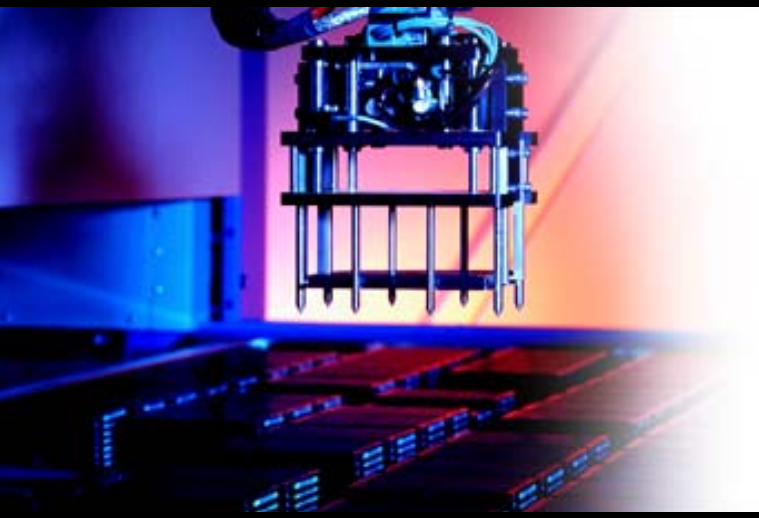


GenVault

Dry-State Biosample Management

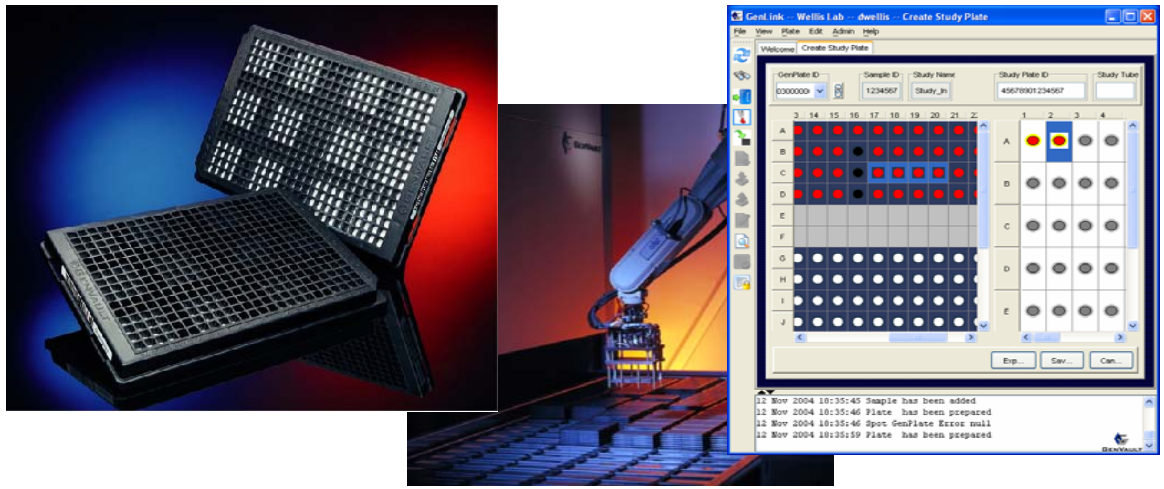
Typical Biosample Management

GenVault

GenVault's Alternative

GENVAULT

GenVault's Complete Solution



Consumables

- storage plate and recovery kits

Hardware

- Storage and sample handling equipment

Software

- Sample tracking, annotation and distribution

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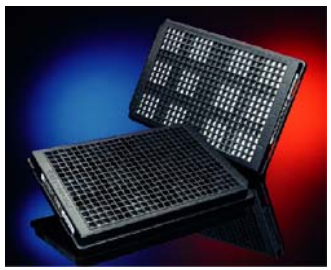
Biosample Management Workflow

