

Reintroducing High Workload Needle Free Jet Injectors to the US Military Medical Community

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Reintroduced Jet Injectors

- **WILL**
 - Increase injection speed and efficiency
 - Reduce injection errors
 - Reduce injection associated injuries
 - Reduce associated medical wastes
- **WILL NOT**
 - Allow pathogen transfer

Previous Jet Injection Successes

- Major campaigns world-wide
 - Extensive use by US Military (till 1985)
 - Smallpox (1967 to 1980)
 - Polio (1972 - 1976)
 - Measles ((1972 - 1976), (Brazil; 1990 to 1996))
- Russia
 - Significant part of public and military vaccination programs
 - Part of their bio-defense program

Felton's Position

- Spring and gas powered high workload jet injection devices (human and veterinary)
- Solution to pathogen transfer (patent pending protector cap)
- High workload and unit dose systems
- IP on 450m/y development

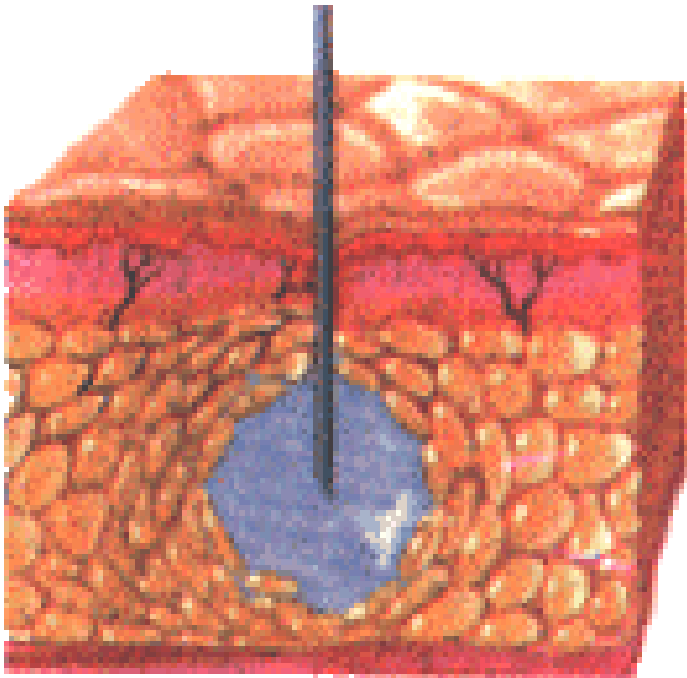
General Characteristics

- User and patient friendly
- Easy to clean and maintain
- Robust (field demonstrated designs)
- Wide range of capabilities
 - Configurable for specific applications
 - Targeted designs for specific applications

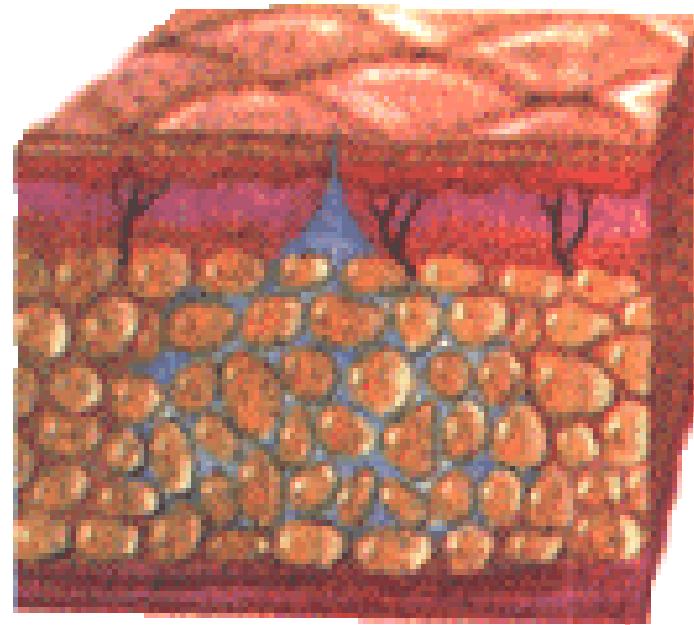
How Needle Free Jet Injectors Work

- Pressurized medication acts as needle
 - Stream is 1/5 diameter of 22 gauge needle (0.15mm)
 - Less than 0.2 seconds for 0.5ml injection
 - Injections can be IM, SC or ID.
 - Pain is minimized
- Eliminates needle stick and associated pathogen transfer

