Dr. Dick Bell, U of C at Davis, DIVE TABLE RECALCULATIONS

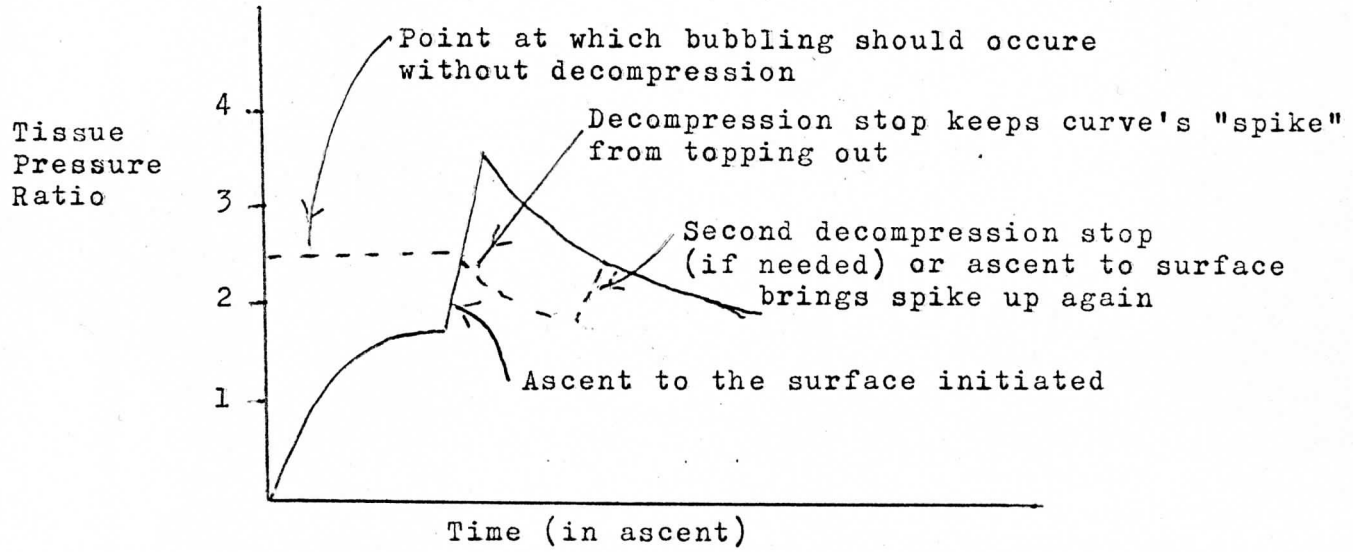
Here is where we apply the theory to high altitude diving. The Davis campus uses Lake Tahoe a great deal for diving activities throughout the year. It is used as a laboratory to train scientists in the art of research diving, including decompression diving. With this in mind, the U of C at Davis undertook a program to evaluate the altitude tables now in use, the Cross tables. According to these tables, a dive at Lake Tahoe and its equivalent at sea level were evaluated, by comparing various computer simulations, varied to see which data would best fit the dive (by comparing tissue pressure ratios for the different dives and various other data). As an example, similar dives at Tahoe and sea level are compared below:

	Sea Level	Tahoe
Actual depth	100'	100'
Theoretical Depth	100'	124'
Depth in USN Tables	100'	130'
Bottom time allowable	25"	10"

Time lost at altitude: 15 minutes

Since diving is conducted at the 6000' level, but people must drive back over Donner Pass at the 7000' level, the later is used for diving. It was suggested that flying after diving could be safely accomplished by using the tables for the altitude at which the plane will fly or be pressurized.

At one point in his lecture Dr. Bell showed a freightening graph of tissue pressures after a dive:



This graph is based upon computer simulations of dives at altitude

Because of many factors, discovered in the computer simulations, the ascent rate must be slowed by two feet for each 1000' of altitude.

Dr. Bell's conclusions:

1. The Cross Tables are good if the ascent rate is adjusted (2' for each 1000' altitude slower)

2. There is an increased liability for getting decompression sickness using Cross' Theoretical Depth Decompression Schedule (based upon some cases of critical tissue pressure ratios.

3. For decompression, use the deeper Navy stops (30', 20', etc.) except for the last stop (shallowest), which should be the Cross stop. (This last stop would be at 8' at Lake Tahoe)

Depth Guage Corrections at altitude:

The best method is to use an oil filled guage and unscrew the plug. A bubble will form, which can be removed by filling the guage with more oil (a drop is all that's necessary). It will still read for sea water, however. Fresh water readings are 2-3% deeper than the scale depth.

Tables also exist for correcting various guages to depth at altitude.

Bob Tolar, Conference Sponsor, CONCEPT OF THE KNIFE EDGE

For sport diving at altitude, all a sport diver needsstto do is use a capillary depth guage (which reads deep at altitude) and give himself a large safety margin by staying away from the"knife edge" of the no decompression, repeditive dive tables. Correct use of the repeditive dive tables is imparative and the sport diver must not come close to the no decompression limits using this concept.

Discussion

Several points were brought up here. Capillary guages are not too accurate or reliable (air column breaks and depth cannot be determined), the capillary tube guage may unduely limit the diver if improperly used as the air column will contract due to temperature variations (hot surface air temperature and cold bottom temperature, for instance); another point is that many people in cooler waters are using new dry suits and still not thinking of repeditive dive tables and suface intervals. The problem here is one of education.

Flying after Diving

1. May use the altitude at which the cabin is pressurized for table altitude

2. Use pressure ratios to convert to surface interval letter designator, using tables from NAUI NEWS.

Example: altitude 6000' = 11.28 psi ; flying 12000' unpress.
81' = 35.154 psi ; 12000' = 9.35 psi
$\frac{46.43}{9.35} = \frac{4.96}{1}$ Pressure Ratio $= E$ P_{81} = 46.43 psi

I raised one interesting question. Are diving manufacturers required to state in the instructions which tissue types their decompression meters are based on?

Answer from Dr. Bell: In my opinion, decompression meters are a piece of junk. First of all, no two of them ever read the same on duplicate dives. Second, if you need to know accurately what your decompression stops, etc are, you must plan the dive, then dive your plan. Since the decompression meter isn't accurate, this must be worked out ahead of time. A descending line should be used, with extra tanks at the stop to accurately measure depth and the decompression stops.