

DAVID MICHAEL GRIFFITHS, SWORN AND EXAMINED:

CORONER: Thank you. Please, be seated.

MR TATE: Thank you. Thank you, your Honour. Doctor, if I could ask you to formally introduce yourself to the Court, please? •• My full name is David Michael Griffiths.

And I think your medical practitioner registered on the specialist role in Queensland? •• I'm a medical practitioner who was registered on the specialist role in Queensland at the time of my reports - my initial reports but I retired from all practice approximately one year ago.

And •••••? •• In October last year.

And your currently residing in Tasmania; is that correct? •• That is correct.

Now, Doctor, if you could briefly outline for us, please, your qualifications and experience? •• I graduated in Manchester in 1965 and obtained diplomas in obstetrics and anaesthetics in 1968 prior to working in Africa where I did an extensive amount of diving and became a British Sabbatical Club Dive Instructor in 1974. I moved onto Tasmania where I worked in the Royal Hobart Hospital in the hyperbaric unit there and as a trainee anaesthetist achieving fellowship in anaesthesia with the College of Anaesthetists in 1979. I joined the naval reserve to undergo further training in hyperbaric and diving medicine and went to their basic course in 1978 and their advanced course at HMAS Penguin in 1979. I obtained my SPUMS at South Pacific Underwater Medical Society Diploma in Diving Medicine in 1988 and I obtained my College Certificate as a grandfather clause because I was part of setting this up in diving and hyperbaric medicine in 2003. I have obtained many courses in diving, including one on medical support of deep diving in 1996 and have been the director of the Hyperbaric Medical Unit here in Townsville from '97 until last year when I retired from medical practice.

Doctor, thank you very much. Now, I think police asked you to review a number of facts and circumstances surrounding the tragic passing away of Tina? •• Yes.

And you prepared a report, I think, which is dated the 18th of February, 2005? •• Yes.

And that was your primary report back to the police having reviewed the material that you were provided by them? •• Yes.

Now, at that time when you prepared your report, what material had you been provided with by police? •• I had been provided with the transcript of a number of reports. I can't tell you whether they were comprehensive •••••

No? •• •••••but a number of reports from witnesses and I was provided with the opportunity to assess the activity of the computers - the diving computers used by both the deceased and her husband.

All right. Now, I think we have both the dive computers for you and it might be a convenient place to start, which is on page 3 of your report. Now, my understanding is that on the 14th of February, 2005 you took part in pressure testing of the dive computer which had been - or the dive computers that had been identified to you by police as being, firstly, one owned by Gabe

Watson and the second one; am I correct, also his wife, Tina's? •• Correct.

Now, you should have those two dive computers in front of you. One is the large one. Now that I understand is Gabe's dive computer; is that correct? •• Yes.

And the small one is Tina's? •• Yes.

Now, perhaps you might briefly just inform the Court what the - how these dive computers work, what their function is and from a medical perspective how useful they are in assisting divers in terms of managing their dives? •• Can I clarify that the testing I did was not on the accuracy of these devices. That was done by the police diving organisation.

Yes? •• I made certain tests on them but it was not to determine the accuracy which I believe was tested and has been found to be completely satisfactory.

Yes, indeed. Yours was pressure testing. We'll get to that. But probably, first, if you can help us from a medical perspective understand what these devices, what their purpose is and why they might be of importance from a medical perspective? •• What these devices do is to record what actually happens to a diver in the water. They're of great value both to divers and to those on the diving deck who are supervising the diver and, indeed, if there is a problem following the dive to anyone looking after the person who has made the dive, both the diving first aid team and any medical persons who might be involved in the management of a person with a problem following diving. In particular, they record the depth and times that people go to; they record the surface intervals between dives; they record the rates of ascent and descent and they record any event in some of them whether the - for example, the air pressure is low in supply for the divers. But the less sophisticated ones have fewer features than the more sophisticated devices. There of particular value to people as an object of record of what actually happened in a dive because it's not possible to manipulate the data recording of the dive after the event. You can erase it under certain circumstances but you can't change it unless you have very sophisticated access to software so that it will provide a reliable, accurate indication of what actually happened in a dive. Now, when divers traditionally came on the back of a boat and were asked how long they'd been under water and to what depth they'd gone they would look at their gauge and their watch and say, "Oh, about 50 minutes or about 50 metres.". But that was a bit of a guess because they may or may not have gone down when they set their watch at the start, they may have been on the surface for a minute or two. With this you get an accurate record of all those features; when they actually went down, when they actually started coming up, how long they took coming up, how much time they should stop if they need to stop for decompression on the way back to the surface and whether indeed they did make those steps on the way back to the surface. So this is an objective record of what a diver does in the water and it gives him real time advice on whether there is a problem during his dive that he should observe and whether he is within the appropriate limits that are described by the various tables in the software within the dive computers.

And I think you've been provided with the material from Mr White, I think it is, who is a representative of Oceanic, the manufacturers and distributors of this - these equipment to suggest that they were in fact working properly and accurately and what have you? •• The records that I have indicate that they were completely accurate.

From your perspective then, it's a bit like a black box and we can rely on what those recordings are telling us? •• Yes.

All right. Now, the medical significance of this information? •• The medical importance of this is that it's clear from the diagrams and is it possible to put the diagram up on the screen that was shown yesterday of the actual dive profiles?

Well •••••? •• Or is that not possible?

•••••unusually, Doctor, I - I've been - missing it and I've asked the Senior Constable to do that but he's going a bit slower than •••••? •• Oh no, that's - that's fine.

•••••I thought he might be so we'll get there in a moment. Now, I think you've had an opportunity of seeing these diagrams both to refresh your memory since you've been with us in Townsville and you also written documents noting the dive profiles, is that correct? •• I have a copy of the dive profiles here.

Yes? •• But for the Court's benefit, your Honour, it will be helpful I think if people can see it for all to review.

Now, that I think is the document you're after. Just so that it's on the record, it's headed up "Six Incident Investigation and Analysis Continued", "Dive Computer Data, Appendix A", and the two axes appear to be depth in metres and time and on the right hand side there is a legend that indicates which dive - dive profile relates to which diver. Thank you, Doctor? •• The importance of this particular record is that this is the record of the final dive that was made by Tina •••••

Yes? •• •••••and her husband. And the profile you will see, in fact, completely overlaps from the start of the dive until the point of separation at what is marked as 50 feet and five minutes into the dive.

Now, I'll just stop you there for a moment and I'll ask the Senior Constable to confirm with us that we're tracking along the same line that you are. Is it the •••••? •• That is the blue dotted line on the graph that continues down to a point just above where your finger is now at the 50 foot mark.

Fifteen metres? •• And the - it coincides with 50 feet in five minutes. Now, at that point there is a separation of the profile by Gabe who ascends in a controlled fashion to the surface and of Tina who descends in a similarly - apparently controlled fashion to the bottom which I think is marked as being just short of - well, in this case, 60 feet and in your case - no, 30 metres, is it?

Now, you can see there that we - we - and if I may, your Honour. Senior Constable, just trace your - your hand along the blue line •••••

UNIDENTIFIED SPEAKER: Near to the ruler, yeah.

CORONER: Be easier - save your shadow going on you can stand back a bit further.

MR TATE: The blue line right from the top going down - going down and that seems to be the point of separation and I think you've just told us that the blue line coming up is Gabe's ascent and the red line going down is in fact Tina's descent? •• Correct.

You'll see also there coming off the blue line is what appears to me to be a blue dotted line which

suggests a slightly different profile. Senior Constable, if you could just trace that? •• Now, that I believe is the profile that the manufacturer of the computer has indicated are the limits that the recordings are providing accuracy for. In other words, there could've been excursion up or down to that extent from the recorded events because the recorded events are only maintained - I - I can't remember from the top of my head how often they're actually recorded in the computer but it's certainly not every second, it's every few seconds, 10 seconds or so. So there will be a gap in between when things could've changed slightly up or down whilst down is progressing.

And we should see that or perhaps understand that as error rates - potential error rates or error bars on the recordings? •• Yes.

Now, it's probably a convenient time for me to ask you, looking at the blue lines and then the point of separation, the ascent and descent, and now the dotted line which are the possible error rates within the recordings, is there anything of significance that we should know about? •• The descent profile looks completely normal. If you look at most controlled descents to a dive site usually it's a gentle controlled descent which appears to be the case here and importantly the two profiles remain absolutely in synchronisation all the way down so they clearly descended together •••••

Yes? •• ••••• or at least at exactly the same rate.

Yes? •• If there were a problem during that descent that was obvious then you would expect perhaps some slight turbulence and maybe a stopping in the descent to sort out a problem or if one or other was overweight maybe they would've gone down faster than they had intended to go down, not necessarily but it would be likely that they'll be some slight turbulence in the pattern of the descent in the computer record. There's no such sign of that in this instance.

Are we - is it permissible to draw an inference from that? •• It does not exclude any difficulties occurring on the way down but it does not specifically indicate that there was any obvious difficulty until that point.

Until the point of separation •••••? •• Yes.

••••• is what we're calling it. All right. Thank you, Doctor. Now, just looking then subsequently, from the point of separation at 15 metres for Tina going down to about 28 metres, is there anything significant from your perspective in that particular profile? •• If she had deliberately continued on down that might have been a perfectly satisfactory profile but, as we know, she was not found to be conscious on the bottom and at some time from that point must have become unconscious. We can assume that she was conscious in the early part of the dive but we don't know at what point exactly she lost consciousness. We simply know that she was found on the bottom by the report from Wade Singleton unbreathing with eye open and unmoving in response to stimulation at the time that he found her just a matter of a minute or so later.

Interestingly, I think you've also told us that her - her mouthpiece was in place? •• Importantly, her mask and her regulator were in place and available for use so •••••

Is that significant? •• ••••• if she had been - if she'd been in a position to breath you would've expected her to have continued to do so.

Yes. All right. And that, I take it, is because breathing is a fairly autonomic response, we don't think about it, we just do it?•• Even if someone is unconscious, unless they've got water at the back of their throat which is causing them to have a spasm of their vocal chords and preventing them from breathing, in unconscious people, they would be likely to continue breathing if they've got an air source available to them, yes.

And Professor Williams, I think, helped us yesterday by describing the difference between dry drowning and wet drowning and you've just described dry drowning, which he excluded at post mortem?•• Yes.

We are looking at a wet drowning here?•• Yes, but that, as he described, is a terminal event and not the cause of the problem.

Indeed. Now, when we look at the point of separation at 15 metres, Gabe's ascent, what can you tell us about that? It seems to be 15 metres over about two and a-half minutes. Am I right in that assumption, Doctor?•• Yes, he came up from - what - his record was 50 feet to the surface in one, two, just under three minutes.

Just under three minutes. It might be worthwhile if you look at the dive computer information that you have and give us as accurate an indication of the time of ascent that you can?•• He left the 50 foot mark, and the record I have is in feet not metres - I appreciate the Court is reviewing the profiles converted into metres - but he left the 50 foot mark at five minutes on the scale that we have here.

Yes?•• And reached the surface - I haven't got the - the exact entry point because the graph stops just before the surface, the computer turns off at about a metre below the surface.

Yes?•• But it's - I can't see accurately from this distance. Can you read exactly which point his computer reaches the surface on the - that line there, yes.

UNIDENTIFIED SPEAKER: That's the seven minute mark.

WITNESS: Yes.

UNIDENTIFIED SPEAKER: Then the eight minute mark.

WITNESS: So, seven and a-half minutes, roughly.

UNIDENTIFIED SPEAKER: It's seven and three-quarters, isn't it?

WITNESS: Seven and three-quarters. Between seven and eight minutes. I'm sorry, I can't be more accurate.

MR TATE: Yes. So we're looking at - at quickest, two minutes?•• Yes.

At slowest, three minutes?•• Yes.

Now, in your experience, does that tell you anything about the rate of ascent?•• That is an ascent rate which is a little faster than would be recommended; indeed, the current

recommendation from most of the navies in the world is 10 metres per atmosphere or 10 metres per minute is the recommended ascent rate. It used to be twice that, but it's been brought back as a safety factor. So 10 metres per minute is acceptable and, clearly, he's ascended 15 metres in a reasonable period of time.

But in terms of the standards, you'd expect him to be able to cover that 15 metres or 50 foot in accordance with navy standards in one and a-half minutes? •• Yes.

Now, if he were an experienced •••••

MR WALTERS: Your Honour, I'm just having a bit of difficulty there. My understanding is the minimum time he took to do 15 metres is two minutes, the maximum could be three. Now, applying a 10 metre thing to that, he's well within that limit because that's per minute and he's done 15 metres in a minimum of two minutes. So that - that on average is seven and a-half metres per minute, at the minimum. As I hear it coming out, there's some suggestion it's quick.

MR TATE: Doctor, I think what my learned friend's saying, and hopefully I was asking you appropriately, was that if the navy standard is one atmosphere or 10 metres in one minute, to comply with that standard, you'd be looking at one and a-half minutes for the 15 metres? •• That would be the minimum time that the navy would have recommended.

Indeed? •• For the ascent rate under normal circumstances.

Yes. So perhaps I'll just put it this way: on the assumption that at best it's two minutes, at worst it's three minutes •••••? •• Yes.

•••••his ascent is much slower than the navy standards? •• His ascent is well within the navy standards.

Indeed. Now I'd like you to assume that we have a diver with quite a number of dives. Are you aware of his - or Gabe's previous dives? •• I do not recollect the exact number of dives that he's done, but I think he's done in excess of 30 dives.

It's about 50 dives. He's also trained and holds a certificate as a rescue diver? •• I am many years since I have trained as a dive instructor myself and would have to defer to the diving organisations to indicate the level and experience that you would expect in training of a rescue diver.

I understand that, but all I was going to ask you was to really give you an opportunity of commenting that an experienced diver with many dives and a fairly advanced certificate in diving, if there were an emergency, he would have been able to reach the surface more quickly than two to three minutes? •• Yes.

Thank you. Now, Doctor, we might, if we may, go back to page 3 and you've been clear with us that your tests weren't aimed at the accuracy of the devices - that was for others - but your concern was to test them, I think, by looking at how they performed under pressure, so can you tell us, please, firstly, what the purpose of your tests were, how you carried them out and what the results were and, lastly, the significance of your findings? •• **The tests were undertaken at the hypobaric unit here in Townsville. They were undertaken at the request of the police because there was a suggestion that the reason that the first dive that Tina and Gabe**

undertook had been aborted was because there was a problem with his dive computer.

Yes?•• And the problem was alleged to be one of the battery.

Yes?•• It is said that - I understand he stated that the computer beeped when they went in the water and that that made him realise there was a problem because it does make beeping noises if the - if it has an alarm. It warned him that there was a problem, so he and his wife returned to the surface. Now, what it showed on the screen, I don't know. He didn't make any statement as to what it showed on the screen and I can't tell you what might have happened. However, I understand that he stated that the battery was in the wrong way around, he took the battery out and reinserted the battery•••••

Yes?•• •••••whilst he was on the surface and whilst the tanks were being refilled before they made a second dive.

Yes?•• The same computer was used in the second dive and records of the second dive are within the computer but because the battery was in the wrong way around, we don't have a record in the computer of the first dive. **We wanted to find out in the chamber how the computer responded to reversing the battery.**

Yes?•• **So what we did was to take the dive computer into the chamber and initially tested the computer with the battery correctly inserted but without any external connection to a source of compressed air.**

Yes?•• The computer was turned on and observed to self test normally. The dive computer was then immersed in a bucket of salt water within the chamber and the chamber was slowly pressurised. At a pressure of 10 kilopascals, which is the pressure you achieve at one metre of sea water pressure or three feet of pressure, the computer began to beep, as observed by myself and the police, who were viewing and recording the computer display from outside the chamber and viewing it through a view port. **A message flashed on the screen indicating low air pressure whilst the chamber pressure continued to be increased. The depth gauge and timer function operated normally whilst the chamber was compressed to 50 kilopascals or five metres of sea water pressure.** We did not continue further because we knew that formal testing of the accuracy of the computer would be done by other people. The computer was then decompressed and removed from the water.

If I can just stop you there. The point, I take it, of not having it connected to any compressed air explains why the reading of low air supply was given?•• That is correct and that's why the computer did indeed beep.

Yes?•• So Gave would be well aware that if it indicates an alarm, it makes a beeping noise.

