



24 Oct 2010: Inaugural CC-UHMS -“Diving & Diving Medicine”

*‘New Canadian Forces Treatment Tables:
Top Five Changes...Hot off the Press’*

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Defence Research and
Development Canada

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Canada



“...*NOT!!!*”



Background:

- 5oct05 traffic from CPO2 G. Gillan:
- “...I am working on a project to convert all CF Diving [tables] from Imperial to Metric values. “
- (*rationale...*)
- “My first step is to do an impact analysis and follow that with ...an implementation plan.
- I have until mid Nov to complete the analysis and [it] is intended to have this conversion happen in FY06/07...”



“Oh (says I)...should be no problem...”

- *“...the treatment tables are arbitrary anyway so a few differences from rounding shouldn't be any big deal...”*



Current Status: ‘Just over the horizon...’





‘Top Five’ Changes (*my picks*):

- 1. Metrification
- 2. Enhanced O2 requirements for Attendant
- 3. Much expanded provision for ‘De-lays’
 - ...and potential use as Extensions!
- 4. ONE Treatment Algorithm – DCI!
 - Everything starts at 18m
- 5. Management of ‘SEVERE’ features
- *Honorable mention:*
 - ‘Deep Blowup’ saga



Job #1 - Disclaimer...

- NO endorsement of the CF Metric Addendum for civilian use can be inferred from this presentation
- The Presenter offers his own views and cannot be regarded as an official spokesman for the CF or the Gov't of Cda
 - (ie he's just a 'foxtrot charlie')
- The CF cannot officially promulgate or otherwise offer these tables for use by others
 - Copyright issues unclear; Bateman can't violate
 - Unofficial promulgation – the CI Div 'MAFIA' ...



Next: Acknowledge Collaborators #1...

