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ASiR, ASiR-V, and DLIR compatibility of UW CT Protocols

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REF **Rev: 1.0***

*This guidance is being released with the Rev: 5.0 of UW CT Protocols. The revision number of this document refers to this document's history, not the actual UW CT Protocols.

GE scanners have multiple different versions of CT reconstruction and denoising options. Specifically, this document considers ASiR, ASiR-V, and DLIR. Implemented on different scanners, the behavior of these algorithms produces slightly different results. We demonstrate this below in Figure 1. Our CT Protocol Optimization Team and Advisory Boards have selected specific ASiR, ASiR-V, and or DLIR values on a protocol by protocol and scanner model by scanner model basis. The differences in ASiR and ASiR-V percentages vary by protocol and scanner to balance the changes in spatial resolution (i.e., MTF) and noise texture (i.e., NPS) observed for different use cases.

In general:

   a. We do not apply ASiR or ASiR-V to high resolution images using a Bone Plus reconstruction kernel. Therefore you will find all bone MSK images and thorax lung window images do not use ASiR or ASiR-V.
   b. We vary the ASiR and ASiR-V percentages in order to keep the noise texture from becoming too patchy/plastic/course for soft tissue and angiographic reconstructions. Therefore you will see our use of ASiR and ASiR-V for soft tissue imaging in regions like the liver never exceeding 40%. We do use higher levels for the head, as we have found neuroradiologists more amenable to higher ASiR/ASiR-V levels than other body sections.

Figure 1. Example of how different versions of ASiR (i.e., ASiR versus ASiR-V in this example) exhibit different image quality. The left column is ASiR, the right column is ASiR-V. Top row is 50% strength, bottom row is 100% strength.
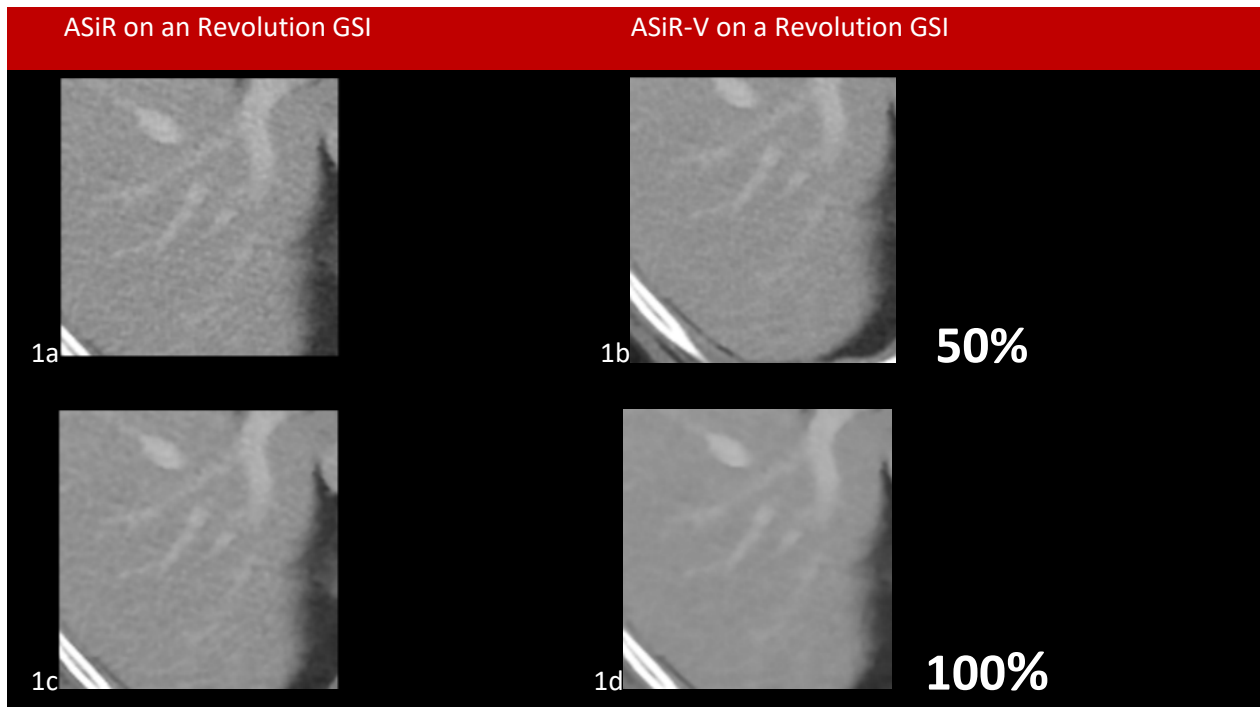
From Figure 1 we can appreceate a noticible difference between the perfomance of ASiR as compared to ASiR-V at the same percentage. From Figure 1, we can also appreceate how the change from 50% to 100% has a more dramitc effect on image appearance for ASiR-V as compared to ASiR.

We created Figure 2 to aid the end user in understanding where our CT protocols and your GE CT scanners display ASiR/ASiR-V/DLIR information.

