A TRIAL OF GENE TRANSFER AUGMENTED BY RADIAL SHOCK WAVE FOR RABBIT CHONDROCYTES IN VITRO

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BACKGROUND

- Safety and reproducibility as well as transfection efficiency are required for successful gene therapy.

		Efficiency	Safety	Facility
Viral		◎	△*	△
Non-viral	Ultrasound	△～○**	○	◎
	Electroporation	△	△***	△
	Gene Gun	△	○	△

* : Toxicity, possibility of malignant mutation
** : Augmentation by microbubble agent (Optison® etc)
*** : Damage of target tissue

Can extracorporeal shockwave be applied for gene transfer ?

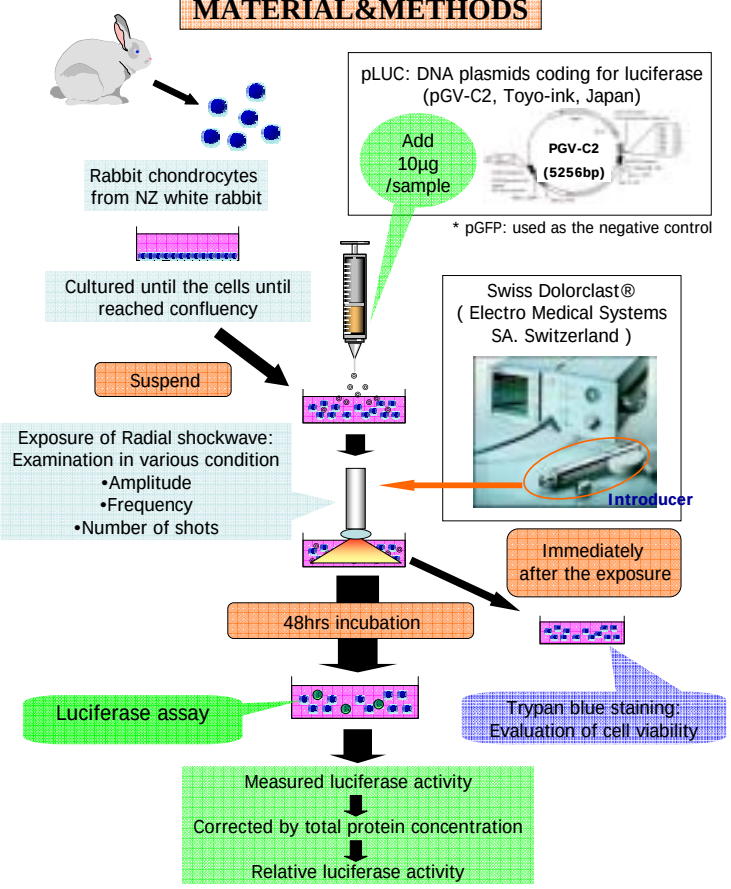
- Degenerative or traumatic cartilage lesions are still difficult to treat despite of many conventional treatments
- Gene therapy in the orthopaedic field has not been established

Gene transfection to chondrocytes with a view of gene therapy for the cartilage lesions

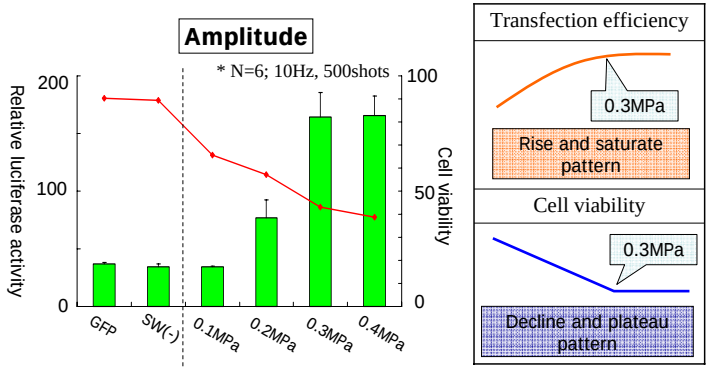
PURPOSE

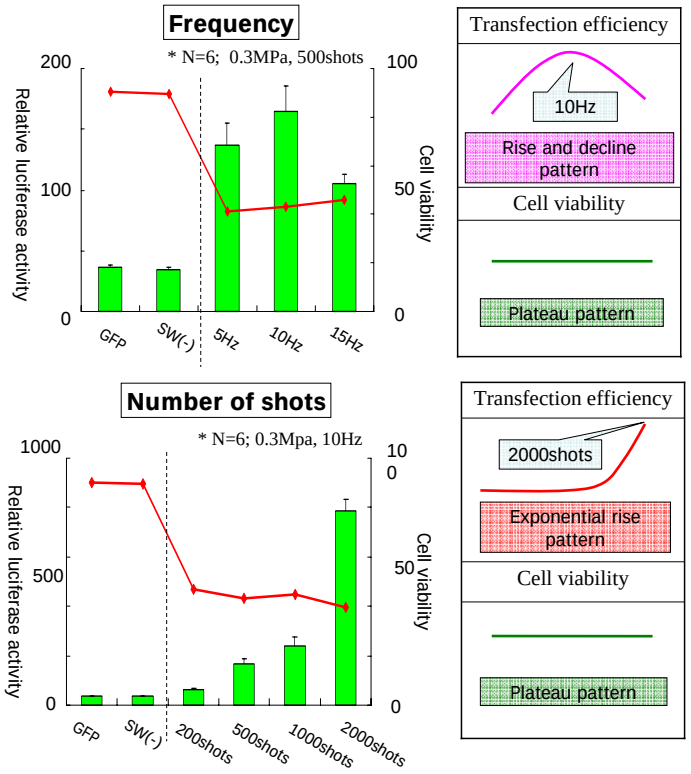
- Achieve gene transfer with high transfection efficiency for chondrocytes utilizing newly developed ***radial extracorporeal shockwaves***
- Examine the parameters of exposure condition (amplitude, frequency, number of shots) that affect transfection efficiency
- Evaluate cell toxicity of radial extracorporeal shockwaves

MATERIAL&METHODS



RESULTS





DISCUSSION&CONCLUSION

- Luciferase coding DNA plasmid was successfully transfected to rabbit chondrocytes by ***radial extracorporeal shockwaves***.
- The transfection efficacy of the exposed cells increased up to ***about 20-fold*** compared to the control under the specific condition (0.3 MPa, 2000 shots, 10 Hz).
- The effect of following parameters on the transfection efficiency and the cell viability was investigated.
  Amplitude: A threshold (nearby 0.3MPa)
  Frequency: No significant effect on the both factors
  Number of shots: Dose-dependent effect on the transfection efficiency but not on the cell viability?
  → Each parameter may play the different role on the both factors.
- The transfection efficiency may be augmented by varying these parameters ; e.g. more large number of shots.
- Gene transfer by radial shockwaves could be applied for the treatment of various cartilage lesions.