Right, thank you?•• The chamber was decompressed and the computer was removed from the bucket of water. The battery was then restored to the correct orientation within the instrument and when retested under water in the chamber, **the computer screen remained blank whilst the chamber was slowly compressed to a pressure again of 50 kilopascals or five metres of sea water. This is with the battery in the wrong way round.**

Yes?•• No battery - no beeps were audible from this test. Following decompression the

computer was removed from the water and the battery was again inserted correctly. The computer was turned on and noted to self test again and to display the normal surface screen. **We thus demonstrated that the dive computer does not in fact beep when underwater at a depth between surface and five metres when its battery is reversed contrary to the report that Gabe made in his statement of October 22nd 2003, page 5 of 9 paragraph 26.**

All right. Now, I think we might leave it there and one of the reasons for that is my friends may well wish to put various facts to you or various hypotheses to you, but for my purpose I'd like to keep our evidence in a - in a different category and one of the reasons I say that is that if we look at the material, on one view and at one end of the spectrum we have something like 16 different sets of words being used by Gabe to explain what happened, or if you want to go to the other end of that spectrum, 16 different versions, as I count them, and I think that makes it very difficult for you to accept any particular set of facts. So, I'm very keen, Doctor, if we can just stick with what we're able to say about things objectively. Does that make sense?•• What I can objectively say is that the computer does not make any beeps when the battery is reversed if it's submerged in the ocean•••••

Yes?•• •••••and taken to any depth.

Yes?•• The screen remains blank•••••

Yes?•• •••••does not turn on, but it does not emit any beeps.

Yes?•• But I can advise that alarms will emit a beeping sound audible underway by the diver if the battery is in the correct way around and any alarm function is raised by the computer. Too fast an ascent, low on air, decompression time overstayed. Any alarm will emit a beep and Gabe would certainly have been familiar with the beeps that the device emits if an alarm was raised. So, he would expect it to make an alarm sound but may or may not have expected it to do with the battery reversed.

Indeed. Thank you, Doctor. Now, I think if - if we can now move to Professor Williams. Is there something more you'd like to say?•• I would like to, your Honour, draw everyone's attention to the fact that I'm afraid there is one minor error in my original submission and that is on page 2, I draw your attention to line 8 on paragraph 4.

That's the third last line where it goes, "40-6"?•• Yes. It should be 40 to 60.

Yes?•• And going back to the point of your question about the actual ascent rates you will notice that there are two rates that are quotes by the Navy. The current rate that is now recommended is 30 foot per minute.

Yes, 15 metres?•• Thirty foot is roughly 15 metres.

Yes. I was actually going to come back to that, Doctor, if - if we can just return for a moment. If - if you want to make a note on a piece of paper that there are particular things that you want to say about that we'll - we'll do that, but I want to try and keep•••••

Yes?•• •••••some sort of continuity going.

Fine?•• The next issue, I'd like you to look at, having talked to us about the test of the dive computers is Dr - Professor Williams's autopsy report and statutory declaration. Now, I take it that as part of the material that you were provided by police you received a copy of Dr Williams's opinions?•• Yes, I did.

Now, from the - from your speciality which is hypobaric medicine is there anything in those autopsy reports that are of significance?•• I fully concur with his conclusion that drowning was the final cause of - of death.

Yes?•• I think that's not controversial. I wish to take him up on the matter of the gas that was found in the patient's blood vessels and•••••

Yes. This could be a convenient time for you to do that, Doctor?•• And his assertion that the rapid ascent that she was subjected to - that Tina was subjected to by Wade Singleton in bringing her to the surface may have been responsible for causing pulmonary barotraumas and cerebral gas embolism. Now, if that were the case that would have been a terminal event and as was quite rightly said by Dr Williams or Professor Williams that would be effectually artefactual. That would not have been the cause of the problem that occurred when she lost consciousness and became separated from her dive buddy at the 15 metre mark.

Yes?•• Now, the only circumstance in which she could have sustained a cerebral arterial gas embolism.

Also known as CAGE I think?•• Known as CAGE would be if she had sustained a pulmonary barotraumas of ascent.

Now, I'll just stop you there. What exactly is that condition?•• A pulmonary, meaning lung, barotraumas pressure damage of ascent coming up.

And that, I think is a result of Boyle's law and the behaviour of gases?•• The expansion of gas a trapped space if it cannot escape is one of an increase in pressure within that confined space and the lungs have got a limit to their elasticity. If the air is not able to escape from someone's lungs when they have been breathing underwater either because they voluntarily breath-hold or because their vocal cords are closed because they are in spasm because they've got salt water or some other irritant like vomit on the cords then it is possible that air may be trapped in the lungs and if someone comes up during that time the pressure in the lungs will rise as the individual ascends in the water.

And the gas expands?•• The gas will expand and will cause an overpressure injury in the lungs. When that happens the lung may literally burst and produce what is called a pneumothorax or air around the lung, rather than in the lung, or more commonly in divers because the lung area is huge and is typically that of a - the area of your lungs when you open them out are the same size as a tennis court they are intimately associated with the small blood vessels that are responsible for the gas exchange in the lungs. As the lung tissues are stretched so are the blood vessels that are responsible for gas exchange in the lungs are also stretched and both can be torn at the same time allowing the air under pressure to get into the torn blood vessels. In the presence of a continuing circulation the moving blood then takes those gas bubbles to the left side of the heart and then transports them round the body. Because the first vessels that come off the aorta, the big artery that leaves the heart, the first vessels go up towards

the brain, and particularly if people are in a vertical orientation there is a tendency for most of the bubbles to be taken by the blood stream up to the brain, hence the condition called cerebral arterial gas embolism. Now, that can only occur during an ascent and if it were to occur in this particular circumstance would have been a terminal event in someone who was already unconscious but not yet dead. In other words they were still able to close their vocal cords either - well, if they were unconscious voluntarily because perhaps water or vomitus might have been on the cords and hold their breath during their ascent to the surface. Now, that is possible as a terminal event in this instance, but it in no way causes the initial event that happened - the problem that happened at 15 metres is totally unrelated to this.

Is there any evidence at post-mortem to support that particular theory that there could have been a pulmonary barotrauma or a CAGE in this ascent? ●● Professor Williams indicated that the lungs showed no signs of rupture but that is normally the case in someone who has a CAGE. You would not expect to see obvious objective sign and you would need to section the entire lung looking for tiny fissures which may be artefactual. It's not practicable to demonstrate the small leak between the vessel to demonstrate this, but I reiterate if this were the situation it would have been the very terminal event and not the causative event of the initial problem.

I understand that. Now, at autopsy was there any evidence of a CAGE? ●● Well ●●●●●

I notice, for example, that at the circle of wills there was suggestion of gas which was one of the indicators? ●● Professor Williams indicated that there was extensive gas within the vasculature including the cerebral vasculature of Tina.

Yes? ●● There are three possible explanations as he indicated in his evidence. One is that the resuscitation attempts including needles by expert medical practitioners clearly entered the blood vessels in the neck because we know there was bleeding into the tissues of the neck and we have witness reports that attempts of resuscitation with drugs were made into the major blood vessels in the neck. During that resuscitation attempt it would not be surprising if some air was introduced into the circulation but it would be a small amount. A secondary reason for air in the blood vessels throughout the body is that of the post mortem decompression artefact. That is well recognised and reported in the same text book that was used for earlier reports by Carl Edmonds and I can give you the chapter and verse for that if you would like me to do so.

Well, it might be helpful? ●● I am retired your Honour and therefore I have the earlier than my local colleagues. This is Edition 3 of Diving and Subaquatic Medicine by Carl Edmonds, Christopher Lowry and John Pennefather and if I take you to page 441.

Yes? ●● The last paragraph on that page states; "The widespread disruptive influence of post mortem decompression artefact has already been mentioned. This develops in divers who die under pressure within minutes and hours after they are brought to the surface or in divers who retain a nitrogen load and die so after surfacing." If I can explain that a little bit more ●●●●●

Thank you? ●● ●●●●● the essence of it is each of us is in fact a saturation diver now on the surface of the Earth out of the water.

Yes? ●● We are breathing air and nitrogen is at all times - the molecules of nitrogen are being breathed in with the air that we're breathing in and are being carried around our body. The same time nitrogen is being eliminated from our tissues and we're in balance. If we then dive to twice

the pressure that are at now there is a much greater pressure of nitrogen in the air that we're breathing in because we have to breathe air at the pressure that we are at or we would not be able to physically draw the air down. If you go more than a foot or so below water you can't physically pull air in, you've got to have air supplied to you at the pressure around you. So, that's.....

Yes?••what a scuba apparatus does, it gives you air pressure and delivers it to your mouth at the pressure of the water around you. In other words, at ambient pressure. So, if you go from the surface to 10 metres you've doubled the pressure and you've doubled the pressure not only in the water around you but in the pressure of the air that you're breathing in. On the surface the air composition will be the same as the air composition at depth but the pressure of the air would be twice as great. So, you remember yesterday we had evidence that the gas was analysed and shown to have a little over 20 per cent oxygen.

Yes?•• The remainder being largely nitrogen.

Yes and a small amount of carbon dioxide which there was some debate that you.....?•• A small - a trivial amount of carbon dioxide.

Of no significance?•• Absolutely not. Carbogen which is a medical gas is four per cent carbon dioxide and we give that to patients to breathe deliberately. So, is an absolutely trivial amount of carbon dioxide.

Yes?•• When you go to - to 10 metres of - of seawater and breathe air the partial pressure of the nitrogen is doubled, from .8 of an atmosphere, that's 80 per cent nitrogen on the surface, so, .8 of an atmosphere. When you go to twice the pressure you double that, so, you go from .8 to 1.6 atmospheres of nitrogen. Now, every breath that you take in has got this gas under pressure, increased oxygen, increased nitrogen, the oxygen is used up around the body but the nitrogen is an inert gas, the body does not use it. But it's now absorbing a lot more than it's giving out.

And that's Francis's law I think? Don't worry, Doctor, just continue on, yes?•• I'll give you the right law in a minute.

All right?•• I don't think it's Francis. Henry's Law.

Henry's Law. I can see Inspector Coxon has - who has corrected me?•• The reality is that on surface each of us has about one litre of nitrogen stored in our tissues. When you are breathing air under pressure at depth the increased pressure in the air drives extra nitrogen into the tissues of the body where it is stored.

Yes?•• The so called fast tissues, that is those that have a good blood supply, of course the blood itself, the heart, the kidneys, the brain, the tissues that have a very good blood supply very quickly saturate with nitrogen and very quickly absorb extra nitrogen. The muscles are a little bit slower and take a little longer to take up the nitrogen and then all the other tissues around the body, the so called slow tissues take a long time to fully saturate with nitrogen. The bones, the cartilages, fat.

Mmm?•• Now, normally when you come up after a dive the gas is completely harmlessly released because first of all when you rise through the water, what happens is that the tissues in

your body which have become near saturated with the pressure you are diving to now have an over pressure of nitrogen in relation to the pressure of the air that you're breathing. So, in the lungs more nitrogen is dumped from the blood into the air in the lungs and is then harmlessly breathed out then is being actually breathed in during the ascent phase of the dive and on surfacing after the dive. Slowly the nitrogen is leached out of the tissues of the body in the reverse manner to which it's been increased in those tissues during the descent and at the bottom of the dive. So, that the fast tissues will very quickly unload their nitrogen, the slower tissues will take longer and the very slow tissues like the bone and cartilage will take maybe 24 hours or more to completely unload their extra nitrogen. Now, I will quote you a figure which we have done some work on and others have published, I haven't got the reference here but I can get it for you, to demonstrate that if you go to a little over two atmospheres, about 2.8 atmospheres, after a period of about an hour you can expect that a human will have twice as much nitrogen in solution in their body as on the surface. In other words their body tissues, including the blood, will hold two litres of nitrogen instead of one litre. Now, I'm not talking about the air in the lungs, this is dissolved in the tissues of the body.

Yes?•• If that person returns to the surface with no circulation the gas cannot pass from the tissues into the circulation and be brought to the lungs to be removed. The gas can still pass from the tissues into the circulation•••••

Yes?•• •••••but it cannot be washed out of the circulation by the lungs and the blood passes through the lungs. Hence if someone has been diving for some time, even only a few minutes, the fast tissues, those that have got a good blood supply, will have absorbed a significant amount of nitrogen and if the circulation ceases whilst that individual is underwater then because the circulation cannot wash away that extra nitrogen as the individual ascends, the nitrogen will go to the place where it can most easily move and that is into the blood vessels. So, that this post mortem artefact which is well documented is the off-gassing of tissues into the blood vessels in the absence of a circulation where nitrogen has been stored in the body during the course of a dive.

So, when Professor Williams is talking about evidence of gas embolism being seen, we should understand that to be an expected but incidental finding at post mortem?•• His own words were artefactual.

Yes?•• And I support that fully.

All right, thank you. Now, Doctor, is there anything else that you wanted to touch on in relation to pulmonary barotrauma?•• I have already stated it could have been a terminal event in this situation if Tina's cords - if she'd been breathing - we know she'd been breathing - must have been breathing to the point where there was separation.

Yes?•• But from that point we don't know when she stopped breathing. We appreciate that it is likely that Wade Singleton reported finding her without any evidence of breathing and perhaps it - must assume that she was not breathing on the bottom. At some stage she must have stopped breathing, we don't know whether her circulation had stopped.

Now, there's a curio, Doctor, and I don't want you to speculate but one of the things that we do know is that when Wade Singleton found her on the bottom she still had her regulator in her mouth?•• That is correct.

Now, from a - from your perspective, is that at all significant? •• If she had been unconscious and not obstructed in her airway you would have expected her to continue breathing if she had a regulator in her mouth. If she was dead and various possible reasons why she might have been dead at this point, then of course she would not be able to breathe even though she had a regulator in her mouth.

Stands to reason? •• Her respiratory centre has been extinguished she would not be attempting to breathe.

All right. Doctor, we probably need to return to the point of separation and deal with issues such as unconsciousness and other matters in a moment or two, but before we do that there's just a couple of other issues that we should touch upon and clarify. You'll remember yesterday that Dr Williams expressed the view that he was unable to demonstrate at autopsy any natural disease or a natural disease process or condition that would provide an explanation for cause of death, do you remember that evidence? •• Yes, I do.

Is that a view that you concur with? •• Yes.

Now, can I take you, please, to page 3 of - I think it's page - it might be page 2, I think, of your report and the second paragraph of your report, and you'll see there, just while you're finding it, you suggested to police, and quite properly, that you felt that an opinion of a cardiologist or a cardio-electro physiologist may be helpful in determining the likelihood of a serious cardiac event causing a loss of consciousness, convulsion and subsequent circumstances of Christina's last dive? •• Yes.

Do you remember giving that advice? •• I do.

And I think you've had an opportunity of reading the statement of Dr Mendleson? •• Yes, I have.

And you're aware that he's a specialist cardiologist? •• Yes.

And you've also, I think, had the opportunity of reading the curriculum vitae of Professor Epstein? •• Indeed.

His report to the Court? •• Yes.

And I think through the helpfulness of Sergeant Campbell, you've had an opportunity of listening to his evidence on the police cassette taken of the Court hearing? •• Yes, I did.

And you were able to hear his evidence all right through that cassette? •• Yes.

And you were also provided with a first draft, at least, of a transcript of his evidence, not an official Court transcript but a police one taken from the tapes? •• I've seen that, yes.

You've had sufficient time to review that material from Professor Epstein? •• Yes.

Now, would I be right in saying, Doctor, that from your specialty, when you're involved in examining a case or examining a patient and issues arise that might require the expertise of other

specialists, you would bring them in, have them examine the patient and provide you with advice from their specialty concerning whatever matters are of concern to you? •• Indeed.

And then you would continue on with your diagnostic process to arrive at a diagnosis and a number of potential differential diagnoses? •• Yes.

Having listened to the evidence of Professor Epstein in the way that I've described and also the evidence of Professor Williams, you'll recall yesterday that there were two particular questions that you wanted to have answered and I think you've got a copy of the reply which is dated on my e-mail Friday the 23rd of November 2006, which is the reply to your questions? •• Yes, I have.

Now, if we look at the evidence of Professor Epstein, and I can probably take you to the relevant parts. Have you got a copy of the transcript? •• I have the copy of the transcript from Andrew E Epstein dated Friday 23rd of November at 6.17 a.m.

That's it. Now, can I ask you to go to page 12 of that •••••

CORONER: I don't think he's got what we're talking about. He's got the e-mail.

MR TATE: We'll leave the e-mail for a moment? •• Beg your pardon.

Do you remember the police gave you a copy of the transcript? •• No, no, I don't have with me a transcript of the - of his - of his •••••

CORONER: I've got a copy here.

MR TATE: The police did give you a copy of this, I take it? Now, Doctor, do you recall seeing that document? •• I have not fully - I was aware this document existed, I saw it being handed around yesterday, but I have not had and fully read a copy of this, but I'm aware and have carefully gone through the tape, so I'm familiar with the material from which this was derived.