- LCdr C.E. (Charles) Cross, MD







One: Metrification

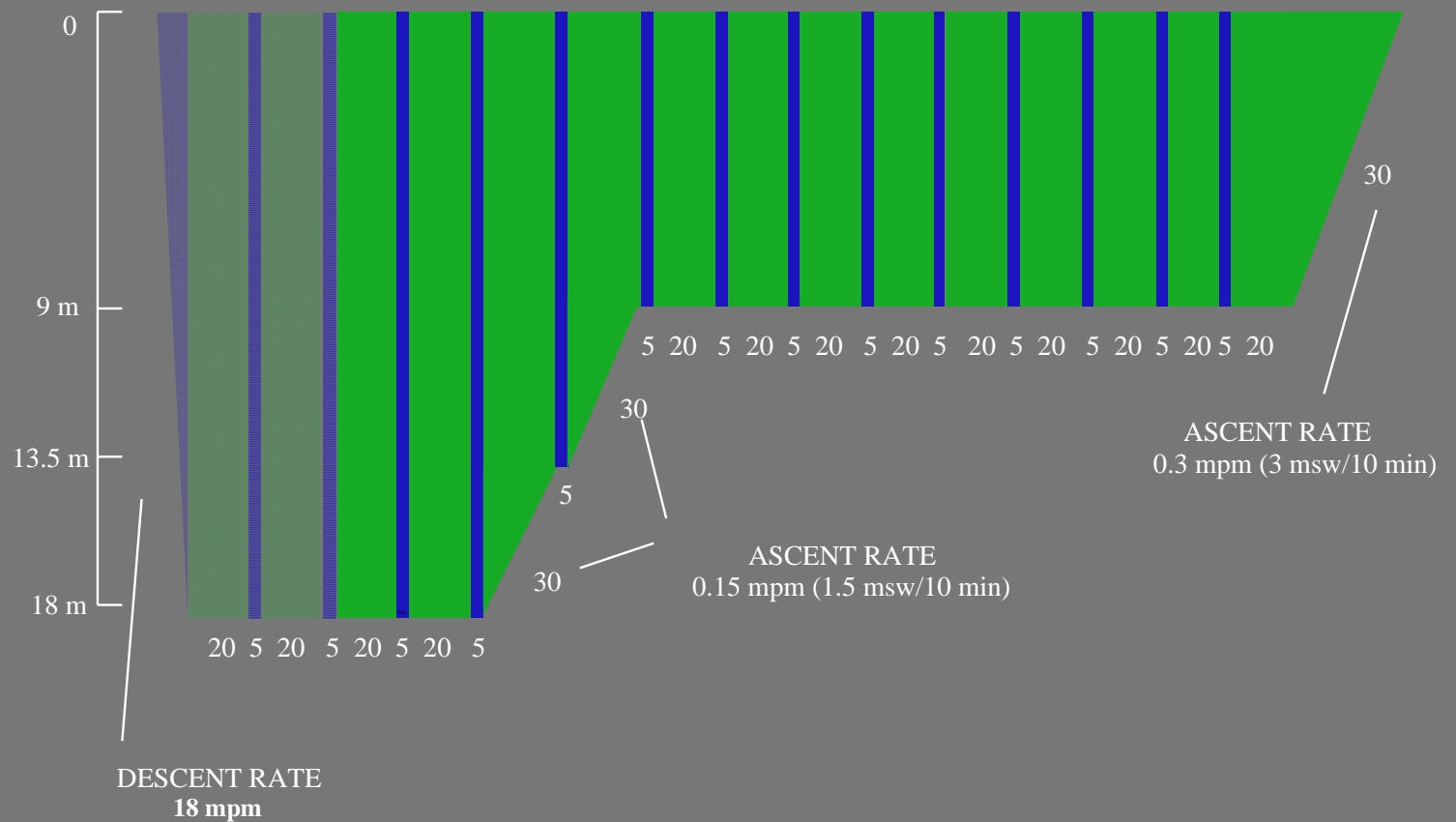
- At first glimpse, EASY:
 - 30' → 9msw; 60' → 18msw; 165' → 50msw
- BUT – what about 45'?
 - 13msw, 14msw, or 13.5msw???
 - 'Soft' vs 'Hard' Conversion
 - Wound up choosing **13.5msw**
- For patient, no big deal...but TENDER??



For Example:

TABLE 6 Modified

7 HOURS 1 MINUTE





Two: Enhanced O2 Requirements for Tender

- Found only TT5 & TT6 = confidently validated
- ...Longer Tables??
- ...Slightly different depths
 - Implications really for TENDER



Acknowledge Collaborators #2...

- Mr Ron Nishi...



Sisyphus was condemned by Zeus to spend eternity pushing a massive boulder up the side of a hill in Hades, only to have it tumble down again once it neared the top