Needle & Syringe vs. Jet Injection



Needle
Injection



Jet Injection

Types of Injectors

- High workload injectors
 - Original configuration commercialized late 1940's
 - Discontinued mid-1980's due to pathogen transfer concerns
 - Weight loss clinic where Hepatitis was transferred between successive patients primarily due to design flaw in device being used
- Unit dose
 - Primarily used for HGH and insulin
 - Wide use restricted by cost and logistics

Felton Injectors (original)

Full IP rights to 17 unique devices



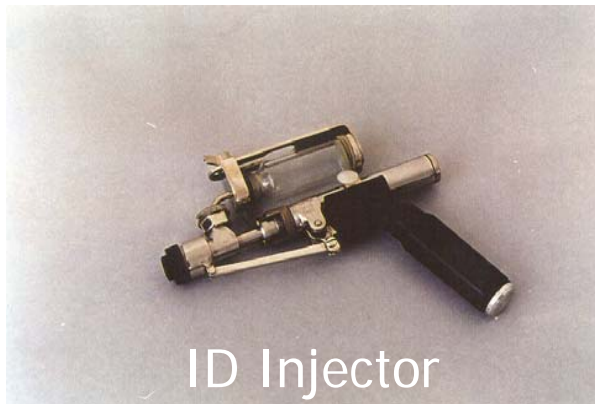
SQ Injector



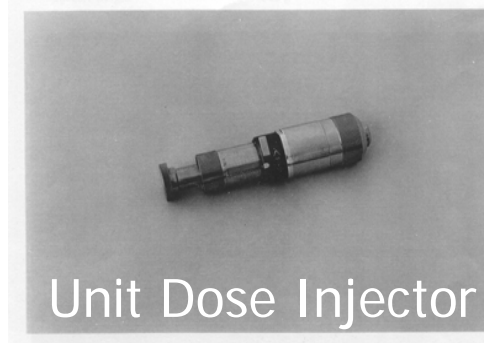
General Purpose Injector



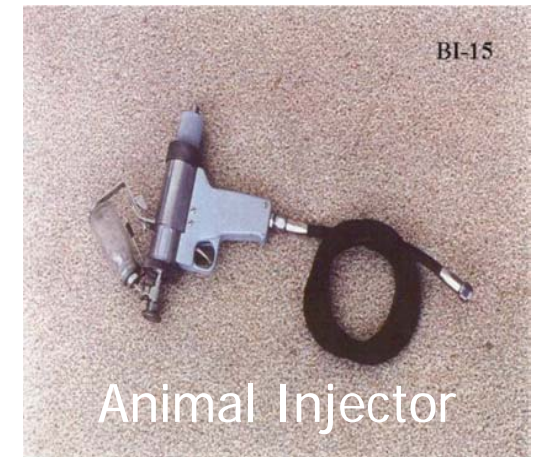
Animal Injector



ID Injector



Unit Dose Injector



Animal Injector

Felton Human Injector Evolution



Bi-3M

(FDA cleared device)

This device had the first protector cap and was

used to give over 100 million injections in the former Soviet Union.



Bi-100

This prototype was developed as a fixed dose system aimed at the WHO measles campaign. It is lighter and has automatic cap removal.



Pistol Grip

Re packaged Bi-100
Used in the trial in Senegal Fall 2002.

Current Device

This device as shown at the WHO Measles conference in April '03.

It is smaller, lighter, power adjustable, and has provisions for an Interlock.



