

## ONDAMED is Nuclear Magnetic Resonance

By

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One proton and one electron compose the spinning hydrogen atom. Both particles have a magnetic moment, the inner magnetic source, which builds the small outer magnetic field around them.

### The Larmor principle (Sir Joseph Larmor, 1857-1942, Irish physicist and mathematician):

When these small magnetic fields, the magnetic moments, are exposed to or are placed in, an external electromagnetic field, they will be accelerated and start rotating about the axis of that field. This is called 'precessing'. They precess about that axis like a top. The accelerated magnetic moments of the hydrogen atoms take up energy from the other electromagnetic field. They take up the most energy, if the frequency of the other magnetic field matches the spin frequency (Larmor frequency) of the hydrogen atoms. Then they are fully resonating. This has been used for the MRI since 1970.

The magnetic moments of the hydrogen atoms will align and precess about the external field axis longitudinally and transversally.

They precess with a specific frequency about the external field (*Larmor frequency*), which differs a little between the tissues. This is because each tissue is differently composed and accordingly the spinning frequency of the hydrogen atoms is slightly slowed by interference from other atoms.

The more the frequency of the external electromagnetic field matches the Larmor frequency of the hydrogen spins, the more those are resonating and taking up energy. This is like a swing, when it takes up the energy of the pushes if these pushes match the frequency of the swing.

Since the external em field is pulsating, is on and off, both the longitudinal and transversal alignments of the hydrogen spins collapse (relax) to their original formation, when the field is switched off. Since the longitudinally aligned hydrogen spins have a lower energy state than the ones that are transversally aligned, switching off causes only the electrons of the *transversally* aligned hydrogens to emit a photon.

The reason why there are two different energy states of hydrogen spins, is because the hydrogen has two so called 'eigenstates', two different electron spins. Some

**hydrogen atoms have an up-spin of their electron, causing a high energy state. Some hydrogen atoms have a down-spin of their electron, causing a low energy state. The high energy state, the up spin hydrogen, aligns transversally and its electron emits a photon when the resonant frequency of the external em field is switched off.**

**By exciting other electrons the photon is the vital energy carrier and the force for tissue repair, semiconducting and neutralizing free radicals.**

**It is a true anti-aging process and explains the dramatic pain improvement in osteoporosis, non-jointed bone fractures as well as improvements of numerous health disorders.**

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