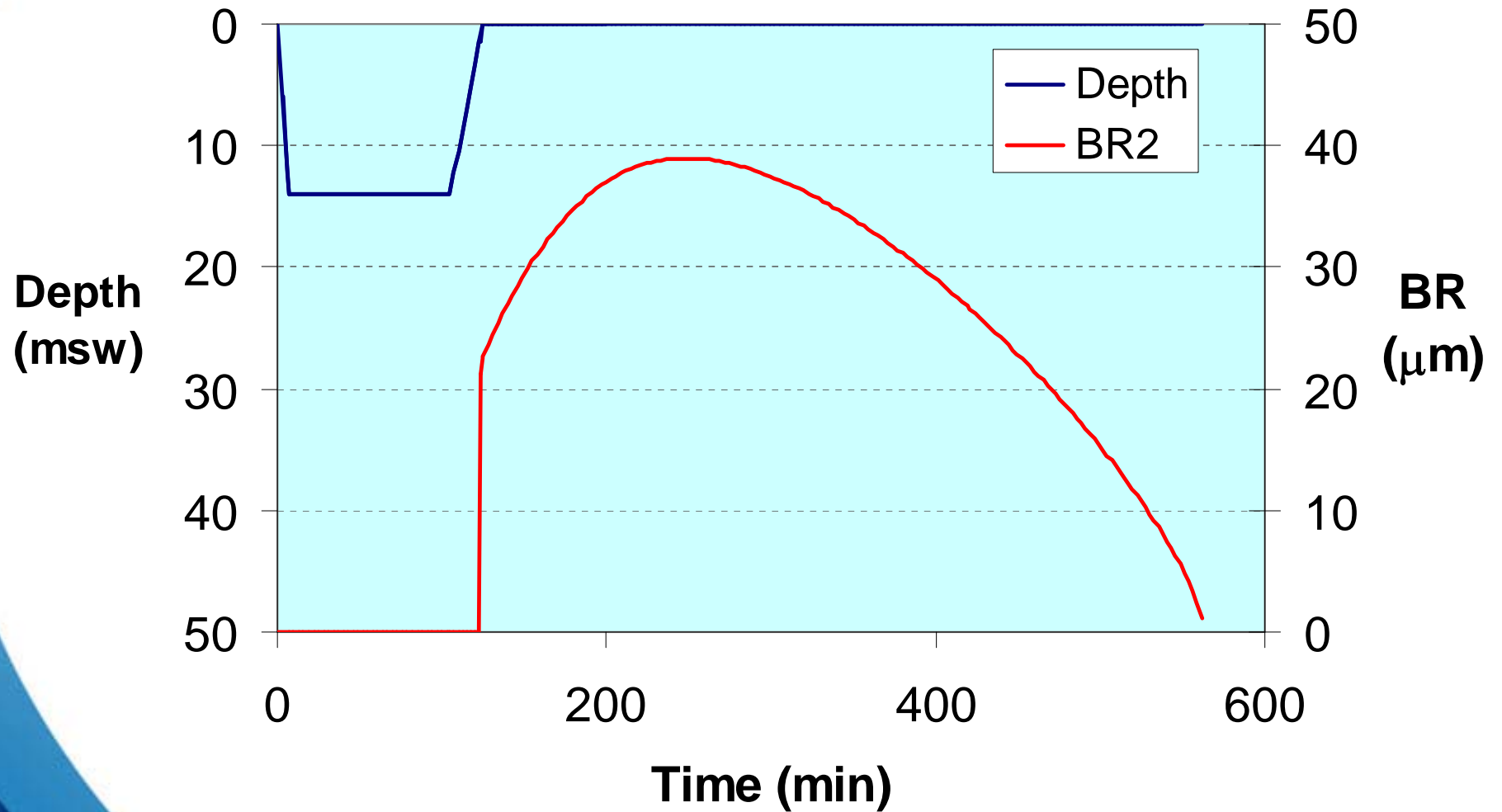
The Approach...

- “The maximum bubble size (BRmax) attained can ... be used as a relative measure of the risk of DCS, i.e., the larger the maximum bubble size, the larger the risk. (BRmax should be considered more an index rather than as a physical bubble size.)”