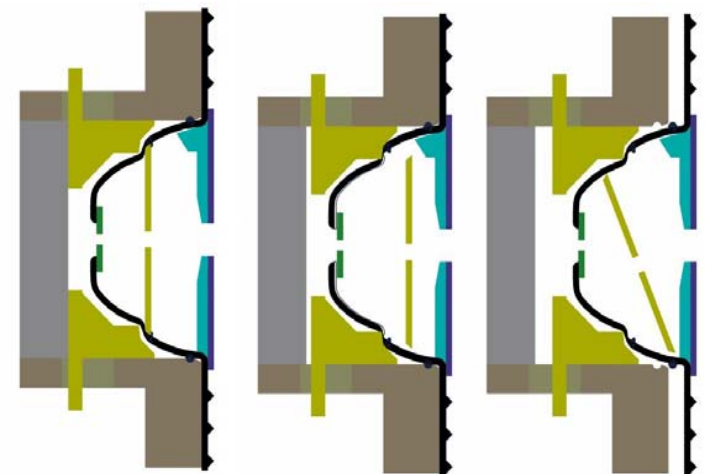
Felton Injectors



- Prototype Human Injector
 - 600 shots/hr
 - 0.5ml SC injection
 - Patent pending protector cap
 - Building prototype for trials

Felton's Protector Cap Technology (Pat. Pending)

- Single use protector is placed between the nozzle face and the skin
- Injection takes place through a film
- The protector contains any “splashback” from the injection
- There are 4 “challenges” to any fluid reaching the nozzle, including the film.
- Protector is inexpensive compared to needle and syringe
- Disposal is low energy and environmentally safe

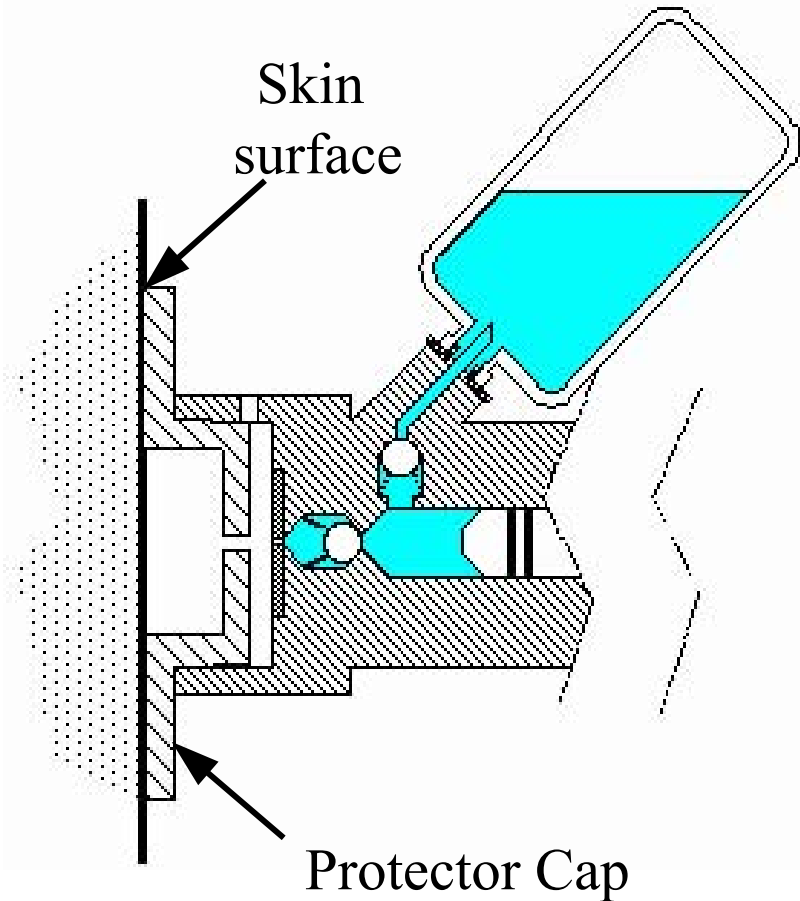


Designs in process / under consideration

- HuBChE Injector – DAMD17-03-C-0015
- Human Subcutaneous Injector – IRD
- Chemical burn treatment device – proposed
- Unit dose device - 1999 CDC SBIR Phase I

