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A comparison of the effect of random and deterministic maskers on comodulation masking release in the cochlear nucleus

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Masking of a sinusoidal signal is considerably less when the masker has coherent level fluctuations across-frequency. This effect is called comodulation-masking release (CMR). In a recent study (Pressnitzer D., Meddis, R., Delahaye, R., and Winter, I.M. 2001, J. Neuroscience, 21, 6377-6386), using amplitude-modulated tones as the masker, it was shown that the responses of some units in the ventral cochlear nucleus of the guinea pig are consistent with the psychophysical CMR effect. This study investigates, if the CMR-like effect can still be observed with noise maskers. In contrast to amplitude-modulated tones the noise masker waveforms will be different for each presentation. The target signal was a pure tone signal at the unit's BF. Three different conditions were investigated. In a reference condition, the masker was a 20-Hz noise band centred at the signal frequency (on-frequency band). In the comodulated and the deviant condition, the masker consisted of the on-frequency band and several flanking bands above and/or below the BF. In the comodulated condition all noise bands had the same temporal level variations whereas in the deviant condition the level variations were independent of each other. The response was measured for different signal-to-noise ratios. In our current population of units, with non-deterministic maskers 42°s of the units showed considerably higher d' values for the comodulated condition than in the deviant or reference conditions at the same signal-to-noise ratio. These units were classified as choppers, primary-like or low-frequency units. Where it was possible to run both masker types, seven out of the eight units showing CMR with the non-deterministic masker also showed CMR with the deterministic masker