CTDIvol vs. DLP

What do they represent?

CTDIvol is based on measurements obtained when scanning either a 16cm or 32 cm phantom. Essentially, it represents scanner output. DLP is derived from CTDIvol, but incorporates a scan length component. Both function as reasonable ***proxies*** for absorbed dose but do not represent the actual patient dose. In other words, if your CTDIvol and/or DLP is twice as high as it could be, then the doses you are imparting will be about twice as high as they could be.

Can CTDIvol and DLP results tell me two different things?

Yes. CTDIvol represents the output when scanning a phantom, while DLP takes into account the scan length. We've seen instances where CTIDvol is considered well within a "normal" range but DLP was unexpectedly high. We found the scan settings were appropriate for the study, but the exam length was longer than what others were using.

For example, a Chest CT could be started too high into the neck and end too far into the abdomen. If this is the case CTDIvol (basic scanner settings) could be just fine, but because scans extended more than necessary above and/or below the requested area, the DLP could easily be too high.

The following information, obtained from RadDaily.com, is a more technical discussion of CTDIvol and DLP for those interested.

http://www.raddaily.com/whitepaperarticle.php?articleTitle=Quantifying+CT+Radiation+Dose

CT Dose Index Volume (CTDIvol)

The CTDIvol can be calculated as:

CTDIvol = [(N x T)/I] x CTDIw
where
CTDIw = weighted or average CTDI given across the field of view
N = number of simultaneous axial scans er x-ray source rotation
T = thickness of one axial scan (mm)
I = table increment per axial scan (mm)

In helical CT the ratio of the I to (N x T) is the pitch; therefore in helical mode:
CTDIvol = (1/pitch) x CTDIw

CTDIvol (or CTDI volume) represents the dose for a specific scan protocol which takes into account gaps and overlaps between the radiation dose profile from consecutive rotations of the x-ray source. Therefore CTDIw represents the average radiation dose over the x and y direction whereas CTDIvol represents the average radiation dose over the x, y and z directions.

Dose Length Product

The dose length product (DLP) is the measure of ionizing radiation exposure during the entire acquisition of images.

Therefore, DLP (mGy-cm) = CTDIvol (mGy) x irradiated length (cm)
(irradiated length is usually longer than imaged length in helical scanning)

CTDIw and CTDIvol are independent of scan length for determining the total energy absorbed whereas DLP is proportional to scan length.