All right, okay. If my friends are satisfied with that, I certainly am. This is just an aide memoire and it's not as good as the tapes. Doctor, if I can just take you to page 12 of that, you'll see there there's what would appear in print to be quite an embarrassing question by me with more "ums" than there are words. I didn't realise I did that. "Now, Doctor - Professor, there's another paragraph that I need to read to you and ask for your comments on, again from Dr Griffin: 'A severe anxiety attack causing Tina to pull her husband's mask of is unlikely.' I'll just ask you to read the rest of that." And the doctor's reply is on the next page: "Again, I have to say that I'm not an expert in forensic, but as a simple physician, in this case, if her mask and regulator were on and it's hard to invoke how the heart would have been involved with the death." And then I said, "Would it be fair to say from your clinical perspective that in terms of the cause of death, the Court would be best advised to look elsewhere" - it should say - "than to the heart and cardiovascular system?" And he simply says that he agrees. Now, as I understood his evidence, together with the responses to those questions, he was satisfied that he could not find a suitable medical explanation to explain what happened to Tina under water and in particular in relation to the arrhythmia that he'd treated her for? •• It was clearly his opinion that the treated arrhythmia that she had previously had was unlikely to recur during her dive and that, even if it had recurred, in his opinion, it would not have been a life threatening dysrhythmia.

Indeed?•• I nevertheless wanted to make further inquiries, as you know.

And that's - that's why we've just gone on that slight variation. The two questions you had, as I understand, and I might ask you just to take your e-mail and to read out the two questions that the Sergeant put to Professor - just read it out loud and you might, as you read the first one, indicate the purpose of your concern or the advice that you wanted?•• **The purpose of my concern is that we've got to find some explanation for why consciousness has been lost in this young woman at some point between her arriving at 15 metres and arriving on the bottom of the ocean.**

Indeed?•• Many possible can be excluded, and we can go through that later, but because she had a history of heart disease in the past, albeit treated heart disease, I have to focus on that as being a potential cause of a serious problem under the stresses of the dive that she was undergoing.

Indeed. So if you'd read us now first - your first question?•• My first question is: "What is the current rate of recurrence of successful accessory pathway ablation by radiofrequency diathermy of patients with narrow QRS tachycardia caused by AV nodal re-entry?" And that is the condition that Professor Epstein treated Tina for.

Now, the first question, did the Sergeant put the question correctly for you to•••••?•• Yes, he did.

And you've had an opportunity of reading Professor Epstein's answer?•• Yes, I have.

Now, are you satisfied with his response?•• Yes, I am.

What does the response tell you?•• The response tells me that he had already testified under oath that he quoted less than a one per cent recurrence rate in 2001. He recalls the defence attorney quoted an old paper with a nine per cent recurrence rate and he pointed out that the data were indeed old. So, in his view, the recurrence rate is likely to be less than one per cent.

Now, your second questions, if I can ask you to read that one and again let us know what the purpose of your question is. It's well recognised that in diving deaths, accidental diving deaths, a terminal cardiac dysrhythmia is often the event - a cardiac dysrhythmia under various stresses can be an event that causes someone to die under water. I therefore wanted to explore the possibility of her having a cardiac event, even if she had a normal heart, under the circumstances of the dive she'd undertaken on the day of her death.

Yes, and your question was?•• My question is can you quantify the possibility of a serious life threatening dysrhythmia occurring in a diver who is in serious panic underwater, (a) with a normal heart, (b) with a recurrence of an accessory A-V nodal pathway.

Yes, and Professor Epstein's reply, does it satisfy you?•• Professor Epstein's reply is that regarding a serious life threatening arrhythmia during a panic attack while diving, in a patient with a normal heart, he states he is not a diving expert. He does go on to say that a young person with structurally normal heart and a normal ECG as is the case here, it would be extremely low. He goes on to talk about patients with genetic heart disease which we've no reason to believe this young woman had and the exclusion of many of the possible heart diseases that could have

given rise to a serious dysrhythmia which have been excluded by his and Dr Mendelson's examinations prior to her undertaking these dives.

So, as a result of all of that information, would your clinical advice to the Court be that we should look elsewhere than to the heart and the cardiovascular system in attempting to ascribe a cause of death? •• **It's my belief as a diving medical practitioner rather than a cardiologist, that under great stress in someone who's been exercising severely, it is still possible that even if she had a normal heart, there may have been a dysrhythmia causing her to lose consciousness. But that is a small possibility, but it is a real possibility, I believe, nevertheless.**

And would you be thinking there of ventricular fibrillation as the most likely arrhythmia? •• Indeed, because that would stop the circulation which is the important thing. If she had a rapid heartbeat, she would still have a continuing circulation and would be unlikely to lose consciousness underwater. She might do when she reached the surface, but not underwater.

Yes. So if she had that sort of dysrhythmia, it really doesn't help us understand why she failed to breathe at some point, from the point of separation to when she was seen by Mr Singleton? •• Well, if she had a dysrhythmia, and if the circulation stopped then, of course, the respiratory centre would not receive oxygenated blood and it would stop her drive to breathe, and she'd stop breathing.

Right, thank you. Now, Doctor, we probably now need to have a look at the recognised risk factors for accidental death in divers, as they may be relevant to our understanding to Tina's situation? •• Once again, rather than reinventing the wheel, I draw your attention to the same text book, Diving and Subaquatic Medicine, and I did provide a reprint of a chapter entitled, "Why Divers Die, the Facts and Figures", and I believe the Court should have a copy of that.

Now, I'm not certain, Doctor, that we actually do? •• If you don't, I have the book here, and there is no problem with providing it for •••••

Just wait a moment, I'll just ask the Sergeant. I'm not certain that we have a copy of it, Doctor. Is it - is it a document that it would be worthwhile us having and reading while you take us through it? If it is, I'm sure I - his Honour will allow us a moment or two to get some photocopies run off? •• I think it would be impractical for you to read through all the detail during the course of our discussion. Nevertheless, I think a record for people to look at and •••••

Subsequently, all right? •• •••••subsequently digest, may be worthwhile. What I would like to do, is to take you through all the various factors that are typically involved as contributory factors to underwater deaths, and see which of those may have had a part in the situation that we are reviewing.

CORONER: I think, Mr Tate, in fairness, none of us have seen it and certainly none of the counsel at the table. It might be wise if we just spend a couple of minutes, I'll send my clerk over and get a number of copies.

MR TATE: Thank you, your Honour.

CORONER: And as - as we're doing it, at least people can refer to the pages the Doctor's referring to. As far as getting a good view on that, we might then subsequent to your finishing your examination, give everybody an opportunity to go through that because this is going to be the only opportunity really that we'll have this doctor here.

MR TATE: Subsequently it would be by telephone.

CORONER: Yes. I just wonder, Counsel, would you prefer to read this article before you commence your examination?

UNIDENTIFIED SPEAKER: Yes.

MR ZILLMAN: Yes.

CORONER: Well, why don't we go - are there other matters you can go on to while we get this photocopying done, or should we stop now?

MR TATE: Your Honour, I think from a - unless Dr Griffiths tells me to the contrary, this would seem to be the next logical matter because we then need to●●●●●

CORONER: Okay.

MR TATE: ●●●●●move on to●●●●●

CORONER: It's going to take us at least five minutes to get this photocopying done, so what we might do is we might break now so everyone can have a comfort stop. I'll get my clerk to do that.

MR TATE: Thank you, your Honour.

CORONER: If we can get back here within 10 minutes, so we don't - we've got a fairly - fairly heavy time - close time schedule for planes, so if we can come back within 10 minutes, and then we'll go through this process, then we'll have to have an adjournment while people read the article, so we're going to go very finely to get his plane, aren't we?

MR TATE: Well, I think my friends are on the 8 o'clock plane tonight.

MR ZILLMAN: The doctor's got a question by the way, your Honour.

CORONER: Sorry?

MR ZILLMAN: The doctor's got a question.

WITNESS: Your Honour, can I suggest that at the same time as making photocopies of the chapter on the - on why divers die, as the chapter is called, there's another shorter component on unconsciousness underwater, which I think is very pertinent to this particular case. Can I suggest that that section is also photocopied and provided●●●●●

CORONER: Well, would you kindly go with my clerk and we'll get that done now?●● Thank you, your Honour.

Thank you very much. Well, we'll - thanks. I'll take you over.....

RECORDING PAUSED AT THE DIRECTION OF THE CORONER

RECORDING RESUMED AT THE DIRECTION OF THE CORONER

MR TATE: He - he'll have to leave here, your Honour, at 12.30.

CORONER: Okay, well we're not - we probably won't get him.....

WITNESS: The flight time is 13.20, your Honour.

CORONER: Thank you.

MR TATE: Your Honour, I'll just return the - the Exhibit autopsy and investigation of scuba diving fatalities that is Professor Williams' article referred to yesterday which has now been copied and distributed.

CORONER: Thank you. That's my copy, is it?

MR TATE: Now, Doctor, I think we reached the stage of recognised risk factors and accidental death, and I think it would be fair to say that we'll be somewhat like ducklings. If you tell us which page to go, we will follow you?.. Mr Tate, may it be helpful to look at the causes of unconsciousness or the potential causes of unconsciousness prior.....

Thank you?.. ..to looking at why divers actually die, because the real thing I think the Court wishes to ascertain, is what were the sequence of events.....

Very much so?.. ..leading up to her death, so I think we have to look for causes of unconsciousness before we look for the actual cause of death.

Thank you very much. And here, you've relied in giving your evidence and also your report, in the chapter 32, "Unconsciousness" which commences at page 423 of the textbook Diving and Subaquatic Medicine, going through to page 429?.. That is correct.

Thank you. Doctor, I leave it over to you to tell us what it is that we need to know?.. Well, to save you spending too much time on areas that clearly are not relevant, we can exclude breath hold diving because we know she was - Tina was scuba diving during the incident. So, you can ignore the first two pages and turn to page 425, where the area is titled "Causes possible in all types of diving". The first title under that is "Hypocapnia due to hyperventilation". That simply means that some people can lose consciousness if they over-breathe. If any one of us on the surface breathes up too much, if you over-breathe, you can wash out enough carbon dioxide from

your body to become unconscious. Now, that would normally be a completely self-resolving situation. If a diver underwater were hyperventilating in that they would have some minor symptoms, they would be unlikely to lose consciousness but if they did, if they retained their regulator they would soon start breathing again as the carbon dioxide built back up in their body when they held their breath. If they lost consciousness, they'd be likely to stop breathing. When they stopped breathing, they would build up [indistinct] and their normal respiratory reflexes would start up again and they would regain consciousness. So I think you can exclude hypocapnia.

Yes?•• Drowning we know is a terminal event but I believe we have to look for other causes prior to drowning so the reverse possible factors enumerated here that could cause drowning, underwater entrapment we can exclude there was no sign of that because the separation we know took place in - in open water. Equipment failure we can pretty much eliminate because the equipment was very carefully checked after the event and apart from a slightly loose hose which did not prevent the apparatus from functioning normally. The apparatus was demonstrated to perform perfectly satisfactorily.

I - I should also indicate that the evidence of Mr Singleton is that he was able to purge the regulator when he found Tina•••••?•• Indeed.

•••••and secondly he was able to inflate the BCD?•••••?•• Indeed.

•••••from her own air supply?•• Yes.

Thank you?•• Poor judgement is something that the Court has to consider but it's beyond my area in this situation. I think the diving community needs to - to look at that in terms of the - the details of how the dive was undertaken. Faulty technique, aspiration is possible it stated using diving equipment due to malfunction which we - we know did not happen or incorrectly performed techniques such as buddy breathing [indistinct] and so on. None of those things took place, so I don't think there's a - a real issue with any likelihood of faulty technique.

Yes?•• We know that she probably vomited at the end but I believe that was a terminal event and there's no real suggestion that she had vomited at the point of losing consciousness although that is possible. And if she had vomited and the vomit had obstructed her airway, that might have caused her vocal chords to close and might have caused her to lose consciousness.

Certainly, it's not an observation that was reported to us by Mr Singleton?•• Fine. **The last item that's mentioned her is panic, and I think we can probably assume that Tina would have been in a panic situation, if indeed, she was as been described by various people, inexperienced for this type of dive•••••**

Yes•••••?•• working in a current which was significant.

Yes?•• And I can quote that Navy divers who are fully trained and fully physically fit in diving equipment cannot exceed about two knots of swimming speed. We don't know what the actual current was on this occasion, but if Tina was trying to swim against the current even at one knot, that is about as fast as many people who are not well trained physically fit divers can go, and she probably was in a situation where she was physically getting exhausted and likely to be therefore in a state of panic if she wasn't reaching her objective.

Now, I'll just stop you there. The evidence that we've had is that prior to the dive commencing the dive boat operators send out one or more people to view the wreck, view the currents, view the speed of the currents. And at that point in the official ship log it's reported as a strong current. We're also told that it's going from the bow to the stern and the current is noted to be half a knot. Equally, we've also had evidence to suggest that as the day progressed the current lessened. And we've had divers of various levels of experience, including simple open water divers and females, suggesting that they had no real problems or didn't feel too tired or didn't have too many troubles variously described swimming from the stern back to the bow, so that would be against the current. So, Doctor, what I'd like you to assume is that as it stands at the moment, we don't have any objective evidence about the actual strength of the current. But we have a number of subjective impressions about how strong it was? •• Thank you for that correction. I did not hear the earlier evidence •••••

Mmm •••••? •• and stand corrected that perhaps the current was not as strong as I had the impression it was likely to be.

Well •••••

MR ZILLMAN: Well, I - I object to the evidence, your Honour. With respect, the - the evidence should be given on the issues of medical science rather than the witness being asked to assume certain facts and whether that might cause, in this case, Tina to be panicking. Really, that's your task, with respect and •••••

CORONER: But the problem is that we need to go back further. I mean, leading up to this before Mr Tate came in, the Doctor had assumed a situation of panic in a case of strong current where, for instance, two knots - the person but not reaching the objective. I think he was talking about possibilities. He may have always assumed that there was a strong current, but what he was - we - we were talking about the possibility of panic. And I understood him to say well if a person was in that situation and the [indistinct] of current of say two - two - two kilometres and wasn't reaching an objective, then that could cause panic. And then I think Mr Tate was then going to try and qualify that that wasn't an assumption which was - which he should be basing his assessment on. But I think he was just going through these causes.

MR ZILLMAN: Yes, I understand that but the Doctor, in effect, is being asked to assume that Tina, for example, is a poor, medium or good swimmer, what her current rate might be to one person as against the next. In fact, whether the current caused her to panic or not as against some other detail •••••

CORONER: Well in fairness, Mr Zillman, I don't think the proposition was put but I think what I understood from my account, Mr Tate saying that he was bringing it back to what the evidence was from a range from .1 - .5 of a knot of a strong current description to a - a current - a current where other people were saying was reasonable - they had no difficulty. Now, I don't know whether Mr Tate was going to put any propositions to him. I thought we were only getting Mr Tate's original - and the statement was, he was getting objective evidence from - from this doctor along the lines of what you're suggesting. I - I think you - perhaps pre-empted the - any questions that might rely from that. Mr Tate, what was your - what was your intention of the - raising these issues?

MR TATE: Simply this, your Honour, I wanted the doctor to have an opportunity of providing his - his advise based on the evidence that we have, which is, the current could be going at .5 of a knot or it might be less than that. Ultimately, that, in my submission, is a matter for your Honour to try and work out what.....

CORONER: Well, that's what Mr Zillman is saying.

MR TATE:the current is.

CORONER: I mean, all the doctor has said hasn't he, that if it was strong current of about 2k's, and a - and a diver such as Tina was swimming against it and not achieving her objective, that could cause panic.

MR TATE: Yes.

CORONER: Now, that's not the evidence that I have had here. That's just going through, as I understood, eliminating some other causes here?.. Your Honour, may I rephrase my comments to perhaps clarify the - the situation? Is that possible?

Well, what Mr Zillman is saying first of all it's inappropriate for you to give opinions in relation to - to what may be a range of current that various people from evidence have given. I - I'm sure these propositions are going to be put to you by somebody else. I'll - I'm happy for you to rephrase, but I - I - I would need to rule on whether that question is appropriate to this witness. So, perhaps if you rephrase what you wish to say and then we'll take it from there?.. Your Honour, panic is well recognised as a cause or one of the factors involved in many accidental diving deaths. Panic is something which cannot be assessed after the event unless it's observed by people in the water or likely to have occurred as part of the history of the events leading up to the situation that has occurred under water.

Thank you?.. Under those circumstances, unfortunately panic would not be amenable for example to any autopsy evidence and would only be something that you could definitely prove if there were several objective witnesses who could see obvious signs of panic in an individual. Nevertheless, the likely causes of panic might be swimming against a current, particularly if you're not particularly experienced and the value that I quoted of two knots, was simply to indicate that if there were a strong current, the maximum speed that anyone could swim would be at that rate of - of two knots in the scuba gear. In half a knot of current many people would be able to swim quite satisfactorily, but they might well find that that was a significant exertion. And exertion together with any other difficulty could certainly, potentially, give rise to panic. I'm not asserting that panic is definitely one of the factors here, what I'm saying is it could have been a factor and that it should not be discounted.

Well that - I think that really puts it in - in perspective, doesn't it?

MR TATE: Yes, I can live with that. Doctor, if you'd continue?.. The next item is "cold". We know that Tina was wearing an appropriate wet suit and not been in the water long.

