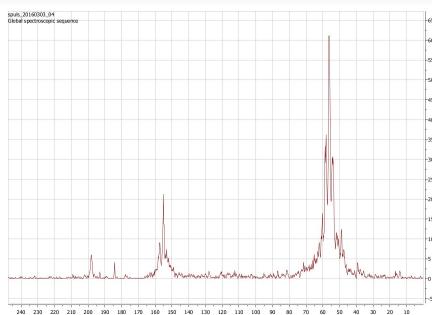


Option 1: Surface coil

- Surface transmit-receive coil $^1\text{H-X}$
- Linear polarization ^1H
- Linear polarization X-nucleus

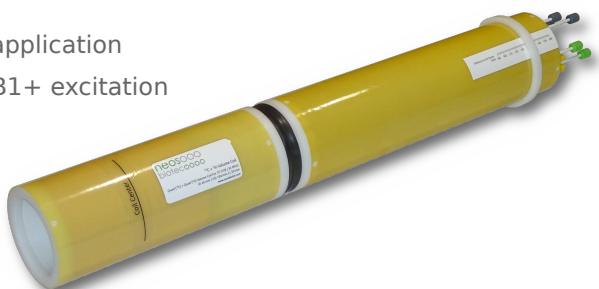
- Lowest investment
- Non-uniform B1+ excitation
- Relatively high SNR
- Bulky enclosure



Mouse liver ^{13}C spectrum (courtesy of CNIC)



- General application
- Uniform B1+ excitation
- Low SNR



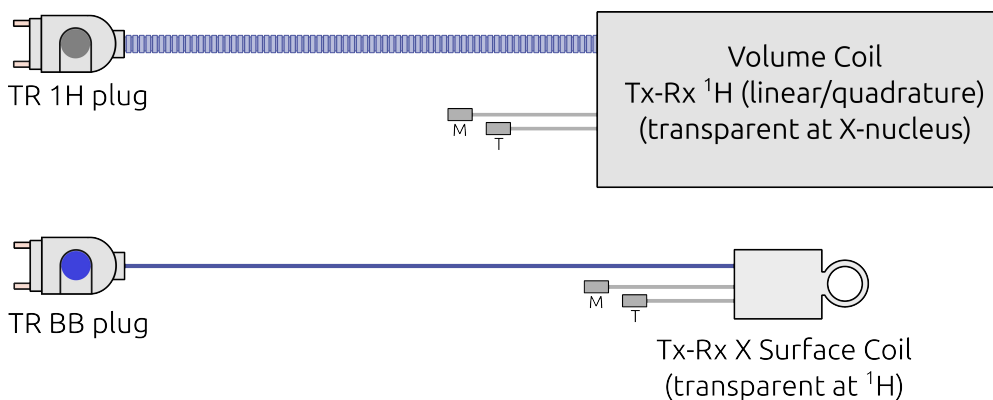
Option 2: Volume coil

- Volume transmit-receive coil $^1\text{H-X}$
- Linear polarization ^1H
- Linear / quad polarization X-nucleus