–R. Nishi’s prelim’ry report, je08

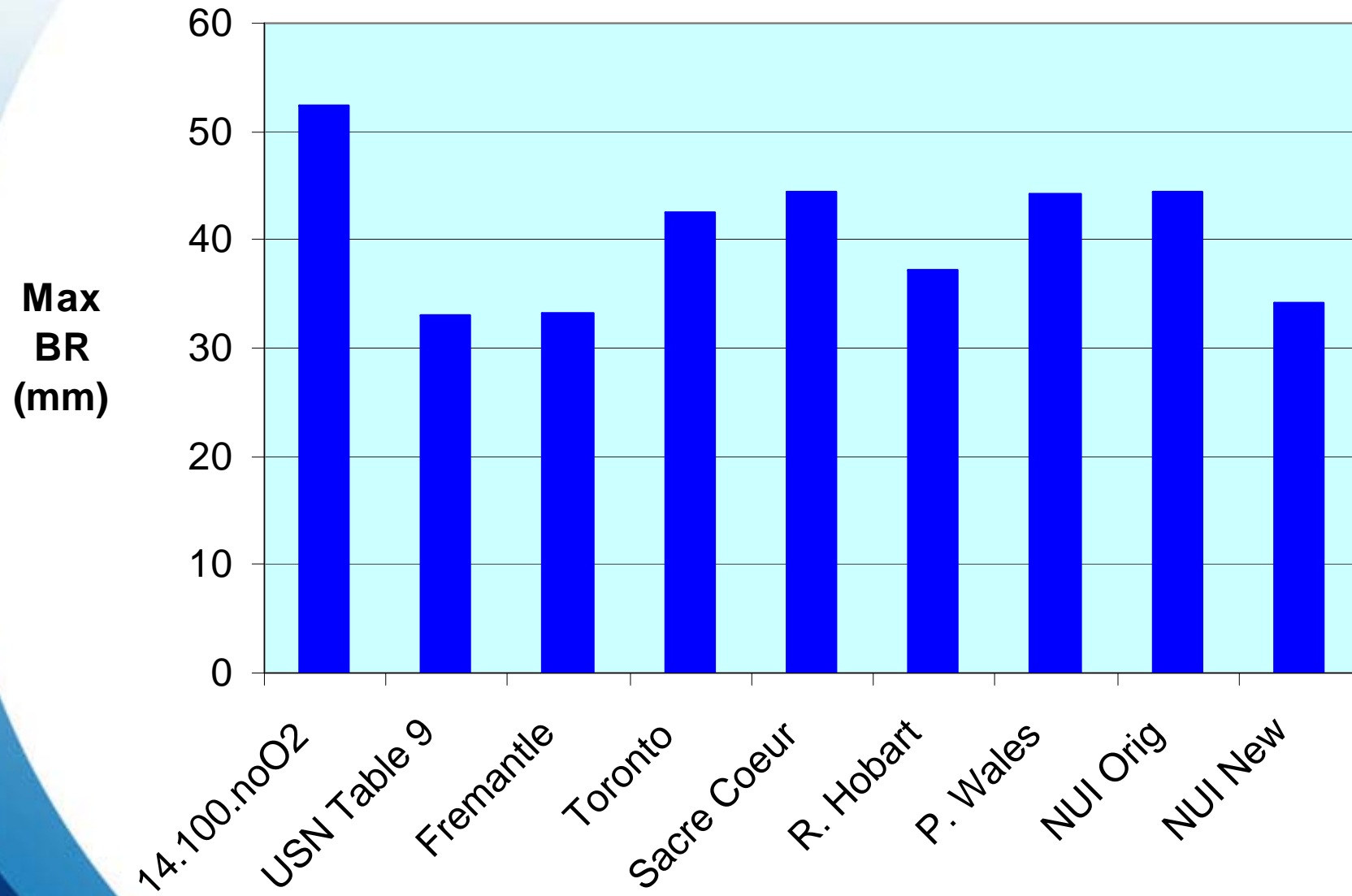


Example of Bubble Evolution (risk of DCS) after Treatment Profile



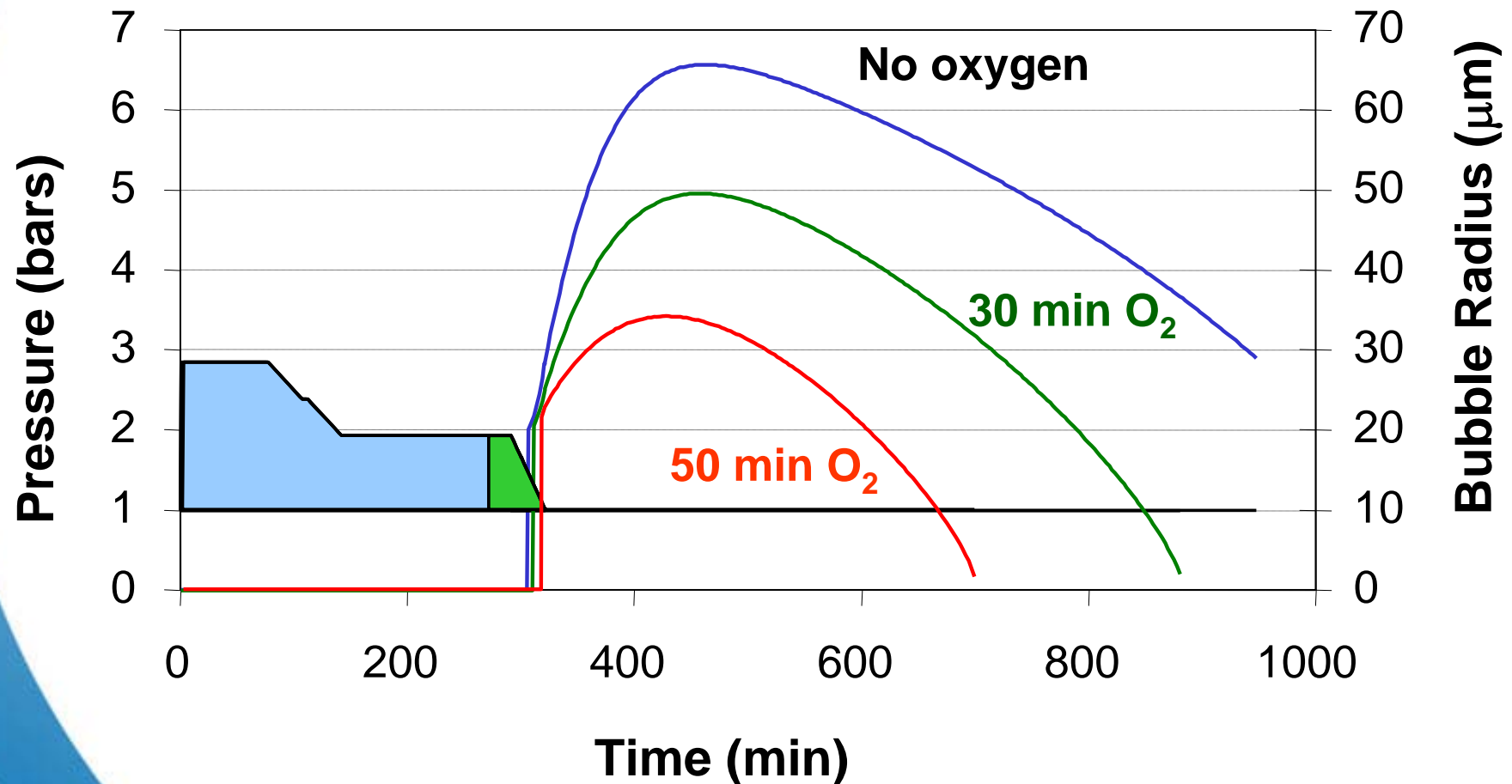


Maximum Bubble Radius 14 m Treatment





Effect of using Oxygen at end of modified TT6/RN62 for attendant





For each table & scenario...

Table 3. Analysis results for TT6 Mod

Profile #	Time at 18 msw	Delay at 18 msw	Time at 9 msw	Delay at 9 msw	Tender O ₂ Time	Time at Surfacing	SAD on Surfacing	BRmax post-dive
TT6 Mod	100		225		50	421	-1.69	35.6
Case 2	100		225	25	50	446	-1.66	35.3
Case 2	100		225	50	50	471	-1.64	35.0
Case 2	100		225	100	50	521	-1.59	34.6
Case 1	100	20	225		50	441	-1.53	36.9
Case 1	100	20	225	25	50	466	-1.51	36.4
Case 1	100	20	225	50	50	491	-1.50	36.0
Case 1	100	20	225	100	50	541	-1.48	35.3
Case 1a	100		225		70	421	-2.44	0.0
Case 1	100	20	225		70	441	-2.27	0.0
Case 3	100	40	225		70	461	-2.12	0.0
Case 3	100	50	225		70	471	-2.04	0.0
Case 3	100	75	225		70	496	-1.87	27.1
Case 3	100	100	225		70	521	-1.72	27.9
Case 3	100	150	225		70	571	-1.46	29.4



Painstaking Procedure...

