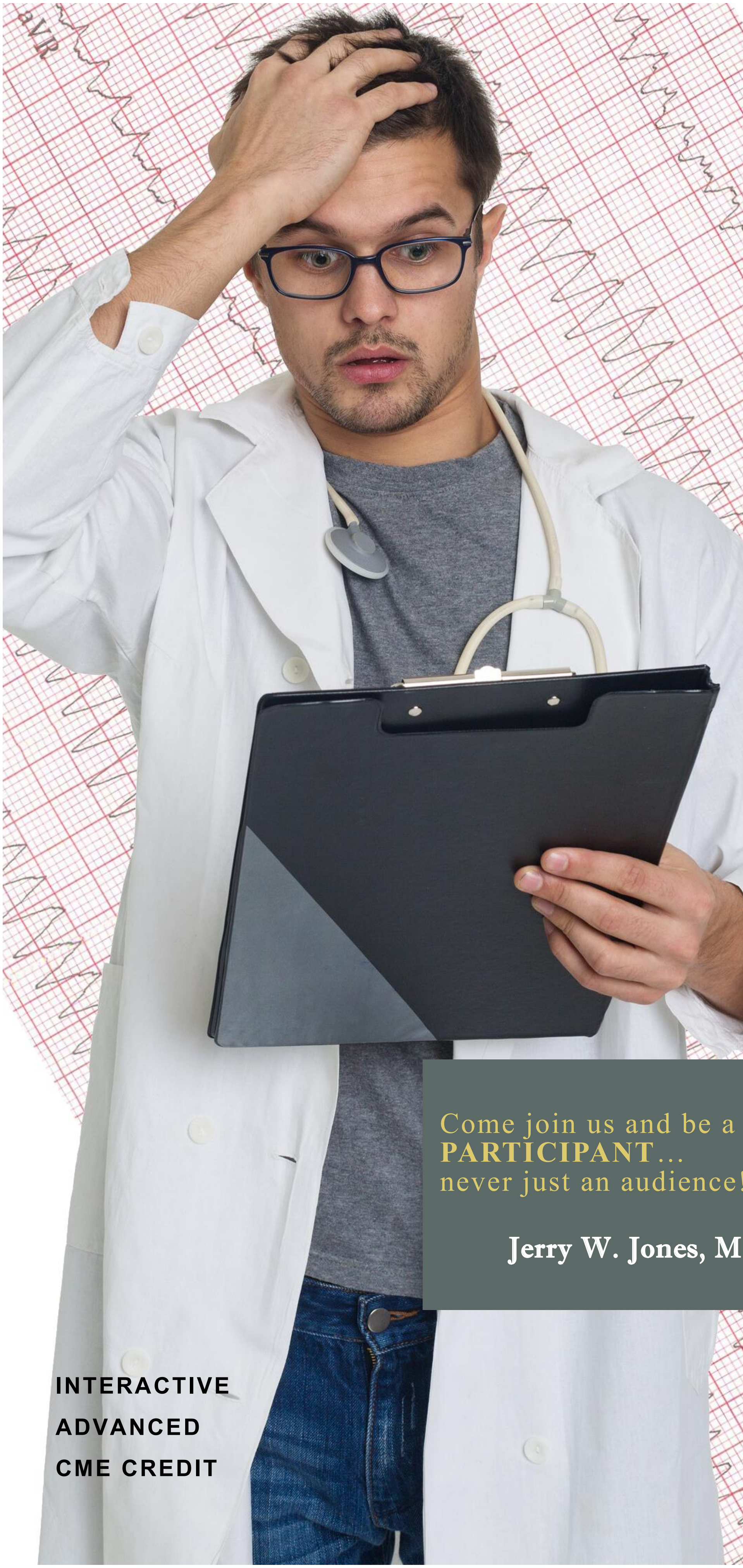

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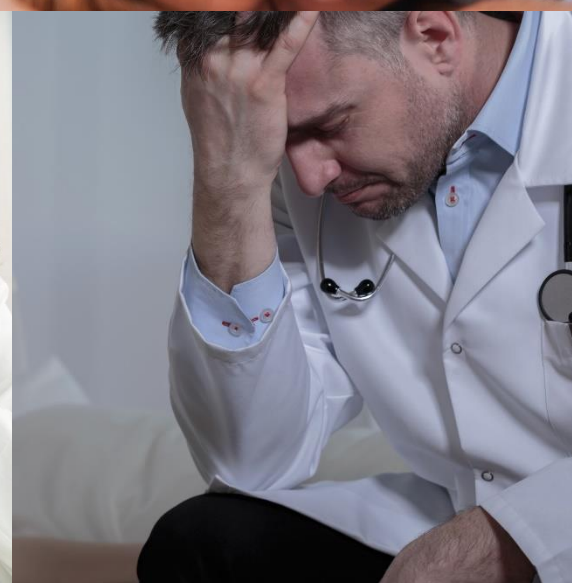
Is there something you're just not understanding?



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