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Targeted transport therapeutic nanoparticles into adipose tissue

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Brown Adipose Tissue (BAT) generates heat by mitochondrial uncoupling. This effect is mediated by the uncoupling protein-1 (UCP-1), which reduces the proton gradient over the mitochondrial inner membrane. Upon activation, BAT increases energy expenditure and is therefore, a promising target for anti-obesity treatments. Hydrophobic therapeutic drugs or hormones, for example triiodothyronine (T3), embedded in the core of artificial Triglyceride-Rich Lipoproteins (TRLs) could specifically target active BAT *in vivo* and increase the thermogenic capacity by increasing UCP-1 expression. The triiodothyronine-loaded TRLs having both repeatability and high T3-loading capacity would be optimized and synthesized to reach the aim of better targeting and activating BAT. One dose 5 ml/kg T3-loaded TRLs was injected into mice that experienced cold exposure. We found that the expression of uncoupling protein 1 (UCP-1), which is a marker of BAT differentiation, was significantly higher than the mice treated without T3 hormone in the control group. At the current stage, we are focusing on optimizing T3-loaded TRLs. To achieve a better activation of BAT *in vivo*, the optimized T3-loaded TRLs should contain a high concentration of T3, but a low concentration of T3 in the surrounding aqueous buffer. To reduce the concentration of T3 in aqueous fraction, size exclusion chromatography is used to separate synthesized T3-loaded TRLs and non-loaded T3. We believe that the utilizing TRLs as a carrier to specifically target BAT and deliver T3 could bring benefits to both metabolic health and drug delivery in anti-obesity researches. Since some anti-obesity medications are water-soluble, it is also necessary to investigate and develop liposome drug delivery method to deliver hydrophilic drugs to the targeted organ. We think that developing and investigating both methods could provide a new therapeutic aspect of addressing obesity in the future.

Biography

Zheming Niu has obtained his Master's degree program in the field of Ontological Imaging at the University of Kiel, Germany. Currently, he is a PhD student working in the Professor Alexander Pfeifer's lab at University of Bonn and he has passion in developing both novel imaging method and nanodrug delivery system against obesity.

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