Yes?.. And I think you can discount that as being a likely cause of unconsciousness.

Yes?.. The next one is "pulmonary barotrauma of descent or thoracic squeeze" and she was

breathing from her regulator, not breath-holding and, in any case, the depth she went to would not have provoked a pulmonary barotrauma of descent even if she had held her breath all the way down. Free divers can go much deeper than that without any barotrauma of their lungs.

One of the questions that we've had in days gone by is what might have happened if - and the proposition was that you could have a pulmonary barotrauma just by rising whilst you were underwater as little as .8 of a metre I think the - the - the phrase was used; is that correct?•• The figure of two metres is more widely recognised but it must be stated that that two metre rise is the last two metres before the surface. Two metres at depth - two metres - a rise of two metres at 15 metres would not, by Bell's law, be sufficient to overexpand the lungs with full lungs and a - a breath being held, a 10 metre rise would not be enough to burst the lungs.

On the dive computer records for Tina is there anything in that profile that would leave - leave that open as a possibility?•• Are you asking me now about a pulmonary barotrauma of ascent?

Yes?•• Well•••••

I think the answer is probably no because there's no - no suggestion in the dive profile that she went up?•• It's not something that can have occurred before the event that took place at 15 metres six minutes into the dive?•• Thank you.

If you'd continue, Doctor?•• Thank you. The next one is "marine animal injuries". There is no history, from the record, of marine animal injury plus the autopsy report gives no evidence suggesting that there has been any marine animal injury involved in this case.

Yes. Thank you?•• "Vomiting and aspiration". There is evidence that Tina had perhaps vomited but this may have been a terminal event. We don't know whether such an event had occurred at the 15 metre mark at six minutes into the dive. It is possible. It is unlikely as a preliminary event because most people who are going to vomit underwater have had severe sea sickness on the surface and on jumping into the water, if there's still a fair amount of slop, might go on to actually vomit underwater and that certainly can be a precipitating cause of a serious event underwater but there is no evidence that I am aware of that Tina was suffering from significant sea sickness and I'm not aware of any report suggesting that she was unwell prior to going into the water.

At the surface, when she was brought back and resuscitation is occurring, there is evidence, I think, of aspiration. I must say that I understand that to be terminal aspiration, which is one of the mechanics, as it were, of death; is that correct?•• I agree that that is very likely to have been the event. Either she regurgitated before or during a resuscitation attempt or even possibly during her retrieval on her way to the surface. **If she'd swallowed any air into her stomach during the course of the dive, as that air expanded on the way to the surface, even if she was dead, that would tend to blow the stomach contents up her oesophagus and back into the back into the back of her throat and be seen as vomitus.**

Thank you, Doctor. If you could continue, please?•• "Decompression sickness". By its very name, decompression is not an issue here because she did not decompress before the event occurred. If there were any decompression sickness it would be at the end and that would have been a terminal event but it would not be, in any way, likely to occur after such a short dive to such a shallow depth. "Miscellaneous medical conditions" are the next item and here you'll notice that diagnoses such as myocardial infarction, cardiac arrhythmia, syncope, cerebral vascular

accident, diabetes with hypo or hyperglycaemia and epilepsy should all be considered. Now, as I understand it, from her medical records that I have reviewed, there is no evidence that she has suffered from syncope episodes, even when she had her original heart dysrhythmia problem she felt light-headed but didn't actually lose consciousness. She certainly had a normal heart at autopsy and therefore the likelihood of any sort of myocardial infarction is negligible and cardiac arrhythmia is mentioned there and, as I state, **despite the fact that she's had her accessory pathway ablated, even with a normal heart, I believe there is a remote possibility that she may have developed a cardiac dysrhythmia in response to some sort of stress during the course of the dive.**

Mmm, but it remains a remote possibility?•• **It remains a remote possibility but it's - it - I don't think it can be completely excluded.**

And, of course, in your evidence, Doctor, you really trying to be as helpful - helpful as you can by raising anything that you can think of, medically, that might assist the Court in better understanding what happened?•• **What I'm aiming to do is to exclude things that cannot have been the cause•••••**

Yes?•• ••••and to indicate those that could have been the cause, even if unlikely.

Thank you?•• The other issues mentioned, "cerebral vascular accident, diabetes and epilepsy", again, there is no evidence that we have to suggest that any of those occurred although one of the reports in the water suggested that she may have been thrashing about. Now, I think a first epileptic episode in the water with never having had an epileptic attack before, never having had a blow on the head before the dive, is very very unlikely.

Mmm?•• There are other metabolic disturbances which clearly are not going to have been an issue in someone whose young and fit and able to go diving such as renal failure and liver failure. Drugs are mentioned but we know that those were sought and the autopsy blood samples were taken and analysed and no significant quantities of any drugs that could have contributed to this incident were identified. So drugs are unlikely to have been part of the - the problem.

Yes?•• The next item is "trauma" and, again, there's no history of any trauma and no autopsy report suggesting that any trauma occurred to the victim. There are now a series of causes identified that are confined to compressed air diving which, of course, Tina was undertaking and the first one is pulmonary barotrauma of ascent. As I've already described that cannot have been an issue up to the point where she lost consciousness or continued to descend when the incident, whatever it was, occurred at 15 metres depth six metres into the dive.

But, in any event, what we know about the ascent is that at that time she was observed not to be breathing with the regulator in place?•• That does not exclude the possibility that if she was still alive but unconscious and if she had any water or vomitus on her vocal cords, she could have closed her vocal cords during the ascent that was assisted by Wade Singleton and brought to the surface with a closed vocal - closed glottis or vocal cords and that could potentially have provoked a pulmonary barotrauma of ascent but that would have been a terminal event and not the causative factor in this whole situation.

So not the cause of death, in other words?•• Correct.

Thank you? •• "Syncope or fainting", is the next item and as it's been commented on here, syncope of ascent can occur but the problem occurred before any ascent was started. Therefore, you can eliminate syncope of ascent and the postural hypotension that was identified is on leaving the water. Now, she didn't leave the water before the event occurred so you can exclude syncope as a likely cause of any problems. The next item is "inert gas narcosis". We know that the depth that she attained even at the bottom was only 20 - 28 metres; is it?

About 28 metres? •• Twenty-eight metres. Nitrogen narcosis can be an issue at 28 to 30 metres. It is never an issue - it's been clearly documented that two atmospheres of pressure or 10 metres does not produce any significant narcotic effect but that by the time you get to 20 metres it is a mildly observable phenomenon. Indeed, there is a law called Martini's law which describes the effect of nitrogen narcosis as being like drinking a single martini - the nitrogen narcosis effect that you would achieve by going to 15 metres -and for every additional 15 metres that you go to it's like drinking another martini on an empty stomach. In realistic terms if you look at a single standard dose of alcohol, 10 grams of alcohol, that might be the influence of nitrogen narcosis equivalent at 10 to 15 metres.

And a big •••••? •• So at the depth - maximum depth that she went to it would no more than if she was conscious on the bottom, having two drinks of alcohol.

And that would take us to what? .01 or .02 •••••? •• Point •••••

••••• on the VAC scale? •• I - I'm not an expert in that area. I •••••

All right. Thank you, Doctor? •• ••••• can't comment.

All right. Please continue? •• We know she was not breathing any other inert gas that was likely to be a problem. The gas was analysed and it was - it was, in fact, adequate air. Carbon monoxide toxicity is excluded by the gas analysis and oxygen toxicity would only occur at these depths if she was breathing a hundred per cent oxygen which, again, we know is not the case. There was not a mix up and she was not given an oxygen cylinder to breath. The air that was analysed was, indeed, 20 point something per cent oxygen and not a hundred per cent oxygen so oxygen toxicity is not a cause. Carbon dioxide toxicity would involve her breathing a very high inspired concentration, as I mentioned earlier. We have a gas called carbogen which is four per cent carbon dioxide and oxygen which is used for medical breathing in hospitals and if she was to breathe increased carbon dioxide underwater she'd need to breath the equivalent of one per cent on the surface to even have the amount in carbogen at the bottom and she certainly had only tiny amounts of carbon dioxide so you can exclude carbon dioxide as a cause.

Yes? •• Hypoxia due to faulty equipment or a technique, well, we know that the equipment that she was using was perfectly satisfactory in its function, no reason to believe that she would've been exposed to hypoxia. Indeed, as the pressure around her increased the air would've had a - a greater partial pressure of oxygen and she would've had more oxygen delivered to her if she was breathing normally and had a circulation. **You then come onto the contributory factors, inexperience is one that is commented on and I won't say anything further about that.** Overheating is unlikely to have been an issue here in someone who's actually been in the water. Change in blood glucose level, fall or rise in - in blood glucose is unlikely to be a problem in someone's who's been eating normally, has not been sick for days, is not a diabetic.

Psychological factors certainly could be an issue, anxiety is a possible issue. And cardiacarhythmias is the next item which I have already discussed. The factors considered go on to say the post-mortem examinations have not been helpful in the context of any sort of cardiacdysrhythmia because you can't demonstrate those at - at post-mortem examination.

So, at the conclusion of this exercise would it be fair to say that you leave open for the Court's consideration cardiacarhythmias, panic and anxiety as being trigger events? •• And possibly some degree of exhaustion, I don't know how hard she had to swim and how far she had to swim but she was certainly underwater for several minutes. Some degree of heavy exertion may have taken place and I can't speculate how much that was.

All right. Now, is it your medical view, Doctor, that at some stage, either at the point of separation or subsequently, that she became unconscious? •• The evidence that I have been provided, and I have to rely on the report from Wade Singleton, am I allowed to assume that that •••••

If you tell us •••••? •• ••••• that he's an objective witness?

If - well, if you tell us the facts that you're relying on from Mr Singleton then we can be with you in terms of the base - factual basis upon which you're offering your medical advice as an expert? •• Well, I am unclear when she lost consciousness but I think it's unlikely that that event took place during the apparently controlled descent. It may have taken place at a point - at the point or about the point of - of separation with her buddy, it could've taken place just before that, it could've taken place after that if there was a - an episode of some event at that particular time but •••••

What would be the signs of unconsciousness? •• In the first instance, someone becoming unconscious would likely to become flaccid. They might just drift into a - a flaccid position underwater and stop moving - stop making any attempts to - to fin. They may well, if they're in the early stages of unconsciousness, still continue breathing. They may or may not have their eyes open. And more than that I think I can't say.

Is there any reason why the eyes would be closed or open or is it just something that can go either way? •• It can go either way.

All right. Thank you. Now, Doctor, I think you wanted to take us to the next part which is "Recognised Risk Factors for Accidental Death". And this is from the same textbook. And I notice that you've provided us with pages 81 through to 93? •• Ninety-four.

Ninety-four. Yes, indeed, thank you. And again, Doctor, if you take us through what you want to show us we'll busily follow you? •• Thank you. The - if I go through the individual factors that may have had some place in this matter, the diver profile does not appear to have been a significant issue because the diver appears to have descended in a fairly normal fashion to a relatively shallow depth before the incident, whatever it was, occurred. So the initial dive profile does not appear to have been a significant event. The activity that - I state, there is a range of activities that have been suggested here. None of those were relevant under - other than the fact that she may have been swimming to some extent and perhaps swimming against some degree of current. Age is the next item and in her case is not really an issue, she's a young woman. The

depth at which incidents occur often are near the surface but in this particular instance the depth I don't think are really an issue that needs further consideration, neither does the duration of the dive because it was a relatively shallow dive and was not one associated with diving to the exhaustion of her air supply or any other problem like that. Experience is an issue in that I understand from the evidence that Tina had undertaken a limited number of dives in the past and possibly had dived under slightly different circumstances from those that she experienced on the dive on the Yongala and response to a problem is certainly an issue that needs to be considered in this context. And one of things that I draw your attention to is the fact that the weight belt or contained weights as in this case was ditched by the victim in only nine per cent of cases. And the buoyancy compensator was not inflated either on the surface or at depth in 48 per cent. Now, if someone has an incident underwater when they're aware that they have a problem they are trained of course to make themselves buoyant and swim towards the surface if they have a problem and need to get to safety. **But it would appear that, for whatever reason, Tina has neither ditched her weights from the buoyancy compensator, there were some that were readily ditchable but they were still intact when she was found as I understand from the equipment reports. And similarly she had not, by the reports that I've had, inflated her buoyancy compensator but that's in line with many diving incidents and it has been suggested that this may be provoked in some instances by panic.....**

Now.....?.. ..or anxiety.

Now, I don't need to ask you to comment about this but you are of course aware that she was a with a buddy?.. I am aware that she was with a buddy and if a buddy had been aware that she had had problems then it may well be that a buddy would've been likely to try and assist in either of those functions, that is inflating the buoyancy compensator device or in a more extreme situation perhaps trying to release the releasable weights.

All right. Thank you?.. It goes onto to say, "The rescue assisted with air supply in a - a number of instances, 11 per cent, and ditched the victim's weights in 12 per cent and inflated the buoyancy compensator in 10 per cent and assisted with the rescue in 23 per cent. But when the buddy remained with the victim there was usually an appropriate response and only rarely did the rescuer become the victim, that's not an instance in - in this case.

So, in reading that am I to assume that if the buddy stays with the person suffering difficulties one would expect a good outcome?.. It's more likely there would be a good outcome, yes.

I see. Thank you?.. Can I continue.....

Yes, please?.. ..with the contributing factors?

Yes please?.. The medical contribution is one that I have drawn your attention to already. The psychologically ones particularly are a possibility with panic and fatigue being possible issues here. The physiological contributions such as vomiting and physical unfitness, I make no comment on the physical unfitness, but vomiting we know occurred at some stage or regurgitation occurred at some stage and may have played some part but is likely to be a terminal event and not a precipitating event and we've excluded other things like pulmonary barotrauma and significant cardiac disease as a cause of her problem. The autopsy findings have been well discussed and as you know don't point to any particular medical cause or accidental injury cause

or other causes that we've discussed and the medical contributions survey that's provided here does indicate that the commonest factors are panic and fatigue. Panic at 39 per cent and fatigue in 28 per cent in the group that was taken from the United States and in the Australia and New Zealand Group was - those particular factors were considered in the ANZ Group, but in the medical contributions excluding drowning panic was a factor considered to be cause of death in 39 and fatigue in 28 per cent of diving injuries.

Yes. Doctor, just looking at asthma I just need to let you know that the advice we were provided by Dr Epstein.....

CORONER: Could I just interrupt for one moment.

MR TATE: Yes, your Honour.

CORONER: **Obviously if you total all those figures up they're more than 100 per cent so panic and fatigue could be a combination of events.....?.. Your Honour, these events indeed or often multi-factorial.**

Multi-factual, yes?.. It's very rare for an accidental diving death to occur with a single factor responsible.

Yes?.. But they are almost always multi-factorial and therefore many factors are often reported in a single diving death.

Thank you.

MR TATE: Now, Doctor, looking at the question of asthma, what we're told by Professor Epstein is that at history, and also during his pre-operation examinations, which apparently were quite thorough, so he told us, there was no indication of asthma but there was an indication of, I think it's described as rhinitis to allergies. Is that of any relevance of his Honour to consider?.. If that were to be of any consequence and if you are suggesting there could be a possibility of asthma, asthma only becomes an issue during the ascent. It would not cause a problem at depth.....

And I notice.....?.. unless a severe asthmatic attack occurred.

I see?.. Rhinitis may make it more difficult to equalise the ears but the autopsy report indicated that here eardrums were intact and without sign of any significant barotrauma so although rhinitis might have made it a little more difficult for her to equalise her ears there are unlikely to have contributed to her death.

Thank you. Many of the other causes of actual death have been reviewed in the context of causes of unconsciousness including panic, fatigue, vomiting, narcosis drugs. One that is not is saltwater aspiration.....

Yes?.. ..and I would point out that saltwater aspiration is something that can occur if people have difficulty breathing underwater. It's very unlikely to occur in someone who has satisfactorily functional breathing apparatus, as we know Tina had, and I think it's very unlikely to have occurred and even if it had occurred it would not provoke unconsciousness within a matter of minutes so we can exclude that.

Yes?•• Pulmonary barotrauma we've talked about and cardiac disease we've talked about, asthma we've talked about and•••••

Respiratory diseases might be the last?•• Respiratory diseases we are not given any advice to suggest from the autopsy or from the history that there was a likely problem.

Thank you. In terms of the diving techniques we know she had a plentiful air supply, there was still plenty of air left in her cylinder and as she rightly pointed out, I think Wayne Singleton did a magnificent job in retrieving her from depth in that as soon as he located her he retained her airway, he purged the mask to clear her mouth from water, he supported her airways and he brought her to the surface. By the report that I've read I could not fault his - his retrieval from finding her on the bottom to the surface and I don't think it could have been done better.

