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ファイザー社とモデルナ社のワクチンで使われているmRNA改造法

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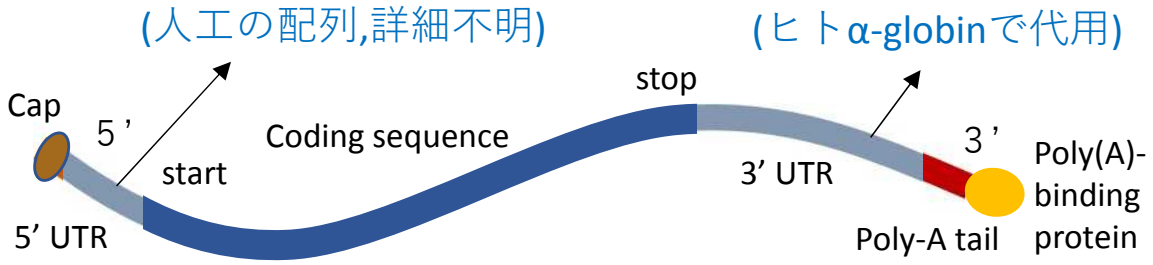

【３つのmRNAトランスフェクション法】
- *Trans*IT™法
- リポフェクチン™法
- 脂質ナノパーティクル法
  →これがワクチンで使われている

本来のRNA	改造後のRNA
Cap: RNAの先頭を示すキャップ(帽子)構造	2’-O-methyltransferaseでcap1に改変
5’ UTR, 3’ UTR: 非翻訳領域	？？
Coding sequence: 遺伝子情報	ウリジンをpseudouridine(Ψ)に置換 →免疫機構が回避でき、蛋白合成が2～10倍に
Poly-A tail: 尾部を示す200個前後のアデニン鎖	130個のアデニン鎖

【改造RNAは体内で何をするのか？】

・自然のRNAでは：
ウイルス感染→OAS(酵素)活性化→2-5A(核酸分子)合成
→RNase L活性化→RNA分解が進行

・改造RNAでは：
OASを活性化しない→コロナmRNAは分解されず細胞内に残る。マウス実験では１回の注射で中和抗体が9週まで増加。memory B cellsの消長は不明。T follicular helper cells ↑ →germinal center ↑ →中和抗体↑。PKRを抑制。

(青字は,その後,別の研究者が発表したデータ)

【改造RNAは逆転写されるか？】

細胞内で逆転写が起こることが確認された

【Spike蛋白のコーディング】

full-length S protein with deleted furin cleavage site
とした場合、CD4+ T cellの反応が最良

【免疫反応】

CD4+, CD8+↑ → Th1 ↑ →IFN-γ ↑ (つまりTh1細胞優位のため再感染時にアレルギー反応は起さない)

【改造の効果】

培養細胞実験で2倍長く残る。ラット実験12～78倍蛋白合成が増強。ヒトでの研究から60日間残ることが確認された

ワイズマン、カリコ両氏の名前が含まれた学術文献の一覧

全部で 32 編ありますが、そのすべてを参照した上で当サイトの執筆を行っています。内容は多岐にわたり、かつ専門的です。個々の文献についてご質問があれば、メールにてお知らせください。

岡田正彦

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＊著者名は、第１著者、およびワイズマンとカリコ両氏の３名のみとし、それ以外は「その他」を意味する et al.で略記しました。学術文献における著者名の順番は研究への貢献度を表すなど重要な意味を持ちますが、当サイトの主旨を考慮し、このような記述としました。これらの情報で文献の検索が可能であることを確認済みです。また Karikó 氏の「ó」を「o」と表記している文献もあり、そのまま記述しました。