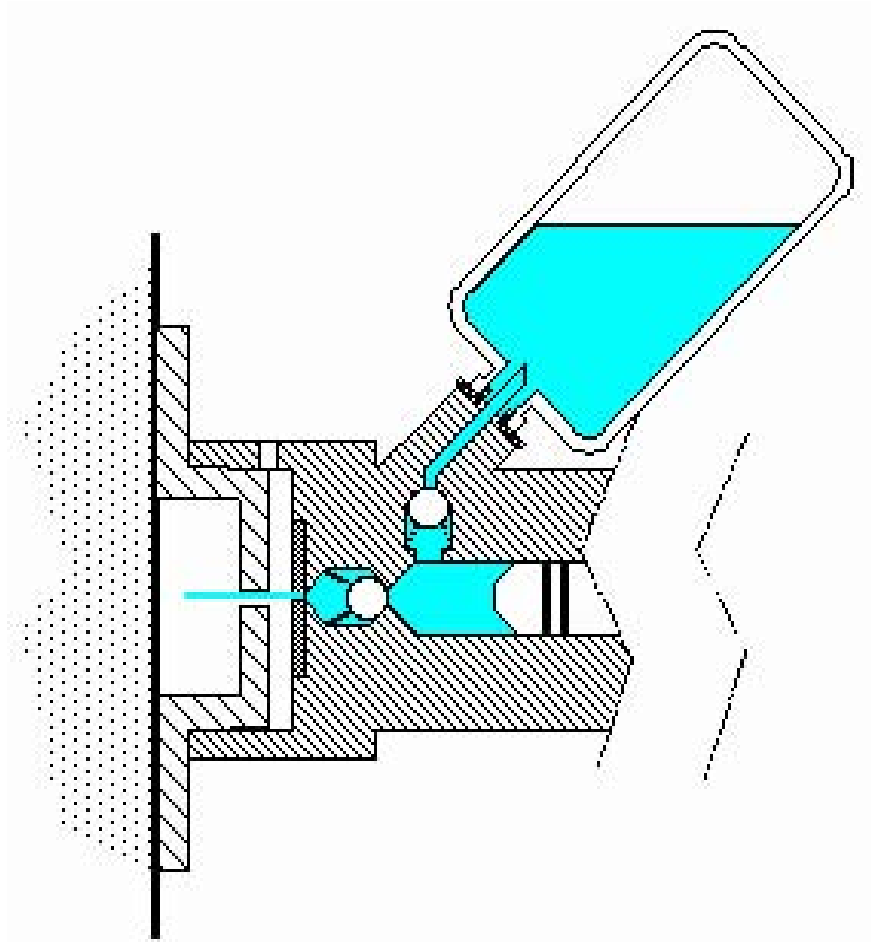
Protection; Theory of Operation - Step 1

- Protector Cap between nozzle exit and patient
- Multiple features
 - Air spaces /capillary breaks
 - Narrow passage
 - Focused stream
 - Sharp check valve cutoff



Protection;