Option 3: Insertable surface coil

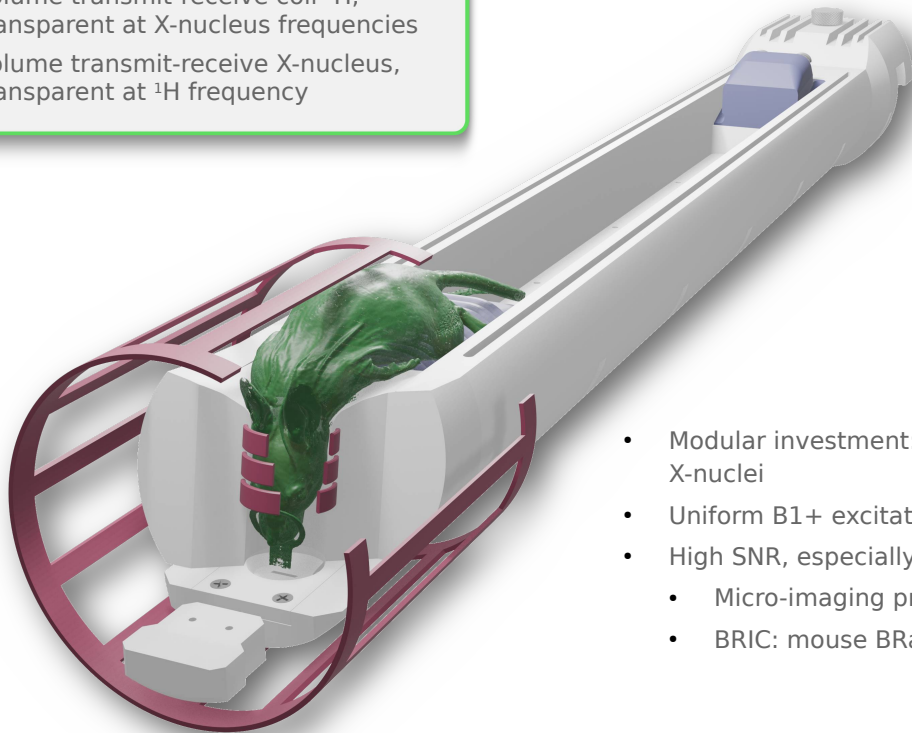
- Volume transmit-receive coil ^1H , transparent at X-nucleus frequencies
- Surface transmit-receive X-nucleus, transparent at ^1H frequency

- Modular investment: same volume coil works for all X-nuclei
- Uniform B1+ excitation for ^1H
- Non-uniform B1+ excitation for X-nucleus
- Relatively high SNR



Option 4: Insertable volume coil

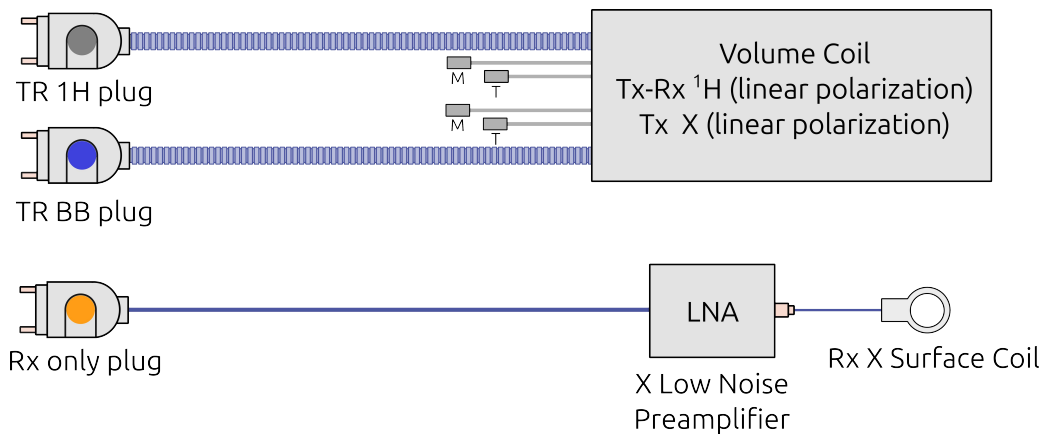
- Volume transmit-receive coil ^1H , transparent at X-nucleus frequencies
- Volume transmit-receive X-nucleus, transparent at ^1H frequency



- Modular investment: same volume coil works for all X-nuclei
- Uniform B1+ excitation for both ^1H and X-nucleus
- High SNR, especially for small regions of interest:
 - Micro-imaging probe for small samples
 - BRIC: mouse BBrain Imaging Coil

Option 5: Volume transmit - surface receive

- Volume coil ^1H (transmit-receive) - X (transmit-only)
- Modular X-nucleus surface coil (receive-only), with integrated low-noise preamplifier.



- Uniform B1+ excitation for ^1H and for X-nucleus
- Highest SNR
- Modular low noise amplifier allowing the connection of different surface loops, optimized for each region of interest