Other Delivery Content, Tec 40-6

Study assignment: Tec 40 Handout 6

Learning Objectives

By the end of this section, you should be able to answer these questions:

1. What are Oxygen Tolerance Units (OTUs)?

2. How do you use OTUs to manage oxygen exposure?

3. How do you use the CNS "clock" to manage oxygen exposure?

4. What is the basis for CNS clock surface interval credit?

5. Why may you choose an EANx blend than has a PO_2 less than 1.4 at the working depth for a particular dive?

A. As you already learned, you need to manage your oxygen exposure when using EANx (and later oxygen as a Tec 45 diver) to avoid pulmonary and CNS oxygen toxicity.

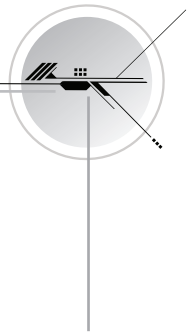
1. Recall that your primary prevention of CNS toxicity is in keeping your oxygen partial pressure below the critical thresholds of 1.4 (working part of the dive) and 1.6 (decompression at rest).
2. Because it is a biochemical process, there must be an exposure-time relationship involved with the onset of CNS toxicity. However, there are so many other physiological variables involved that, for practical purposes, the relationship is useless for reliably predicting CNS toxicity.
3. Pulmonary oxygen toxicity does have a useful time-exposure relationship that allows reliable predictions.
   a. OTUs (Oxygen Toxicity Units or Oxygen Tolerance Units, depending upon the reference) and the "CNS clock" both help you prevent pulmonary oxygen toxicity.
   b. As a Tec 40 diver, pulmonary oxygen toxicity is highly unlikely, but possible if you make several dives in a short period using EANx with high oxygen (like EANx50).

B. OTUs

1. OTUs are units that measure your oxygen exposure as a dose. A given time at a given PO_2 yields a certain number of OTUs based on a simple mathematical equation.

2. At the Tec 40 level, as you know, you use your desk top decompression software to calculate your OTUs.
   a. You enter the actual gases you use (EANx blend) for your bottom depth and time, and for your decompression stops and times.
3. OTU limits vary depending upon how much diving you're doing.
   a. The Oxygen Tolerance Units Exposure Limits table in the Appendix of the *Tec Deep Diver Manual* shows you the limits based on the number of days diving.
   b. The Total OTUs for Mission is the limit for all OTUs together over the given number of days.
   c. The Average OTUs per day is the maximum allowed in a single day.
   d. Note that at 11 days on, the daily limit is 300 OTUs.
      - Many tec divers use 300 OTUs per day as the limit, even if diving for fewer than 11 days. This keeps things simple and conservative.
      - You'll find that 300 OTUs covers a lot of diving – this is a very workable approach even at higher tec diving levels.
   e. Check your OTUs with your desk top decompression software after each dive.

C. CNS clock
1. It seems somewhat redundant to calculate the "CNS clock" and OTUs, but this is the state of practice in tec diving.
2. As you know, you calculate CNS clock with your desk top decompression software. The CNS clock is expressed as a percent of the allowable exposure – so it should not exceed 100 percent.
   a. Most software calculates OTUs and CNS clock simultaneously.
3. There is oxygen surface interval credit for the CNS clock.
   a. Between dives, your body begins reversing the effects of oxygen exposure. This means there is potential for crediting time at the surface.
   b. The basis for CNS surface interval credit is hospital patients undergoing long term oxygen exposure. The system has a good field record with use.
   c. Most desk top decompression software will credit your CNS exposure when you plan repetitive dives.



d. The system has variations, so different decompression programs may give somewhat different results. You can also reference the CNS Surface Interval Table in the appendix of the *Tec Deep Diver Manual*.

e. Note that there is no surface interval credit for OTUs.

4. As always, stay well within CNS and OTU limits.

D. Oxygen exposure and gas blend choice

1. As you've learned, the "ideal" blend for a given dive is the one with a PO_2 near 1.4 at the maximum depth. This is based on the assumption that you want the maximum possible oxygen so you have the minimum nitrogen (and/or helium as a trimix diver) possible.
2. However, previous oxygen exposure or plans for additional dives may affect this.
3. To keep oxygen exposure well within limits, you may choose an EANx blend with a PO_2 less than 1.4, even if it means a shorter bottom time or a longer decompression time. This also keeps you well within PO_2 limits.
4. As you gain experience and increase your training as a tec diver, it becomes increasingly important to consider prior and planned dives when determining your OTUs and "CNS clock" exposure.

Exercise, Other Delivery Content, Tec 40-6

1. Oxygen Tolerance Units are units that measure your oxygen exposure as a dose.

❑ True

❑ False

2. To use OTUs, (choose all that apply):

❑ a. use software to calculate OTUs based on actual depths, times and gases.

❑ b. stay within the limits of the Oxygen Tolerance Units Exposure Limits table.

❑ c. never exceed 100 OTUs per day.

❑ d. use your software to calculate OTU surface interval credit.

3. To use the "CNS clock," (choose all that apply):

❑ a. use software to calculate CNS clock percent based on actual depths, times and gases.

❑ b. you don't exceed 100 percent.

❑ c. stay well within limits.

❑ d. use your software to calculate CNS surface interval credit.

4. The basis for the CNS clock surface interval credit is extensive testing with military divers.

❑ True

❑ False

5. Even if it were available, you may choose an EANx blend with a PO_2 less than 1.4 at the working depth to

❑ a. make your decompression more efficient.

❑ b. reduce oxidative wear on your equipment.

❑ c. decrease narcosis.

❑ d. manage your oxygen exposure over several dives.

How did you do?

1. True. 2. a, b. 3. a, b, c, d. 4. False. The basis for the CNS clock surface interval credit is data from hospital patients undergoing long term oxygen exposure. 5. d.