- Needed a fearless leader with iron-clad determination...



Acknowledge Collaborator #3...





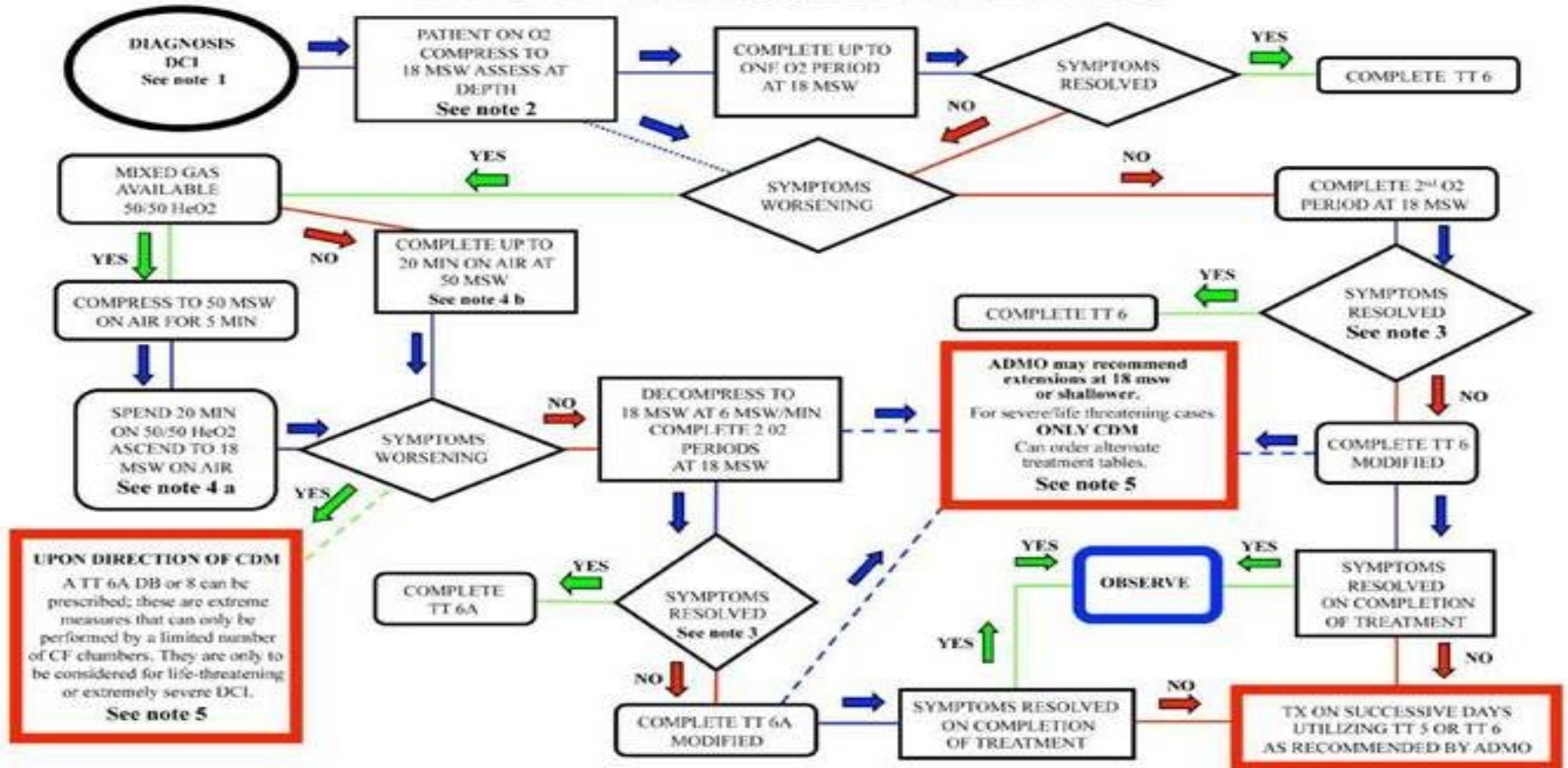
Three: 'De-Lays' / Extensions

- O2 Requirements of tenders taken into account:
 - Up to:
 - 150min @ 9msw AND / OR
 - 150min @ 18msw (combining for max delay 300m)
 - 50min @ 50msw
 - Equates to:
 - Extra SIX O2 pds @ 18msw
 - *TT6M max: 4+6 = 10 (!!!)*
 - Extra TWO O2 pds @ 50msw (!!)



Four: Single 'DCI' Treatment Algorithm...

DECOMPRESSION ILLNESS



- Note 1:** ADMO shall consult CDM or equivalent in all suspected cases of DCI.
- Note 2:** For severe DCI (AGE/Type II DCS) where patient is deteriorating or not responding at 18 msw, compress to 50 msw on Air at anytime during first O2 period preferably by 10 minutes at 18 msw. (Not for Joint Pain Only)
- Note 3:** Patient should optimally be symptom-free for one O2 period before traveling from 18 msw.
- Note 4a:** Time at 50 msw is 5 min on air including descent time from 18 msw plus 20 min on 50/50 HeO2 (25 min)
- Note 4b:** 20 min on air-only includes descent time from 18 msw. Depending on patient progress, travelling to 18 msw can occur earlier at discretion of CDM/ADMO.
- Note 5:** As per art 3207 & 3216, ADMO can prescribe extensions at 18 msw, but only CDM or equivalent can extend at 50 msw or order alternate Tables 6A DB, 7 and 8.

Figure 3-2-2 Decompression Illness



Five: Provision for ‘Severe’ Findings

- Definition:
 - “the term ‘DCI’ is used to represent DCS or AGE or a combination of both ”
 - “refers to symptoms or findings of DCI that require the utmost aggressive therapy. They represent the gravest and most worrisome end of the spectrum of serious / Type II presentations. ”
 - Lists eg’s (paralysis from waist-down) & COUNTER-eg’s (numbness / tingling)
- Approach - Still start at 18msw, but CAN dive to 50msw if no response



Honorable Mention (not really a 'change')...

- Blowup / omitted-D traditional approach
 - < :30 → TT5; > :30 → TT6
 - But what about (say) 100msw/:30
 - (HOURS of omitted D)
 - ???TT6???
- Couldn't resist the urge to go deeper (50msw)
 - PLUS: slower ascents from 50→18msw (and dwell @ 34msw)



Important Adage...

- “A few MONTHS in the LABORATORY will often save you a few HOURS in the LIBRARY”

»(*Anon*)