Begin study

1

Receive Samples

2 Spot GenPlate



Archive Sample

3 Retrieve Sample

4 Assemble Study Plate

5 Recover DNA

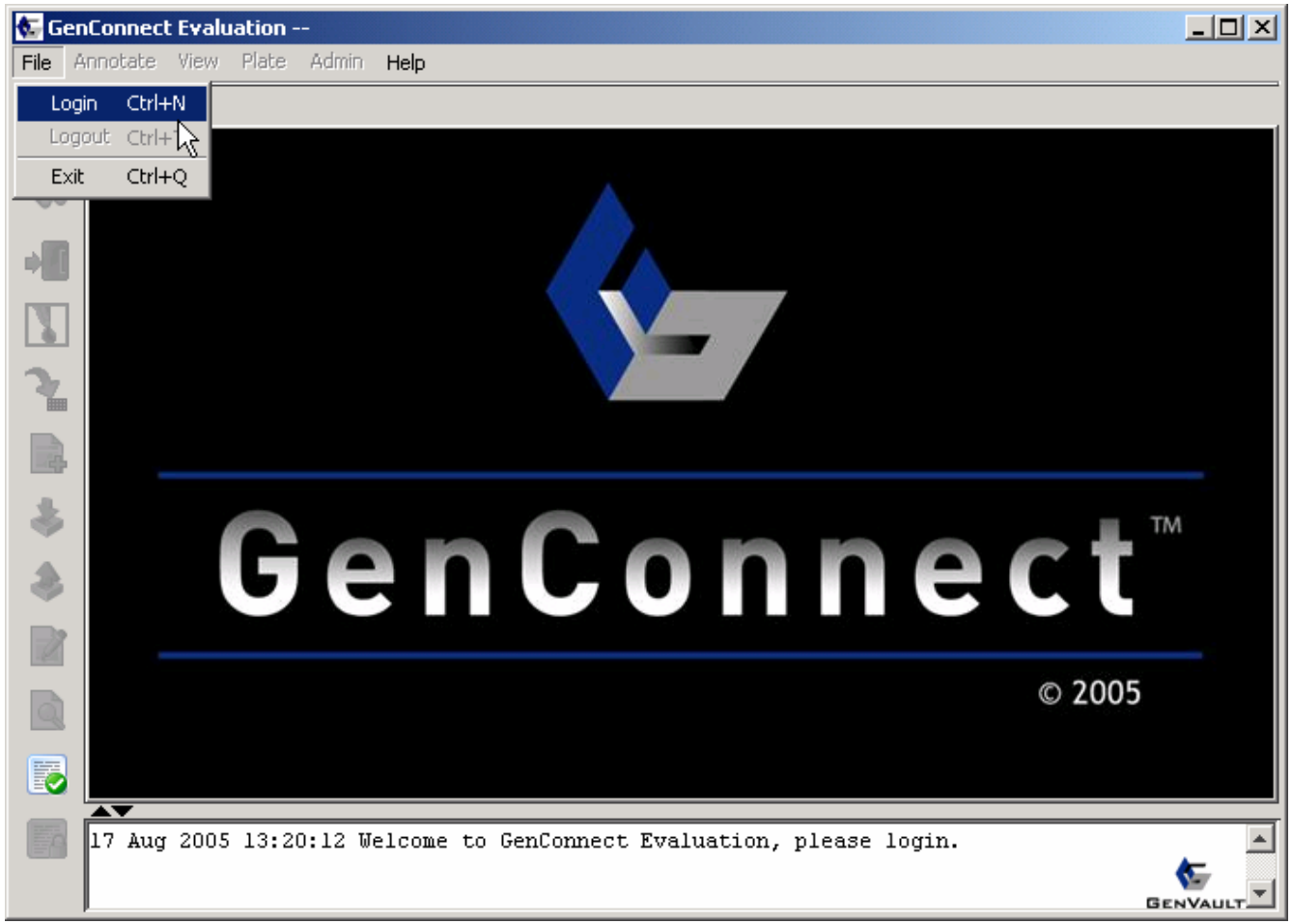
GenVault

1

Begin Study, Receive Samples

GenVault

GenConnect Login



- Web-based
- Oracle friendly