Thank you. Now, is there anything else out of this article, Doctor, that you need to take us through?•• The last three items, yes, buddy diving. We know there was separation and that is a very common issue with people who voluntarily separated. You'll notice that 25 per cent voluntarily separated after a problem commenced. So, it's very common for separation to occur for whatever reason after an incident occurs underwater and if that happens in increases the likelihood of a poor outcome.

Yes. I could ask you some questions about that but I think that's probably an area that Mr Walters will want to cover. So, if we can continue?•• Buoyancy is the next one.

Yes?•• And we are all aware that whilst Tina's buoyancy may have been appropriate on the surface by the time she had got down to the depth of 15 metres her wetsuit would have compressed somewhat and the evidence that we have is that the buoyancy compensator had not been inflated so we can assume that she was likely to be somewhat negatively buoyant and would tend to sink to the bottom as has been demonstrated on her dive profile in the dive computer. So, she was probably negatively buoyant because she had no additional air to put in her buoyancy compensator and when that started to happen, for whatever reason, no air was put into her buoyancy compensator nor were any weights dropped.

All right, thank you?•• And the final thing is the weights and as I've already said•••••

Yes?•• •••••many diving victims are found with their weights still intact but divers are taught that if they get into trouble and if they're conscious they should, of course, as a last resort ditch their weights but it's not uncommon to retain them. If she were unconscious she wouldn't be able to ditch them, but even if she were conscious in a situation perhaps where she was getting anxious or panic, it's not surprising that she didn't think to - to drop her weights.

Now, one of the curios about the possibility of panic and I might just ask your help, if you're able to give it. I understood that one of the usual scenarios when a diver panics is to bob for the surface?•• That is correct.

Why is that?•• Most people recognise that the underwater environment is a very hostile one and that they cannot breathe without their equipment and if, particularly if they're having any difficulty breathing, they know that where they can obtain air is on the surface. **So, the natural reaction, if there is a problem, is to make every effort to gain access to the surface and a plentiful**

air supply.

We know that that didn't happen in this case? •• Yes.

Is that at all curious from a medical perspective? •• Well, that is why I think it very likely that there was a loss of consciousness involved at this stage, but why consciousness was lost I am not able to advise.

If, for whatever reason, at or around the time of separation Tina wasn't able to breathe air because there wasn't any or there was some other problem but achieving air, is that at all significant? •• The first reaction that you would expect any diver to do would be to attempt to use their supplementary air supply, the octopus rig.

Yes? •• I understand there's no evidence that this was done under the circumstances that have been laid out, but that would be the first thing, that people would assume that it was a problem with their regulator and if they know they've got plenty of air they would try to use their alternative air source. If that failed they would then seek an alternative air supply from their diving buddy. That is standard practice, that's what recreational and all divers are taught to do.

If a person is breathing underwater and suddenly there is no air to breathe, how many breaths do they have and what happens from a breathing perspective? •• If the cylinder is simply decreasing in pressure and is nearly out of the air they will usually get some slight increase in resistance to breathing. They'll have to suck harder and that gives them a little bit of warning. If they then start to ascend they will get several extra breaths because the pressure around them will decrease and the relative pressure in the cylinder will continue to give them some air. If they remain at the same depths they will not have much extra air available. If the air supply is simply turned off then there'll be very little air available, only the pressure that's retained in the second stage of the regulator which might be one breath or less.

And from a medical perspective what then happens to a diver in that situation? •• If a diver breathes...and finds there is no air in the regulator they'll - you'd have to speculate but their likely response would be that they're aware they're out of air.

Mmm? •• And they would seek an alternative supply and the most obvious first one would be their octopus rig or their secondary regulator. Failing that their buddy and if that was not available they would reach, as quickly as they could to surface if they were conscious and able to breathe normally.

How long would it take for a person who is out of air to go into unconsciousness? •• It of course is going to vary but you need to recognise that at the pressure we are talking about the nitrogen is under increased pressure that the diver is breathing and so is the oxygen. The diver will have slightly longer in a conscious state without being able to take any breaths at this pressure underwater than they would have on the surface. Certainly be well in excess of one minute. It might be of the order of three minutes or more. On the surface, as you know, many people can hold their breath for two or three minutes and still remain conscious. Underwater because of the increased partial pressure of oxygen from the air breathed in that interval may be increased, and in some people it may be well in excess of three minutes from the last breath that they've taken. It will depend though on whether the individual has just taken a breath and has full lungs, in which case they'll have a reservoir of oxygen in their lungs, or if they have just breathed out and have

tried to take another breath and find no air available to them. In that case they're going to have a smaller reservoir of oxygen in their lungs than if they had just taken a bit breath. So, I cannot tell you exactly how long a person would last. In a conscious state from the time that they were deprived of their air supply but my best guess would be - it would be likely to be the order of at least three minutes.

And does exertion, flailing about, attempting to get the buddy's regulator or.....?.. That was why I suggested a figure of about three minutes because it would be likely to be extended beyond that by the oxygen reservoir but reduced by physical activity which will use up the oxygen more quickly.

Mmm?.. So, I - I give you that figure as - as a guess.....

Mmm?..and if you want a more accurate figure then I think you would need to speak with a respiratory physiologist with diving medical experience.

And I suppose the other difficulty is - as well is that we're postulating about what Tina's lung capacity was, whether she was breathing in, breathing out or can we draw.....?.. The - the lung capacity is not critical in this situation but whether she's just taken a full breath of air and has air in her lungs or whether she's breathed most of her out prior to taking another breath which she can't get will make a difference, yes.

All right. Thank you, Doctor, if you can continue please?.. The last group of issues are the equipment issues. We know the regulator was working well, we believe she had normal fins and no reason why she couldn't use those, the buoyancy compensator, I understand that there was evidence that the hose was not fully attached but you have already indicated that the buoyancy compensator was capable of being inflated both by evidence from the rescuer on the bottom and when the equipment was tested later without the hose being fully tightened up. The scuba cylinder, there's been evidence that there's minor corrosion but nothing adverse in that that would be explicable in terms of this problem. The weight belt I've already talked about, the - the lack of ditching the - the weights. The harness and mask; no problems that I'm aware of there that could have contributed because her mask was still in place. If you lose your mask underwater when you're diving that can induce panic in people who are not experienced divers and haven't been in the water for a while. But her mask, as I understand it, was still in place and therefore not likely to be an issue. Protective suit; she was wearing. Lines; there was no suggesting of any entanglement. Gauges; she had the appropriate gauges and everything was working satisfactorily. She did not have a J-valve, that's a reserve pull which is a - a non issue with modern equipment and there's no question of any problem with a snorkel because all this happened underwater. **So, that leads us to the environmental contributions and the most common one that's identified has been excessive water movement. And has been pointed out I can't speculate what the actual current was at the time of this event but it is likely there was some current and the victim and her buddy may or may not have swum against the current, I don't know the details of what the swims were, but excessive water movement often results in people having to do significant swimming activity which can induce some degree of exhaustion and indeed some degree of anxiety.** And then depth really is not an issue because she wasn't deep enough to create any depth problems, she was not in a cave. Visibility wasn't an issue. Marine animal injury, as far as I'm aware there's no evidence to suggest any problems there. Entry and exit problems were not an issue, it was not a cold environment, no entanglement, no trapment, no problems that I have heard that suggests

the boat could have been responsible in any way and it was not a night dive. So, I've been through all the factors that have been commonly identified in diving deaths and tried to eliminate those that are likely to have been irrelevant in this instance and to draw attention to those that could have played a part in Tina's problem and her ultimate death.

All right, thank you. Now, Doctor, is there anything that I haven't asked you about in relation to cause of death that you would like to raise with the Coroner?●● Your Honour, it may be of some interest to people to have a perception from the victim's point of view of what might have happened. Now, I can only speculate that she was clearly found to be unconscious when she reached the surface and must have lost consciousness at some stage in the time that she was underwater. I have personally experienced a very near drowning incident when I was rescued by my parents as a youth and I can say from my own personal experience that it was not a particularly unpleasant experience. I therefore feel that it's very unlikely that the victim would have had a very unpleasant experience in losing unconsciousness underwater and that her loss of consciousness would have meant that there would have been no more experience of what actually happened to her in the events that were - that transpired thereafter. Also, from my reading of the information provided to me it would appear that all the efforts of retrieving her and resuscitating her were done to best possible practice and I believe that the people involved did everything that they could under the circumstances.

CORONER: Thank you.

MR TATE: So, at least from the perspective of Tina's parents, she passed peacefully?●● It's very likely that that is so. However, what happened prior - in the events prior, I cannot speculate.

No, I think that's probably the●●●●●?●● Prior to losing consciousness.

●●●●●probably a matter for my friends and - to make submissions in due course to his Honour. Now, Doctor, we've nearly finished, I do need to ask you though to comment on the medical evidence you heard yesterday from Dr Scott and the other physician from Townsville in relation to Gabe's ear problems. Can you help us●●●●●?●● I think I can shed a little further light on that.

Thank you very much, could you do so please?●● We first had evidence from a - the general practitioner here in Townsville, Doctor Fitzgerald is it?

CORONER: Gillespie.

MR TATE: Gillespie?●● Dr Gillespie, who I think quite rightly said that when she saw Gabe three days after he'd been diving, she identified what she described as a mild barotrauma in his ears. She didn't give it a grading, she just called it mild. Now, I know we've had discussion about what grades of barotrauma that Gabe might have had, if it had been a true grade 1 barotrauma which is just a - a reddening of the eardrum by stretching in the same way as you can produce reddening in your own skin by pulling on it vigorously, the reddening would disappear in one or two days. I have the fortunate experience of looking at diver's ears day in, day out in the hyperbaric unit, divers in the chamber and sometimes divers from the water and **I can assure you that a grade 1 barotrauma is extremely common in competent divers, including dive instructors and in people who are regular nursing attendants in the hyperbaric unit. And a grade 1 barotrauma will normally resolve in one to two days with no treatment whatever.** A grade 2 barotrauma occurs when a few blood vessels are overstretched in the eardrum, as the

eardrum is distended by pressure, and those ruptured vessels shed small numbers of red cells into the tissues around the damaged blood vessel. They take several days to disappear and we were told that the general practitioner had reviewed the ear first on day three and said it was a mild barotrauma and then I think three days later.....

On the 30th?.....she reviewed him.

So, she first sees him on the 25th and then again reviews him on the 30th, as I recall? Five days later a grade 2 barotrauma would have diminished dramatically but if you had looked very carefully and with an operating microscope you might well have seen some small evidence of bruising in the same way as if you bruise your tissues. A week or so after the event you can still see some colour changes but they're not likely to be the bright red colour change that you would see initially. So, when she reviewed the - the - Gabe's ears I understand that she found the eardrum looked normal. Now, clearly the whole eardrum must have looked apparently normal. She may or may not have missed some minor signs of ruptured blood vessels from the earlier event, but.....

It's interesting.....?.....she - she stated that the eardrum looked normal.

Now, it's interesting because if it was a grade 2, you would expect that to be more prominent when she first reviewed him on the 25th of October? No, a grade 2 barotrauma would have persisted from the original insult. Three days after - on the 25th she would have still seen a grade 2, but a grade 1, a true grade one, should have resolved by that point without further exposure to changes in pressure.

I see. Thank you. If you'd continue? I understand then that when Gabe went to New Zealand and was reviewed in the emergency department by Dr Scott.....

Yes?.....he looked with what is probably a very similar otoscope into Gabe's ear. **Both state they were Welch Allyn instruments. And he looked in the ear, not with an operating microscope, but as you are aware, he stated that he saw evidence of old capillary rupture; in other words, that there - this suggests that there had indeed been a grade 2 barotrauma at some time. Now we cannot speculate exactly how far before that had been, but in his view they were old, and I would agree that that means they are likely to be several days old rather than from the immediate flight to New Zealand. If they were from the flight to New Zealand, they would be bright red. He was taken by ambulance from the airport to the hospital and looked at straightaway and they would not appear to be old. So I think if you accept that his evidence is accurate, he has seen signs of a barotrauma from some days previously; we cannot speculate exactly how many days, but in excess of three days probably.**

And nor can we speculate whether the barotrauma that he saw was the one that was occasioned on the 22nd of October or some other time? That is correct.

Now, is there anything else about reviewing that evidence that you need to tell us about? I can't explain why the evidence at the end of the month here in Townsville suggested that the eardrum looked normal, unless it had indeed recovered and there was a new barotrauma, or some minor changes on the eardrum were in fact missed at that examination.

I'd better then ask you this question: how can a barotrauma occur other than through diving?•• Barotrauma means baro pressure trauma injury, and by its nature it's a change in pressure that causes the - the damage to the particular organ that you're looking at. If it's the eardrum then, as was stated by Dr Scott, a blow to the ear, which can drive air under pressure down the canal and damage the eardrum, is one mechanism. **Going to depth in the ocean is one of the commonest means of developing barotrauma, as is going up in an aircraft and then descending. Usually going up doesn't cause any problems because the air can escape relatively easily from the middle ear space to the back of the throat down the Eustachian tube.** However, it's much more difficult to drive the air from the back of the throat down the Eustachian tube into the middle ear space when the pressure around is increasing and to equalise your ears, most people will do something which is called a Valsalva manoeuvre, that is they will pinch their nose close their mouth and give a blow. By blowing air down those little tubes at the back of the throat, they will inflate some air into the middle ear and bring the eardrums back into a neutral position, and that is much more difficult to do than the air escaping as the pressure around you is actually falling. So it's usually on descent into the ocean in a diver and descent into landing in an aircraft that causes barotrauma rather than on the ascent in either case. A blow to the ear is self explanatory. Those are the common causes of barotrauma to the ear.

And others that might be relevant for the Court to be aware of in this case?•• Going into a hypobaric oxygen chamber•••••

Okay, now•••••?•• Any changes, any dramatic changes in pressure. It's conceivable coming down from a high mountain in someone who's got a completely obstructed Eustachian tube if you go up in a car to the top of a high mountain, if you go to the top of Mount Kosciuszko and then are unable to equalise your ears and drive down to sea level very quickly - it's unlikely you'd be able to do that - but if you could, then going down from a high mountain to sea level could possibly provoke an aural barotrauma.

Now, is a grade 1 or a grade 2 barotrauma consistent with pain in the eardrums sufficient to preclude a diver at 10 or 15 metres from continuing a descent?•• Certainly a grade 1 and a grade 2 barotrauma are almost invariably associated with some pain. Having said that, I've seen many scuba instructors who've got a grade 1 or even a grade 2 barotrauma who were unaware that they had developed that. Any sort of distraction that you have in the water - if you're an instructor looking after customers, their responsibility is first to their customer and secondary to their ears. The amount of pain involved is therefore clearly very variable. Some people might experience significant pain, others might be able to ignore the discomfort associated with the increasing pressure on the eardrum. As to whether someone would be able to proceed, I can simply tell you that there are lots of people who've developed barotrauma in the hypobaric chamber because they've declined to come out. If a nurse has had a minor cold, it's not uncommon for a nurse to go into the chamber and if she has a bit of trouble equalising her ears, to try and ignore it until she gets to a certain depth, and even to just tough it out and wait for it to resolve. Similarly, some of our treatments who really urgently need treatment will develop barotraumas when they are undergoing treatment and will often continue with their treatment despite the barotrauma, knowing that the barotrauma will ultimately resolve without any serious consequence for the patient. So it doesn't - because you have a barotrauma, it does not stop you proceeding, but it would certainly be associated with increased people and most people - increasing pain and most people would recognise it if they got a pain that is an issue for them and

many people would choose to reduce that pain and therefore reduce the pressure rather than continue.

What about the effect of adrenalin? Painting a scenario, which seems to be the situation in this case, where Gabe's buddy is suffering difficulties, one should have thought that there'd be an amount of adrenalin and a wish to help her?•• Indeed.

Is that at all relevant?•• As I said, the perception of the pain will vary enormously under the circumstances and if someone is focusing on a particular issue and if it's a problem under water, they may altogether ignore the pain associated with developing barotrauma in the ear. On the other hand, if they're not distracted by other things, they may focus on that pain and pay particular attention to it and wish to decrease it.

By going back to the surface?•• Indeed.

Would your Honour pardon me? So, in conclusion then, Doctor, in terms of where we stand, am I right in saying that you've really taken the last paragraph of your first report a lot further now as a result of having an opportunity of considering further material and your advice to the Court is that the Court should be considering issues of unconsciousness through panic, anxiety, possibly exhaustion or arrhythmia, even though the possibility from the cardiologist's perspective is that an arrhythmia really is highly unlikely?•• That is so.

In environment, you counsel the Court to consider the current and what impact that may have had, and in terms of other personal factors, the experience of Tina?•• Yes.

And also the response to whatever problem, if indeed there was a problem, under water?•• Yes.

And it would appear then that most of these really are not medical issues, rather they are factual issues?•• My original letter was with the understanding that there was a potential for a recurrence of a heart problem which we knew had existed in the past and that that might well have been responsible for the sequence of events that occurred on the day of Tina's death. However, the further information that we've had from Professor Epstein makes that likelihood considerably less but does not completely eliminate the possibility of a cardiac dysrhythmia in response to a series of stresses, even if she is considered to have a completely normal heart.