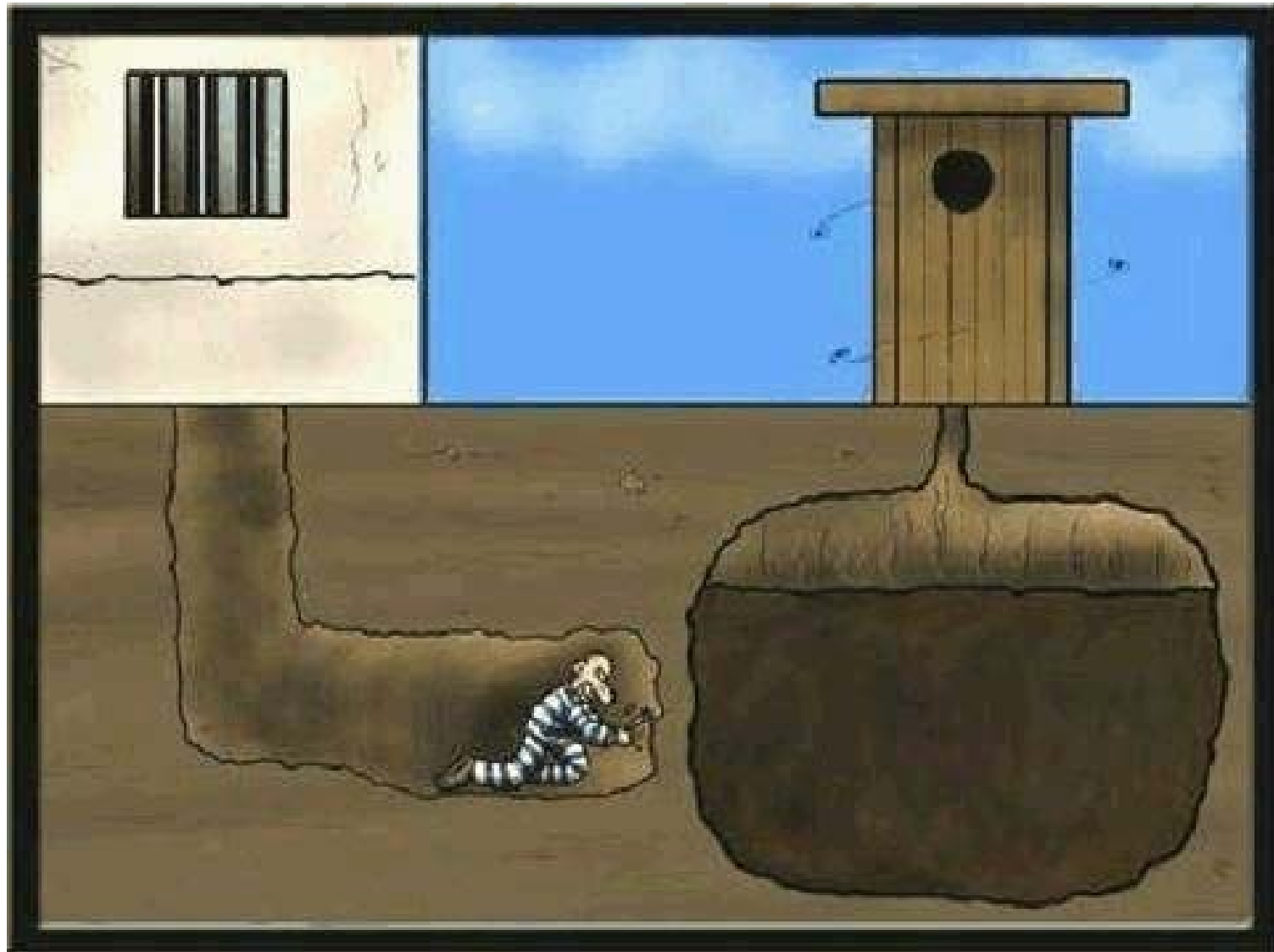


Fodder from 'The Library' (Rubicon)...

- Flook et al NATO AGARD papers on Severe Decompression Accidents (2000):
 - Modelling 81msw/:20
 - Predicted ANY table makes bubbles VANISH
 - In TT6A - tendency for bubbles to REFORM on pull
 - Pig experiments comparing TT6 & TT6A
 - Mortality rate for TT6: **28%**
 - For TT6A...**75%** (!?!?!)
- So...



...Back to the Drawing Board...





Aftermath:

- TT6A-DB now an 'Alternate Treatment Table'
 - to be used only on advice of a C/DM
- Blow-up / Omitted D algorithm reverted to former approach, namely:
 - <:30 → TT5
 - >:30 → TT6



Recap: Top Five Changes...

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The End *...questions??*

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