Figure 2. Example screen shots of (2a) our UW CT Protocols, (2b) a non-Revolution/non-Apex, and (2c, 2d) a Revolution/Apex CT GUI depicting ASiR/ASiR-V/DLIR information.
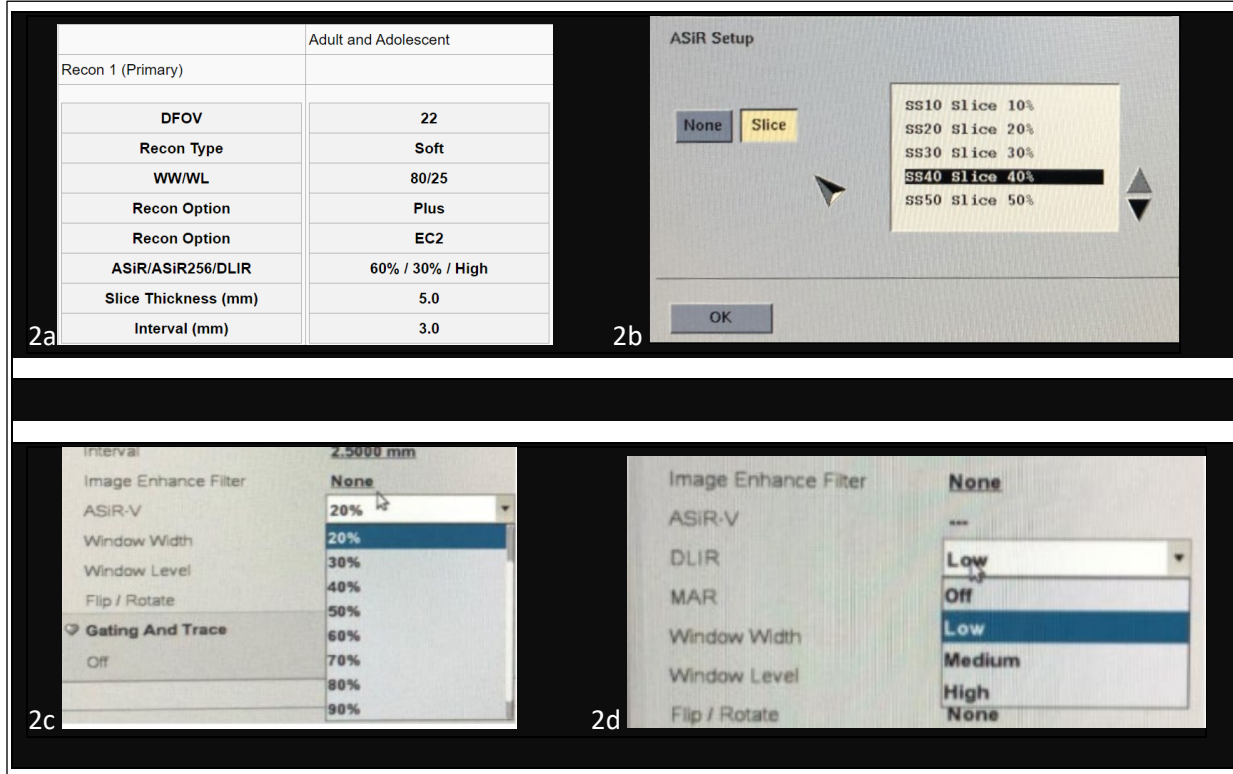
Referring to Figure 2a, the three names we use to describe reconstruction options are "ASiR", "ASiR256", and "DLIR". For all non-Revolution CT and Apex scanners, the value listed first named "ASiR" should be used. If your scanner has the option to use either ASiR-V or ASiR, we recommend using ASiR. If your scanner only has the ASiR-V option and is not a Revolution CT or Apex scanner, then use the first value in our tables. You only use the values in our tables corresponding to "ASiR256" or "DLIR" when you are on a Revolution CT or Apex scanner (i.e., these are the scanners with 8 or 16 cm beam collimations). If your Revolution CT or Apex scanner does not have TrueFidelity (i.e., DLIR) then use the "ASiR256" values for the ASiR-V option. If your Revolution CT or Apex scanner has TrueFidelity, then use the "DLIR" option provided in our tables.

A couple points of confusion:

1. For some scanners, like the Revolution Evo and Frontier scanners, our reconstruction tables use the name "ASiR" when the scanner only has ASiR-V.
2. We differentiate between the type of ASiR on a Revolution CT or Apex scanner using the name "ASiR256". This scanner also comes in an ES configuration which doesn't have 256 slices, but you should still use the value listed under the name "ASiR256". Additionally, we do not have the "V" modifier in our tables.

When in doubt, if you are on a Revolution CT or Apex scanner that has TrueFidelity, we recommend you use the DLIR option. If you are on a scanner that provides the option for using either ASiR or ASiR-V, we recommend using ASiR and the value from our tables (See figure 2a) corresponding to "ASiR".

In Table 1 we describe the AsiR/ASiR-V/DLIR options present across the GE scanner fleet for which we provide CT protocols.

Table 1. Breakdown by scanner model and option set of what value of denoising reconstruction we recommend using.

	Optima CT 580W 16 channel	Revolution CT256 Channel	REV EVO 64 / Optima 660	REV Frontier, REV HD & Discovery 64 Channel	Revolution EVO 32	Discovery IQ PET/ Optima 540 16 Channel	REV EVO 64	LightSpeed VCT	Revolution ES128 Channel
ASiR and ASiR-V (non Revolution256/Apex) We provide the value for this setting in our reconstruction tables with the name "ASiR"	✖		✖	✖	✖	✖		✖	
ASiR-V on Revolution256/Apex We provide the value for this setting in our reconstruction tables with the name "ASiR256"		✖					✖		✖
DLIR We provide the value for this setting in our reconstruction tables with the name "DLIR"		✖							✖