And so in that sense, you would amend the final paragraph on page 3 of your report to coincide with the evidence that you've given to his Honour today?•• Indeed I do.

Thank you, your Honour.

CORONER: Before you•••••

MR ZILLMAN: Your Honour•••••

CORONER: Yes, sorry?

MR ZILLMAN: You might have foreshadowed what I was going to raise. A lot of the evidence that has been given by the doctor was evidence of which I wasn't aware and I know he's got a flight to catch.

CORONER: Yes.

MR ZILLMAN: I was wanting to defer my cross-examination to some other time. It will be on the telephone. I need to digest those various publications that have been passed over and a number of the other issues the doctor spoke about.

CORONER: Well, if the Doctor was going to get his plane that - that would be very convenient for us. What about the rest of you gentlemen?

MR WALTERS: Your Honour, I was going to ask the Court, and perhaps my friend would - may support me on this, if it would be possible that we could get a transcript of the doctor's testimony.....

CORONER: Look, I - I - I'm.....

MR WALTERS:seeing it - it's fairly.....

CORONER:happy to order that.

MR WALTERS: Yes.

CORONER: I mean, on the assumption that we are going to go over to another time.....

MR WALTERS: Yes.

CORONER:I'm happy to order that. I have to say there has been some extraordinary problems in getting transcripts.....?..

MR WALTERS: Yes.

CORONER:through the Court systems and I've been party to some numerous e-mails from the Chief Magistrate about delays and - and missing requests and so forth, I'd certainly put in a special request that that be done if - if that would be convenient to everyone and then perhaps, if that's what the parties wish to do, we could defer some or all of the cross-examination and - and perhaps give you leave to - to re-examine, if you want to do some now at this stage. But what - what's your position, Mr Atkinson?

MR ATKINSON: Your Honour, I only raise to say I don't have any questions for the doctor.

CORONER: Fine. That solves that problem. Well, Mr Tate, I - I don't seem to have any problem with a deferral. I mean, it's just a matter of getting a suitable time.

WITNESS: Your Honour, if you really require me to return, I - I can do that. It's just that, unfortunately, I have commitments tomorrow that.....

CORONER: No, no?..can be very difficult to absolve.

No, well, I don't want you to do that but we may be able to get you either to return, which would

be more appropriate, or perhaps, if it's too inconvenient, we could perhaps line up some time where we can video-conference you, which would be a better proposition than by - by telephone, I would think. It seems to me that it's logically - first of all, we've deferred the doctor sufficiently and I don't want to put in jeopardy his aircraft today. So it seems to be logical and particularly with all that additional information, it's wise that we should defer that. The only deferral problem is, if we don't get through - if we do get through next week then we will - we'll only have this cross-examination to go. I - I - I'm pretty sure in my mind it's going to go beyond next week. Is that a fairly common view; do you think?

MR WALTERS: Your Honour, in relation to that transcript, I - I - I am prepared to cross-examine without it but I think it would be of assistance if we did have.....

CORONER: Well, there's no point in ordering it unless we really believe that the matter is going to be deferred beyond next week. That's the inquest.

MR WALTERS: Yes.

CORONER: Are we going.....

MR WALTERS: Look, I believe it will be, your Honour.

CORONER: Right. Is that the general consensus?

MR ZILLMAN: Your Honour, that's my feeling.

CORONER: All right. Well, I'll do that on that basis. So, Doctor, we may be able to invite you to again return to visit some of your colleagues and former associates in time?.. Yes, your Honour.

Or, alternatively, it's more convenient to you, we may be able to line up a time when we could do a video-conference with you?.. Well, if - if it's in the Court's interest that I return and you.....

Which would you.....?.. ..give me.....

Which would.....?.. ..some warning.....

Which would you.....?.. ..I'm - I'm happy to return.

Which would you prefer to do?.. I am retired so I've got limited commitments so I can return if that's the - the wish.....

We - we would be.....?.. ..of Court.

.....looking for some time in January. No, so, have you got any.....?.. I - I understood you to mean next week.

No?.. Unfortunately my - I have a family wedding which I am planning to attend overseas in January.

Is that all of January? When would you propose to be returning or when - when would you - do you have any.....? Well, when I get back.....

.....definite dates of.....? .. various visitors are coming to stay with us in - in Hobart. Following that I'm not clear of visitors until the middle of January.

So, if we - we - if we aim towards an earlier part of January and did it by video-conference that would be - the earlier part of January would be much more.....? Yes.

.....convenient for you. Mmm.

MR ZILLMAN: Well, I'm going on holiday in January down to Tasmania. Perhaps I could do my.....

CORONER: When do.....

MR ZILLMAN:cross-examination.....

CORONER: When do you return?

MR ZILLMAN:down there.

CORONER: When do you return?

MR ZILLMAN: I think it's on or about the 9th of January, your Honour.

WITNESS: Your Honour, if - if it's a video-conference it's - it's not so difficult.

CORONER: Well, we can do that? Unless I'm physically away.

We can do that. You're going to England; aren't you? I will be going to England but.....

We could video-conference from England? The - the wedding that's occurring in late December and January is - is in Melbourne and then the visitors are coming from the UK to visit us in January in Hobart. I'm later going to the UK but that's not until April.

I see. So - oh well, look, would there be some time.....

MR TATE: The last week.

CORONER: The last week in January, would that be.....? Yes.

Okay. Well, if we - we'll tentatively look for the last week in January and we - and don't - there's a diary here.

MR TATE: If your Honour.....

CORONER:here.

MR TATE: ●●●●●would pardon me, I've got my●●●●●

CORONER: I had one here a little while ago. What - you - you want to go to your aircraft. I don't want to hold this up. Before - we will adjourn but before we do so I note that this - can you find that diary first of all.

MR TATE: Your Honour, my understanding of the dates, the last week in January would be Monday, the 28th of January through to Friday, the 1st of February.

CORONER: Well

MR TATE: The week before that, just for the doctor, would be the 21st of January through to the 25th of January.

CORONER: What's the week before that?

MR TATE: The 21st through to the 25th of January.

CORONER: It may be in either of those two week periods, Professor. Would you have any problem with a day when - those periods or which would you prefer?●● I have to say I●●●●●

You don't know?●● ●●●●●your Honour, I didn't bring my diary for what's●●●●●

Okay?●● ●●●●●happening at those times but I'm not aware of any issues that would preclude●●●●●

Well, I●●●●●?●● ●●●●●my attendance then.

I - we'll - we'd aim, subject to everybody else, towards the week commencing the 28th of January?

MR TATE: That might be a holiday, your Honour.

CORONER: Is it? It is. It will be. But●●●●●

MR TATE: Yes.

CORONER: ●●●●●are we going to need a full week in that - anyhow. It'll be that week most probably but we would liaise with you, Professor, and we'll liaise with you sometime next week when we're starting to discuss times. Before the Professor leaves, and he must go, I think it would remiss if I did not raise two - one issue. We have in Court today, Mr Wade Andrew Singleton I see in the back of the Court. You didn't sit through all of Professor's evidence and I should recount to you that he did, in his evidence, make a - a very complimentary comment about your activities and the professionalism in which you carried out the - Tina's retrieval. I will make sure that you get a copy of those comments in due course but they were very complimentary on your professionalism and the manner in which you carried that out. I think that, Professor, you indicated that there would be no other more efficient or proper process. Perhaps you would like to reiterate those words while Mr Singleton is here?●● I simply said that I thought it was a best practice retrieval that would be unlikely to be improved upon.

So, please, take that from us. Thank you, Professor. We - do you want adjourn briefly now because I want to have our - effectively, our mid morning break and then we'll go through till 2 o'clock. So could we resume at quarter to 1, please. Thank you? •• Thank you, your Honour.

THE COURT ADJOURNED

January 2008

DAVID MICHAEL GRIFFITHS, RECALLED AND RESWORN:

MR TATE: Doctor, you, of course, have previously introduced yourself to the Court, but just for the purposes of the transcript, if I could ask you again, please, just to indicate your full name? •• My full name is Dr David Michael Griffiths.

And your address, currently, I think is in Tasmania? •• I live at 9 Toppin Street, Rosebay, Tasmania.

And you've already indicated to us both your qualifications as a medical practitioner as well as your specialist qualifications in what I might describe as hyperbolic or aquatic medicine? •• Correct.

Now, Doctor, there's just a couple of issues that, perhaps, I should raise with you. The first is more a general question that is over to you. Often it's the case that when a witness - a professional witness is giving evidence, a number of things are discussed, and, of course, then subsequently during a period of an adjournment other ideas come to mind or other issues that flow from the questions and the dialogue come to mind. Is there anything that you thought about during the course of the adjournment that you consider, from a medical perspective, his Honour should be made aware of? •• The - there are two issues, if I may, your Honour. One was the issue of someone who is rendered unconscious in the water, or indeed on land, and my answer to the sequence of events that would be likely to occur when someone lost consciousness from whatever cause, is that the individual would stop breathing, become flaccid, and if they're in the water and negatively buoyant, would tend to sink.

Mmm? •• In practice, many people who become unconscious from whatever reason - deprivation of air source, arrhythmia of the heart - any cause of unconsciousness is often associated with irritability of the brain before the brain stops working. And when the brain becomes irritable it fires off neurons which can cause uncoordinated activity, which just looks like an epileptic fit, and it's quite common for people who are rendered unconscious, from a variety of different reasons, to have something like an epileptic fit before they, ultimately, become flaccid and relax, and if they're in the water, a negatively buoyant sink. So in the instance that has been presented to me, it is possible that if the individual, i.e. Tina, had a problem in the water that rendered her unconscious, she may well, as she became unconscious, have had something that looked rather like a fit, and

thrashed and flailed about in the water, which, of course, is possible might have caused displacement if she was in the immediate vicinity of her dive buddy, of his equipment; possibly his mask or other pieces of equipment.

Mmm, now, would you expect that particular scenario to have occurred because of one of the factors that you left, as included as the raft of possibilities on the last occasion; that's badly put. Let me put it to you this way. You'll remember that we spent some time going through the textbooks with you giving an explanation of what potential causes of death could simply be excluded? •• Indeed.

And which ones you considered his Honour needed to give thought to, as the evidence unfolded in the case? •• Yes.

And you'll remember that in terms of unconsciousness you left in panic? •• Indeed.

Anxiety? •• The two are very closely associated, yes.

Possible exhaustion? •• Yes.

And you left in the possibility of arrhythmias, but as I recall it, you were comfortable and happy to defer to the views expressed by the cardiologist? •• Indeed.

Looking at other possibilities, there was the environment? •• Yes.

And, in particular, there I think you reminded us that we had to be mindful about the question of current? •• Yes.

In terms of other possibilities, you also raised the importance of looking at experience? •• Yes.

And response to a problem? •• Indeed.

Now, given the information you've just provided us about a potential for fitting, would we be best to understand that medically from a lack of oxygen, or could that just arise from any of these other possibilities that you left in? •• It could arise from any cause of unconsciousness and that certainly includes any cardiac cause of unconsciousness, any lack of oxygen, for whatever reason, reaching the brain; the circulation becoming obstructed.

All right? •• The air not being able to reach the lungs themselves, or the circulation stopping the lungs having their oxygen extracted from them and passed up to the brain. So any significant dysrhythmia of the heart, any failure of the heart, any failure of the circulation to deliver the blood with oxygen in it, to the brain, or any obstruction to that process, would give rise to unconsciousness and in any one of those events the individual may well have a fit prior to becoming flaccid.

I understand. Would you see that as a likely - now I always pronounce this word badly, soliloquy to panic anxiety or a possible exhaustion? •• There are many instances reported in the diving medical literature of people who have had panic and other issues in the water that have led to a death in the water. Quite how that takes place, it's impossible for people to tease out because, of course, at a post-mortem examination, if there were some dysrhythmia in the heart it would be

impossible to establish that. Well, you can demonstrate at the autopsy - is whether or not there are certain physical features that have occurred, but not anything to do with electrical activity in the heart, so it's not possible to tease out any sort of dysrhythmia that may or may not have occurred. Certainly, if there's an obstruction to the oxygen reaching the brain, in the airway or in the circulation itself, that can be established and it's likely to be made available from an autopsy, but otherwise in many instances where people do die in the water, a number of factors have been shown in instances of accidental death where no other cause of death than drowning is finally determined.

Mmm? •• Now •••••

So I guess there, what you'd be advising his Honour is we really need to look at what the eye witnesses and the other witnesses can tell us about the environmental facts and what was happening? •• As much information as is possible should be provided to determine the actual cause of the problem; yes.

Yes. Thank you. Now, Doctor, the only other point that I wanted to raise with you, you'll remember that I asked you about this particular chart, which is from Sergeant Campbell's Powerpoint presentation, almost an opening, really, and I'll just read it so it's in the transcript, "(6) Incident Investigation and Analysis continued." And you'll recall there, that is a graph of the various measurements taken from Gabe's dive computer, Tina's dive computer and Mr Singleton's dive computer? •• Yes.

Mr Singleton being the person who brought Tina to the surface? •• I recollect the diagram.

Yes. Now, subsequently, Doctor, it'll come as no surprise that we spent a lot of time learning about the intricacies of dive computers from a number of witnesses. Doing the best I can, it seems that where we ended up was that the dive computers would take a reading every three metres of different depth? •• I recommended to the police when examining the computer, that information was derived from the manufacturers and, perhaps, more information could be provided by them than was printed out in the standard information derived from the computer printout. As you say, it appears to be three metrely in the standard printout.

Mmm? •• But whether the computer manufacturers are able to provide more detail in the actual dive profile than that, I'm unaware.

I can tell you that inquiries have been made, Doctor, and they can't. What we've got is what we've got. We don't get any better. The only reason I'm drawing your attention to this is to make sure that you weren't, in any way, under a misapprehension when you were giving evidence on the last occasion, rather than those lines being exact lines, perhaps, we, perhaps, would be better to understand them as envelopes with a potential differential of three metres? •• I appreciate that there can be some movement in between the recordings and the recordings themselves may not be absolutely precise, but they will give, overall, a reasonable estimation of the timing and the depths that the individuals will be exposed to during the course of a dive.

Would I be right then in assuming that there is nothing that you would add or change to your previous evidence given that we are now looking at, or better understanding these depths as an envelope rather than a linear exact line? •• I have no wish to change my statements.

Doctor, thank you. Thank you, your Honour.

CORONER: Mr Atkinson?

MR ATKINSON: Nothing, your Honour.

CORONER: Mr Walters?

MR WALTERS: Doctor, you had the advantage, didn't you, of listening to Mr Watson's account on the tapes this morning? •• No, I did not. I was asked to leave the Court.

Oh, okay. I apologise. I thought you may have had the advantage of doing that. Doctor, the - as to what was the cause of a fit, if it did occur, it's impossible to say at this point in time? •• I'm certainly not able to help the Court in that regard.

Okay. There may be a cause or more than one cause? •• I would

say that in accidental diving deaths, the causes are usually multi-factorial. They're not a single issue.

Yes? •• If, as you have suggested, there is a deliberate intervention that has caused problems, then, of course, a single event could give rise to the outcome that we all know happened.

Thank you? •• But under accidental circumstances, it is typical that there are more than one cause and they often become additive.

Thank you, Doctor. I have nothing further.

CORONER: Mr Zillman?

MR ZILLMAN: Just on that last issue, Doctor, when you talk about causes in that sense, could I suggest, perhaps, that they might also be described as factors? •• Indeed.

Because inexperience of a diver isn't necessarily a cause in itself, but undoubtedly, is a factor? •• You're quite right.

And in perhaps the same way a diver lacking confidence by reasonably inexperience again can be a factor; correct? •• Yes, perhaps I should have said potential causes as opposed to causes.

Okay. Overweighting can be, again, a factor? •• Well recognised, yes.

And on we go. Then there can be, if you like, a precipitating cause in itself which will lead to further events; correct? •• It's often a sequence of events, you're quite right.

It might be a person panicking? •• Yes.

And then that would have certain consequences or it may not, but consequences may flow from the panic? •• Yes.

If a diver were trapped under water, again there may be consequences that flow from that which ultimately may lead to the divers demise? •• Yes.

All right, well I want to ask you some questions then on this issue of the panic of divers. That seems to be a fairly well recognised factor in many of the deaths that have been associated with diving; is that correct? •• Yes, it is.

All right. And she said panic and anxiety are basically brothers? •• The big factors with these two factors is that unless there is a witness to the event it can be very hard to put the evidence together after the event has taken place.

Okay, all right. Now just on that last topic, anxiety and panic essentially go hand and - well, is that right? •• Panic can follow anxiety, particularly if there isn't reassurance or assistance from an appropriate or other people in the water, yes.

And I suppose it can be reversed, the other could follow the other? •• Yes.