Theory of Operation - Step 2

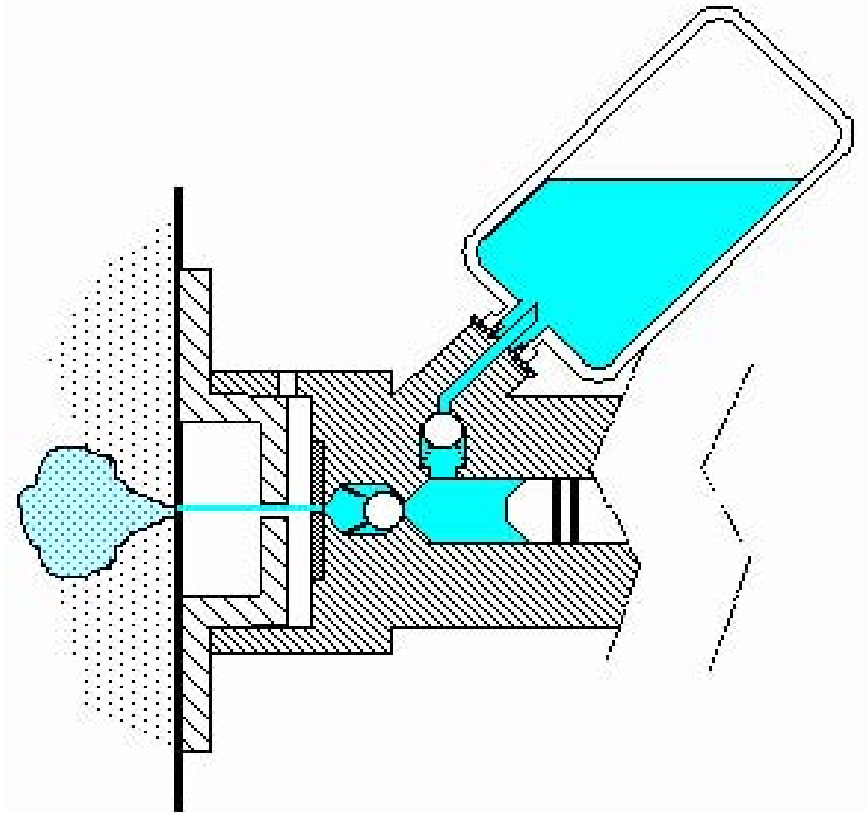


- Cocked & filled injector is ready with new protector cap
- Injector is positioned on patient
- Injector is fired

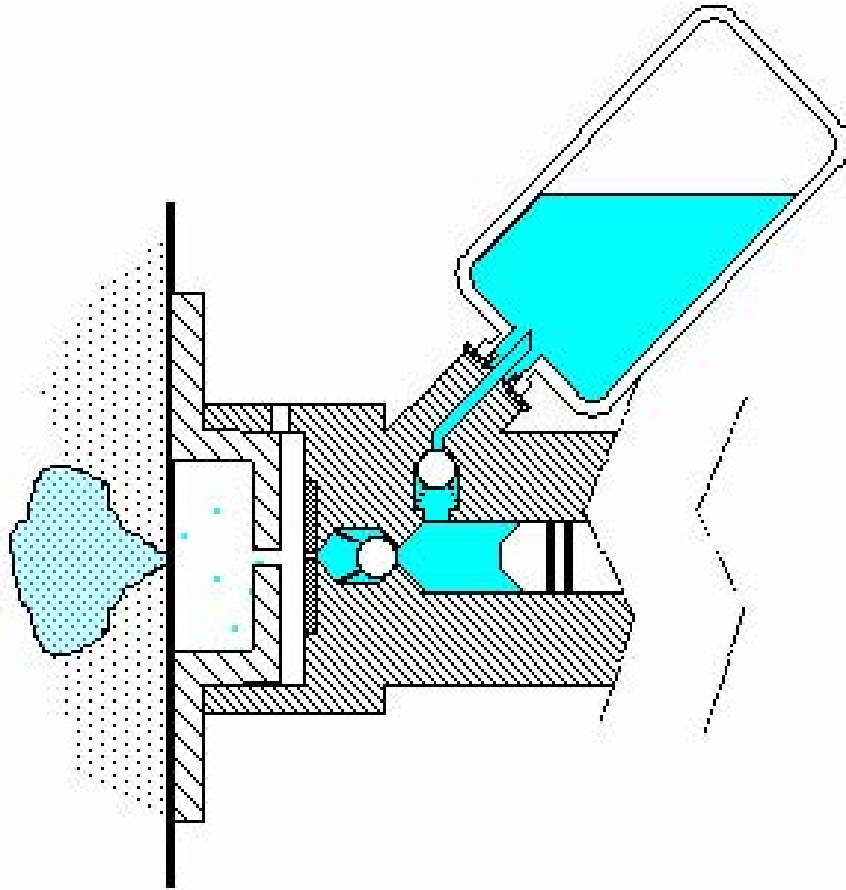
Protection;

Theory of Operation - Step 3

- Jet penetrates skin
- Jet disburses in subcutaneous layer
- At end of cycle as pressure drops, some material may splash back from injection site



Protection; Theory of Operation - Step 4



- Splash back is droplets
- Much lower energy levels
- Protector is a labyrinth
- Particles can not reach nozzle to contaminate subsequent injections