All right. I just want to ask you some questions and ask you to comment and see if you accept these propositions. That anxiety will increase the divers to - bear with me in my pronunciations here - catacolenes is that the way it's pronounced, the word? •• The adrenalin like substances, yes, catacolenes.

Yes. It will change the drivers respiratory pattern? •• It may well.

And hence arterial carbon dioxide and buoyancy? •• The arterial carbon dioxide may tend to fall.

Right? •• Buoyancy may not be effected significantly if the individual is continuing to breath.

Right. It can cause perceptual narrowing and disorientation? •• Anxiety or panic.

Anxiety? •• Anxiety as it's reaching it's limits and becoming panicked, can certainly do so.

Okay, all right. And it can decrease cognitive function? •• It can, yes, produce narrowing of the issues the individual can work with at the same time, yes.

All right. Furthermore, sympathetic stimulation may cause cardiac dyspnea or arrhythmia? •• Yes.

And I think we've already touched on this, arrhythmia is something that really is incapable of doing clinically seen at post-mortem? •• Correct.

Anxiety, I think you've already told me this already, but anxiety [indistinct]? •• Yes.

Now a fair definition of panic is that of behaving in an irrational manner; fair to say? •• Yes.

Or having a lack of logical response to a sea of stimulus?•• Yes.

Or as being unable to perform in a rational manner?•• Yes.

Panic is associated with high levels of arousal and decreased level of cognitive performance?•• Yes.

Which leads to an inability to function or otherwise cope with a potentially hazardous situation?•• Which certainly is likely to result in that outcome.

Okay. Increased inappropriate activity leads to fatigue and exhaustion?•• It may well.

Which will further increase the divers ability to cope?•• Yes.

If those features are not corrected or probably addressed, whether it be by rescue or otherwise, drowning may be expected?•• Yes.

Now panic isn't restricted also to novas divers is it?•• No.

In fact in the literature a very high proportion of divers who have drowned is in fact to be found in those who are described or even very experienced divers?•• Both inexperienced and experienced divers do die in the water, yes.

All right, I think in the publication that you referred us to the on last occasion, the figures were in the 30 per cent area in terms of very experienced divers drowned?•• Yes.

Okay. There's a medical term, again correct me if I'm wrong here, is it hypercapnia?•• Hyper or hypo?

Hypo?•• Hypo.

Well hypocapnia, that describes panic, anxiety and apprehension; is that correct?•• It doesn't of itself. Hypocapnia is something that many people voluntary do before they make a dive on a snorkel into the water, so voluntary hypocapnia is something that you or I can easily do.

Okay. Well I probably left out an adjective there, acute hypocapnia?•• I - my response is the same.

Right?•• You and I can choose to acutely reduce our CO2 levels by over breathing.

All right?•• But in an anxiety attack, if you're not exercising, and I repeat, not exercising, then if you're thrashing about and still breathing out, you may not in fact achieve anything like the hypocapnia that you would achieve if you were remaining still and over breathing.

All right. Well whichever form it be in, acute hypocapnia or the pre-cerebral blood flow?•• If it's very marked, yes.

And the in turns [indistinct] the divers behaviour and cognitive function?•• It - it could do but I repeat that in an exercising diver.

Yes?●● The likelihood of achieving the levels of hypocapnia that would produce those sort of cerebral effects would be unlikely.

Right. Hypercapnia now. That is say an increase in the worker breathing, hard work or strenuous exercise?●● No, hypercapnia indicates the retention of carbon dioxide and it may be caused by holding your breath deliberately.

Mmm-hmm?●● Ah, it may be caused if you have difficulty breathing for some reason and are not getting adequate gas exchange in your lungs, so the carbon dioxide building up in the body is not released from the body. The hypocapnia per say does not say anything about the difficulties or otherwise eventually breathing.

All right. But it can lead to a problem in that sense can it not?●● Hypocapnia can lead to people becoming anxious and panicking because the feeling of really needing to breath, if you aren't able to breath adequately can certainly produce anxiety and panic.

Right. Which in turn - I think you've already told Mr Tate here - can in turn lead to loss in conscious?●● Yes.

All right. Now that's something that medically cannot be excluded in this case; is that fair to say?●● I think that it would be very unlikely that hypocapnia played any part in this. Hypercapnia, on the other hand, is a possibility but you would have to have some postulate that the individual was either not breathing or obstructed in their breathing or, for some reason, unable to breathe. If they have a full air cylinder and they have a functional breathing apparatus with a mouthpiece in the individual's mouth, if your carbon dioxide level rises it stimulates your respiratory centre and your natural response is, if you possibly can, to take as many breaths as possible as soon as you can.

I'm just wanting to confirm this so we're going down the same path, because Mr Tate put to you some issues that couldn't be excluded, as I understand your evidence to be, one was arrhythmia?●● Yes.

Two was this issue of panic?●● Yes.

Now, in that sense, as I understood your evidence, you were agreeing with Mr Tate here that panic can ultimately lead to unconsciousness and therefore drowning?●● Indeed.

Now, in terms of the mechanism of that, is it, as we've just been discovering - discussing rather, by a reference to hypercapnia or some other means?●● Well I believe that hypercapnia may play some part in it but, generally, it's a lack of oxygen rather than the excess of carbon dioxide. But the combination of the two, of course, would be slightly worse than either one alone.

Okay. Well, arrhythmias, by the way, as I understand it, can be brought about by strenuous exertion or exercise; is that correct?●● That's generally only the case in people who have ischemic heart disease. It can occur in people who don't have any ischemic heart disease but it's well known to occur in people with ischemic heart disease.

Okay. And it may occur by reason of some particular defect, as I had previously occurred at least we've heard in Tina, prior to the ablation procedure being undertaken? •• If the individual has an existing heart disease such as cardiomyopathy, then exercise may bring on arrhythmias, yes.

Right. But it could also be brought about, as with her, by some medical malfunction, as it were? •• Yes.

Independent of all of that, and I think you were directed to the evidence in the case concerning the ablation procedure that had been carried out sometime prior to this event? •• Yes.

All right. Well now I want to pass to another issue, and I don't know that this has been addressed or not by you but vomiting to whatever extent, again may lead to a fatal outcome? •• There are many people who do vomit underwater and don't get into trouble but they're usually fairly experienced divers and are able to remove their mouthpiece, vomit, replace the mouthpiece and continue breathing. In someone who is relatively inexperienced and not thought this particular scenario through, if they vomit into the regulator it may cause the regulator to malfunction when they try and breathe having vomited, and it may make it difficult or impossible to obtain air from the regulator. If that were the case, the regulator, when it was assessed later, would be found still to have vomitus affecting its function.

All right. Well do we know that that was done here, whether that exercise was conducted? •• Well, as I understand it, the equipment was carefully assessed and determined to be in good functional order and no foreign bodies were identified as causing any potential problems.

Well, ultimately, I suppose, that becomes an exercise for his Honour to assess the weight of the evidence as to those issues, but with your rider in mind, vomiting into the mouthpiece can cause the obstruction, cause a deprivation of oxygen and lead to, essentially, an [indistinct] insult to the brain? •• Such a scenario has occurred in the past and, yes, it has resulted in deaths.

All right. Now, beyond that, there is something in the literature described as a laryngospasm, is that correct? •• Laryngospasm is the closure of the vocal chords when they're irritated by something, maybe fluids or sputum or vomitus, yes.

Okay. And was that essentially a defence mechanism of the body? •• Yes. The chords close to try and avoid the foreign material entering the lungs.

All right. Now, in that event it would obviously follow that there is a starvation of air to the lungs? •• Initially yes. As the individual becomes unconscious the vocal chords will tend to open and the respiratory centre will then usually make the individual start breathing again if they have the ability to breathe i.e. if they're in an air-filled environment or they have equipment that will allow them to breathe.

Right. Well let's just explore that for a little bit because, again, in the case of a diver and particular in the case of Tina, if there had been some obstruction of the kind that we've spoken about, and that can be simply from a reflex of the oesophagus or other sputum, I think you said, or other foreign matter into the airway; is that right? •• Yes.

That may lead to unconsciousness and the person may simply - particularly with weights on

would sink; fair to say? •• Yes. They may or may not when they become unconscious through lack of oxygen as I described before have something like - rather like a fit and then they would be inclined to sink. They may or may not attempt to breathe at that late point.

I understand. But now with unconsciousness, is it fair to say that the muscle tone of the body will relax? •• The voluntary muscles in the body will relax but the involuntary muscles may or may not continue, such as the intercostal muscles, the diaphragm that continue breathing and, of course, the heart muscles which are specialised muscles will normally attempt to continue operating.

But there are - to that extent voluntary muscles associated with the [indistinct] the regulator in place? •• The voluntary muscles may relax and it is quite conceivable that the regulator could fall out of the mouth, yes.

Or, if they are lying in a position [indistinct] fall out of the mouth but be loosened sufficiently for water to be aspirated? •• Water could conceivably come in beside the regulator, yes.

All right. Well, the evidence we've heard here, and there doesn't seem to be any issue about it, is that the regulator was in place when Wade Singleton saw Tina on the bottom of the ocean floor? •• From his written evidence, I believe that, yes.

There was fluid in the lines on examination at the post-mortem; are you aware of that? •• Yes.

Some of it - well I don't know if there was identification of it but it may have been fluid of certain kinds including seawater? •• Indeed.

Just going back - I'll come back to those issues I'm on now. I just want to go off on a side issue, if I can describe it in that way for the moment. We've heard some talk about dry and wet drownings in the case; a wet drowning, I gather, is simply no more than an aspiration of seawater or water rather? •• Yes.

What's a dry drowning? •• Well, a dry drowning is the situation you described earlier where there's an laryngeal spasm and the vocal chords are closed when the individual is under water.

Right? •• Such that the water in the environment doesn't enter the lungs and the individual, typically, will, in fact, have their chords relax at the end. But if there's no water in the back of the throat then you may not find any water within the lungs.

Right. Well, it's really an asphyxiation, that is air not being admitted to the lung? •• Yes, lack of air exchange.

Okay. And the mechanism as being essentially no different to an asphyxiation on land? •• As you mentioned earlier lack of oxygen and increase in carbon dioxide.

All right. Well now, going back to where we were, there can be no way to exclude, in this case for example, an laryngeal spasm of the kind I've described to you leading to unconsciousness, Tina's sinking to the sea bed. There the muscles of the mouth and jaw relaxing and the inhalation then of sea water? •• Yes, if you're postulating the situation whereby she'd developed a laryngeal spasm as the start of the whole problem then you'd have to find some reason why there was foreign material on her chords. As you said it could be as simple as she coughed up some

sputum but I'm not aware that she had any problems with a cough before she went diving. It could be that she had, for whatever reason, got salt water beside her regulator, but again we've been told that the regulator has been checked and didn't have any leakiness about it so it's unlikely that any salt water was coming in through the regulator. It could be that she had regurgitated from her stomach some material which had got on to the vocal chords but I'm not aware of any history suggesting that she had a problem with significant refluxes from her oesophagus. So all those things are possible but there's no evidence, as I understand it, that makes them likely.

Well, I'm not suggesting it's likely as it were more probable than not? •• It's possible.

And I'm wanting to deal in real possibilities here. You understand I'm not talking about something that is so far fetched as can be discounted by the odds. In the toxicology report after the post-mortem one of the drugs detected in her system was Diphenhydramine, is that the way to pronounce it? •• Yes.

Now that's a preparation that may be taken for various reasons, is that right? •• Yes, it's most commonly taken as a prevention of seasickness.

That's the one I was interested in. So it's either fair to conclude either of two things in that event. One that Tina had a propensity to get ill when travelling on the water or that she was apprehensive that she might do so? •• Yes.

Now, I think the •••••

CORONER: Doctor, would you like to see the certificate? It's just talks about percentages and volumes and things. That's the •••••? •• Thank you, your Honour.

MR ZILLMAN: You must be reading my mind, your Honour, because I was looking for it to give it to him. So can you tell us the percentage of the drug that was found? •• The percentage stated in this document is Diphenhydramine 0.1 milligrams per kilogram.

Now, given the post-mortem - what date was the post-mortem? The 23rd? •• The date of this document?

CORONER: The 23rd of - the autopsy, do you want to have a look at that? •• The toxicology laboratory 14.9.04.

Twelve p.m. on the 23rd of October.

MR ZILLMAN: I'm told it was 4 p.m. on the 23rd of October. I'll show it to the doctor. So that's when the blood would have been taken for analysis, I assume. Twelve noon on the 23rd, so that's when the blood would have been taken for analysis. Can we work back from that, I don't know if you have these calculations or not to be able to tell us at the time that Tina went diving how much or how many tablets or how many milligrams of the tablets she would have been taking? •• I can't answer your question. I'm not a forensic toxicologist. I can't tell you what the blood levels would be even with a normal dose and I can't tell you what the deterioration or otherwise of the drug in the body would be with the passage of time.

Okay. Well, could I ask you this in its stead then. Is this drug foolproof in its effects or not? In other words can you still get seasick if you've taken one of these tablets or not?•• There is no drug that gives you an absolute guarantee of prevention of seasickness.

All right.

CORONER: They'd make a fortune, Mr Zillman, if there was.

MR ZILLMAN: Yes, your Honour.

CORONER: My wife would have buckets of it.

MR ZILLMAN: All right. Well, you can get unwell and regurgitate something for all manner of reason not just because you're seasick, a fair comment?•• People are subject to regurgitation it can happen at any time, yes.

In fact, you can not even be unwell and simply bring up some small amount of matter?•• Yes, but normally it won't get access directly to your vocal chords otherwise all of us if we burped would have a laryngeal spasm.

All right. But it can do, it can?•• It could do.

All right. And another way is not coming up from the body but coming in such as seawater, I think, as you said?•• Yes.

Now that might occur obviously if there's a fault in the regulator or other equipment?•• Yes.

But it might also occur if the thing is simply uncomfortable someone tries to readjust it?•• It could certainly happen but most people will obviously not admit water to the back of their throat when they deliberately take their regulator out of their mouth. If it's knocked out of their mouth unexpectedly then I can see that it may well be possible for water to gain access to the back of the throat.

And it doesn't have to be knocked all the way out, it can just be dislodge partially and water, at that moment, can be aspirated?•• It would be likely to get in the mouth but not necessarily to be aspirated. Each and every one of us have had water in the back of the mouth and we don't normally aspirate it or get it on our vocal chords.

Right. But again, not all - what happens on top of the surface, as it were, can be said to be the same as below the surface?•• There may be subtle differences, yes.

But I'm particularly interested in say where a diver is inexperienced and they are liable to be doing things that a more experienced person is not going to be doing?•• They may, yes.

All right. Okay. Oh, yes, just on the tablet itself, it comes in tablet form, I take it, does it?•• It's available in tablet form. For children it's available, I believe, as a syrup.

All right. Diphenhydramine, that's it?•• Diphenhydramine.

Yes. Now like, I suppose, all drugs though there can be side effects?●● Yes.

And do you know that some of the side effects may be of agitation?●● Rarely, yes.

Confusion?●● Rarely, very rare, yes.

Right. Dizziness?●● Yes.

Drowsiness?●● Yes.

Fatigue?●● Yes.

Disturbed coordination?●● Potentially, yes.

Irritability?●● Potentially, yes.

And blurred vision?●● Yes.

Now, a force - I think you put the rider of "rarely" on the two of them, that's agitation and confusion?●● Correct.

The rest not so?●● The questions that you asked me that I said "yes" to are well recognised responses. If the others were common, the drug would not be available to the public without a prescription.

No, I'm not suggesting they're common, but that they're not so uncommon as can be discounted?●● They're in the manufacturer's literature, yes.

That's right. And they are there because scientifically, as it were, or medically, they are demonstrated to be possible side effects?●● Yes.

Now, someone suffering from any one of those or combination of those issues that I've just been taking you through, may be more susceptible to anxiety?●● Yes.

Than someone not suffering those conditions?●● Unless they're sedated, in which case they might be less likely to be suffering from anxiety.

Well, put aside the sedation. Someone suffering any one or more of those side effects that I've just detailed, may well become anxious?●● May become anxious, but one would expect that the effect on the individual might be evident to others.

Right. Having become anxious they may branch to panic?●● Yes.

Do we know how long it takes after the ingestion of the drug, for any possible side effect to manifest itself?●● It will obviously be variable, depending upon whether the drug is taken on an empty stomach or whether it's been taken just after a meal, and it will vary with the blood supply to the stomach and a whole host of other factors. But it will typically take at least many minutes before the effect is seen. The past event possibly negative effects of the medication. So you'd

expect them to be evident by - perhaps something of the order of an hour.

Right. Well, there's really no way of telling here, one way or the other, of course, when the drug was ingested, was there?•• I have no means of determining that.

And if there's no means of telling when it was ingested, there's really no means of telling when, if there were a side effect, it might have manifested itself?•• There's no means of determining either of the above, but if there were significant side effects that were produced by the drug, one would have expected, as I say, that if it had been taken some time before the dive, those would have been evident before the dive even began. If it had been taken at the last moment simply before going in the water, which I suppose is possible, then you would expect to have a very small quantity of the actual drug in the bloodstream of the individual.

Yes, but if it takes perhaps an hour•••••?•• Mmm.

•••••for any side effect maybe, to manifest itself, the point is this; it may not have been observable before the dive commenced. It might have been only after the dive commenced that the side effect became an issue?•• The effect and the side effects, yes.

So we can't simply discount the drug in that way, of having any effect at all, by reason that someone didn't observe it prior to the dive. That's the point I'm interested in?•• It is possible that as I said before, it's one of - merit - many factors that was involved in the scenario developing.

Okay. Now, your evidence has been that the gas that was evident in the body on post mortem examination, was the result of gassing?•• Of attempted resuscitation on the one hand and off-gassing from the tissues on the other.

Okay. Well, now, in terms of the tissues, that's the second aspect of it, that comes about by reason of the element nitrogen, being saturated into the body and then not being released in the ordinary way, is that right?•• In an air-breathing diver, yes.

The levels of nitrogen saturation are going to increase the longer the diver is underwater, is that•••••?•• The longer and the deeper.

The longer and the deeper. Now, Wade Singleton, you've heard in this case, was in the water at the time of the relevant events. He noticed Tina on the bottom. He swam down to her and then brought her up quickly?•• Yes.

Now, Wade Singleton didn't suffer any nitrogen related problems on the way up, you know that to be the case?•• Yes.

And would you put that down - well, you know his was a fairly rapid ascent?•• Yes.

Could you put that down to the fact that he apparently hadn't been underwater very long at all?•• No.

No? What do you put that down to?•• The fact that he had a mouth piece regulator in his mouth and was breathing and the fact that he had a continuing circulation which could wash the nitrogen

from his tissues back to his lungs and then breath the nitrogen gas from his lungs to the environment.

Well, had he been down there longer, though, he would have been susceptible to the bends, by reason of not stopping at the various levels on the way up, wouldn't he?•• He might have been at risk of the bends, but it would not have been a life threatening event in - certainly in the sort of dive profile that we have been talking about. Even if he'd stayed considerably longer or gone somewhat deeper.

Well, I wasn't suggesting it was life threatening, I just wanted to know the mechanism as to why he wouldn't have got it. As I understood it was - and I might be wrong on this, but I think it was even his evidence - I know he's not a doctor, but by reason that he wasn't down there very long, it was his assessment of things that not much nitrogen would have been absorbed into the tissues to give the problem?•• You have to appreciate that there are what is called "fast tissues" and "slow tissues" in each and every one of us. And by that I mean that when you descend to any significant depth, the fast tissues, those that have a very good blood supply, including the brain, the heart, the kidneys, will receive a lot of nitrogen gas under pressure, very early, and will absorb that, because they've got a very good blood supply. And those tissues will tend to fill up with nitrogen very quickly. But the converse of that is that when you ascend in the water because they have a good blood supply, the nitrogen very quickly moves from those tissues with their good supply, into the blood supply, and that takes it to the lungs where it's harmlessly breathed off.

Mmm?•• There are also slower tissues in the body and there are tissues like bone, cartilage, fat, which has a relatively poor blood supply and takes a long time to saturate with nitrogen. You have to go to a considerable depth for a long time to saturate with nitrogen. You have to go to a considerable depth for a long time to saturate those tissues. But those tissues similarly give up their nitrogen very slowly, despite the fact that you might come up relatively slowly, they may give rise to problems later. Because they can store a significant amount of nitrogen, particularly the fat, if you've been down for any great length of time.

Mmm-hmm?•• The intermediate tissues like the muscles, are somewhere between those two and it will depend upon the activity of the muscles and the integrity of the circulation and the breathing system, as to whether or not those gases or harmlessly released from the body.

All right. Are you aware that the amount of gas found in Tina's body on examination, was described as very significant. That is a great deal of it•••••?•• I am not surprised.

No, I said were you aware of it?•• Oh, yes.

Now, can we - or can you give us any assistance at all in apportioning what may have been due to the retention of nitrogen in the tissues as a result of the dive, and what may have been due to resuscitation attempts?•• **I would like to be able to do that, but unfortunately, there is one factor that makes it difficult to apportion the responsibility and that is we do not know when Tina's circulation ceased. If her circulation ceased whilst she was, in fact, in the water and she had no circulation at the time that she was retrieved, then the majority of the gas in her blood vessels would be likely to have come from her tissues. You will remember I talked about the faster tissues and the intermediate tissues - the muscles, the heart, the brain - those organs - the kidneys will hold something like an extra litre of nitrogen in someone who is breathing in the water at less than - well, certainly, at 18**

metres of sea water pressure, those tissues will be almost saturated with nitrogen and over a litre of extra nitrogen will be held in those tissues, which if it cannot be released through the circulation and through breathing, will, ultimately, a lot of it, escape from those tissues into the circulation. It's the easiest way that the tissues can unload themselves into the circulation.

All right. Just bear with me a moment. I think you were shown Dr Williams - or maybe it was the other way around - did you see his post-mortem report?•• Yes, I did.

It's just been pointed to me by counsel assisting here, that in his report, he formed the opinion that Tina did have a circulation when she was rescued by reason of the gas embolism. Does that help you?•• There is discrepancy there in regards to the beliefs of the pathologist and myself in regard to the off-gassing issue, and he was not aware - as are many of the medical profession, that that is a significant problem. He was also aware that the resuscitation team had made a number of injections and that during the course of administering the injections in an emergency, some air may have been administered into the circulation of the individual, but, again, it's speculation as to how much and what the proportions were.

I might have misheard you, but it was the case that Dr Williams was aware of the resuscitation attempts; is that what you're saying?•• Oh, he was well aware of the resuscitation attempts, but he was not aware that there was a regular issue with off-gassing from the tissues of divers.

But he was aware that the resuscitation attempts may spread gas?•• Yes.

All right. Is there any way that you may exclude or accept if you like, the notion or the proposition that Tina suffered a pulmonary embolism on the rapid ascent; she, at that time, having still air in the lungs?•• It is conceivable that that was the terminal event•••••

Oh, yes, I wasn't•••••?•• •••••but that was certainly not the start of the problem.

I'm not suggesting that for a second, but you don't have any difficulty with that proposition?•• If she was brought to the surface with air in her lungs and was not able to breathe out because her cords were in spasm, then it is conceivable that she could sustain both lungs with loss of gas from the lungs into the tissues and/or the blood vessels, yes.

There was some evidence of pneumothorax here, wasn't there?•• There was talk of that, but as I say, there were various injections that had taken place which may have given rise to that. There was an attempt made to needle the chest to ensure that there wasn't, in fact, a pneumothorax causing difficulty with the individual as part of the resuscitation attempt, and that effort in its own, may have introduced some air into the sac around the lung.

Well, the bottom line of that, I conclude from what you tell me, is that you can't say one way or the other, the cause of it?•• The cause of?

The pneumothorax? Whether it be through resuscitation attempts or through rapid ascent?•• Yes.

Right. Just another issue again. There was no biochemistry, as we've heard, of Tina's blood; you're aware of that? •• You mean in terms of looking at things like blood sugars?

Yes? •• I certainly haven't seen any.

Well, hypo or hyperglycaemia is something that may cause someone to lose consciousness? •• Yes, hypoglycaemia is the one that's likely to do that at relatively short notice and without much warning. On the other hand, hyperglycaemia is usually well preceded by lots of symptoms and comes on very slowly.

Can we exclude that - I don't say hyper - hypo, can we •••••? •• Unless someone gave her an injection of insulin, it's almost impossible that she became acutely hypoglycaemic if she's never had any history of such a problem in the past.

All right. So, the short response is assuming she didn't get a shot of insulin, the certainty of it is that one has to have a history of those problems before one may suspect hypoglycaemia? •• Indeed.

All right. Hearing what you say, and accepting what you say, of course, nonetheless, the examinations - post-mortem - in themselves, can't exclude it? •• It can't exclude hyper or hypoglycaemia if no studies were done.

I know what you're said otherwise, so I'm not taking you to task there. I'm just unsure of your evidence that you gave on the last occasion, so perhaps you can remind me. Can you get barotrauma by decent as well ascent? •• Barotrauma decent is restricted to someone who doesn't have access to the ability to breathe on the way down.

Mmm? •• What is more, it is almost impossible in the sort of depths that we're talking about here. The free divers that you may read about in the papers occasionally are diving now to ridiculous depths without developing lung squeeze, as it's called, which is the barotrauma of decent.

Mmm. Right? •• And, in fact, it was thought originally that if you went below about 30 metres in the ocean with a single breath on the surface, your lungs would collapse and you would start to get problems. But in practice, blood moves into the lungs and supports the lungs and people have dived to well in excess of that depth without getting any problems. So, the only way you would get a barotrauma of decent, would be if you have no access to air and you go to a depth of - a ridiculous depth.

Mmm? •• Barotrauma of ascent, of course, is a different matter.

That's right. Just as a matter of interest, what do these divers go to now - I mean, when you describe it as ridiculous? •• Oh, 200 metres.

Free diving, you say? •• Yeah, well, with a sled to help them down and a balloon to pull them back up. They don't swim.

I've just been reminded by a couple of things by my solicitor. There was some questions I asked you concerning the drug that I can never pronounce. The[indistinct]? •• **Diphenhydramine?**

Yes. I'm told it's also something that may be taken for congestion; is that so?•• You mean as an upper-airway decongestant?

Decongestant, yes?•• It's often part of a mixed preparation of decongestant medication, yes.

All right. And in the toxicology report that you've probably still got there, I think there was some paracetamol?•• There was a low dose of paracetamol - less than 20 milligrams per kilogram. Again, I can't comment on the actual values, but the fact that they say less than 20 milligrams suggest that they don't consider it significant.

No, no, I'm not suggesting it in itself is significant, but it's used for what, any number of things, of course, isn't it, paracetamol?•• Yes.

But ibuprofen, well, similarly so, it can be used for various problems?•• Not generally in association with a drug like Diphenhydramine, but it's usually used as an analgesic or an anti-inflammatory.

All right. Is this fair to say or not: That someone with those three drugs would've at the relevant time been suffering from some ailment or complaints?•• The anti- seasickness remedy may have been purely taken prophylactically.

Yes?•• So I can't comment on that.

No?•• I have to assume that the paracetamol and the ibuprofen were taken for any one of a range of things from possibly period pains to headache.

Well that'd be therapeutic as against the prophylactic nature?•• I presume so.

All right, okay. On the issue of drowning, were you aware that - I think you sat in on Dr Williams' evidence, didn't you?•• Yes, I did.

Well you would've heard it but I don't know if you'd remember it. Do you remember he gave some evidence that the lungs didn't show evidence of drowning macroscopically, but some lung sections showed it microscopically?•• Yes.

What's the significance of that to you?•• It suggests that she didn't breathe in terminally large volumes of water into her lungs. She may have had a small amount of water enter her lungs or indeed the water that got into her lungs may not have occurred during the time that she was in the water. It may have occurred during the resuscitation attempts when many people who are under great stress in the water will swallow any water that gets into their mouth. She may have regurgitated during the resuscitation process and some of that may have gained access to her lungs.

All right. The fact that that was so then, that it was not evident [indistinct], perhaps clinically then increases - and I know it's not your opinion - but increases the prospect that she suffered [indistinct] in the course of the rescue attempt?•• I'm not sure where you're alluding the cerebral arterial gas embolism and the water in the lungs.

Well to this extent, that the cause of death by drowning, which is what you favour, as I understand it; is that correct?•• Well that's the final cause, not the precipitating factor.

All right. And I don't know that anyone suggests it's the - it's not the precipitating factor, but if there was evidence in the macroscopic sense of drowning, would it not tend to confirm the opinion that it was drowning which was the cause of death?•• If she had lungs full of water, then clearly that would've been the terminal event, yes.

There can be an analysis of the fluid done, quite obviously, can't there?•• Yes.

And that will perhaps then determine the issue one way or another by reason of identification of the levels of magnesium in the fluid?•• The diatoms can also be looked at if it's a saltwater aspiration.

That's right. Because there's going to be a large amount of magnesium or diatoms present on analysis in the event of a saltwater drowning?•• Yes.

Was there such an analysis done?•• Well I don't think there was much water found in the lungs to actually drain off and subject to analysis.

Well how much do need, as it were? Was there sufficient or you don't know?•• I - I can't answer that. You'll have to ask the pathologist, I'm afraid.

I've got nothing else, thank you.

CORONER: Any re-examination?

MR TATE: Thank you, your Honour.

MR TATE: Doctor, just so that we're clear on things. As you know, when Tina came to the surface, she was worked on by two physicians that just by chance happened to be on one or both of the boats?•• Yes.

The first was a Dr Downing and the second was a Dr Stutz. I understand that he is an emergency physician, so he's a specialist in emergency medicine. But at this point in time we haven't heard evidence so I don't know what his qualifications are?•• Mmm-hmm.

In terms of the raft of questions my friend has been asking you, would it be fair to say that we would get the best information from Dr Downing and Dr Stutz, particularly Dr Stutz as emergency medicine is his field?•• I am not quite clear as to the purpose of your question. Is it to find out whether the resuscitation effort was made to the best possible standards?

No, no, I'll have another go at it, Doctor. It's just that I'm sitting now a little bit confused. If we were going to try and, for example, unravel whether there was any seasickness here in the sense that various propositions have been put to you - for example, was there vomit - I take it the observations of Dr Downing and Dr Stutz when Tina was brought to the surface would be very helpful in ascertaining exactly what was found for Tina?•• The difficulty with that proposition is that if Tina had vomited at some stage under water and had not in fact fouled the regulator, the

evidence of that vomitus might not be evident on her person. And during the resuscitation attempts, although they would obviously look in her mouth looking for foreign material, if there was no obvious material there, their examination may not exclude the possibility that a small amount of material had, at some stage, been vomited. I mean I don't consider that it's very likely that that had occurred.

Mmm?•• But their examination wouldn't necessarily automatically determine that it had indeed occurred. They might well find if they looked inside her mouth that there were particles of food if she'd had a meal shortly before she'd gone in the water and had vomited food back. But if she only had fluid in her stomach before she went diving, if she regurgitated - if she vomited, they may find nothing obvious in the mouth on examining her on retrieval to the deck after she'd been brought from the ocean floor that would incriminate that as a mechanism for her demise.

Doctor, are we beginning to move into areas that might be best described as grasping at straws in terms of trying to come up with alternate or a range of possible diagnoses?

UNIDENTIFIED SPEAKER: Your Honour, I object to that. If that's a description of my cross-examination, I might as well go home.

UNIDENTIFIED SPEAKER: I thought it was a very good cross-examination, your Honour.

CORONER: Oh well, Mr - yes, Mr Tate?•• Your Honour, I've tried to address the questions to me and provide the best I can•••••

I'm sure?•• •••••of the likelihood of them being an issue in this instance.

I'm sure. I'm - yes. Yes, Mr Tate, that's not appropriate.

MR TATE: Thank you, your Honour

MR TATE: Thank you, your Honour. The only other issue I've got is obviously during your practice at Townsville Hospital you would have had a number of people that were presenting for treatment who were suffering the consequences of a panic attack under water?•• I won't say a lot because the number of people who suffer a panic attack, and it is well managed, reach the surface in one piece and are never seen by myself. Others if their panic goes on to them dying in the water, again, may not be actually seen by me. They go to Dr Williams.

Mmm?•• So it's only those that would, as a result of panic, do something silly which would perhaps result in them developing a decompression illness that would be likely to come to my attention.

So they're the patients that bolt for the surface?•• They're the ones that can bolt to the surface and may certainly come to my attention with what has been described as a cerebral arterial gas embolism, yes.

If you can't answer this question just tell us but does the literature assist us at all in understanding what the expected behaviour of a diver who suffers panic is likely to be? What they're likely reactions are?•• Well, it will depend upon their level of experience and a panicking diver who's reasonably experienced will be either swimming rapidly to the surface if they've lost their air

supply to - their access to fresh air, or seeking someone else very urgently and demanding their regulator so that they can take a breath. Someone who is much less experienced may have a completely different reaction and a typical reaction may be to try and gain the surface but in so doing maybe to displace what equipment they already have in place such as their masks which is their airway. Many divers will, if they think they have a problem with their regulator, reach for their alternative air source and use that. Now, I'm not aware of those issues having been in place in this particular case. I'm not aware that the alternative regulator was found in Tina's mouth when she was retrieved from the bottom.

Doctor, thank you. Thank you, your Honour. That might be a convenient time.

CORONER: Thank you very much for your time, Dr Griffiths. I know you have family commitments and other arrangements so I think you very much for coming back when you do. We'll excuse you for today? •• Thanks, your Honour.

There is no reason to have the doctor on standby for any other purpose, thank you very much.

WITNESS EXCUSED