- Multiple authorization levels & roles

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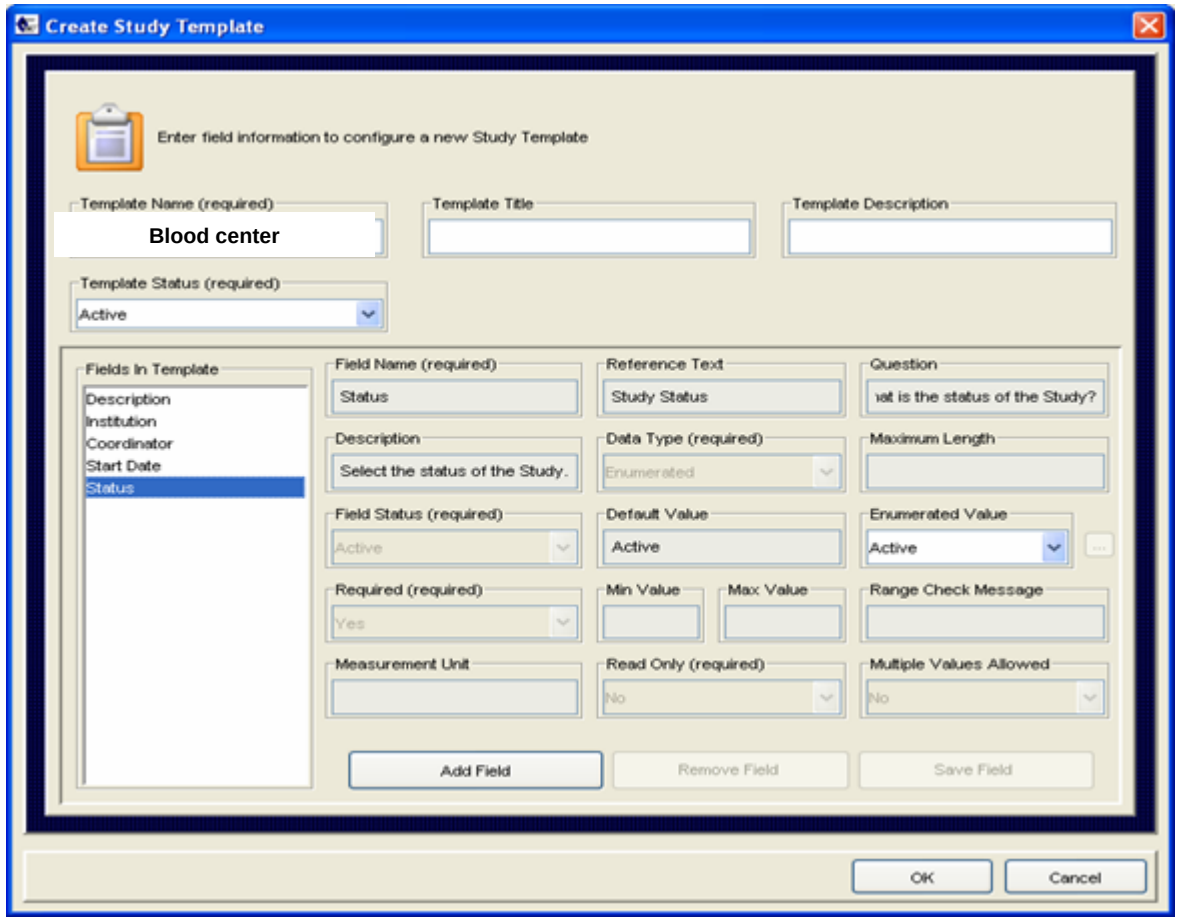
GenConnect: Template Generation

- Flexible and easy to use
- Generate custom reports



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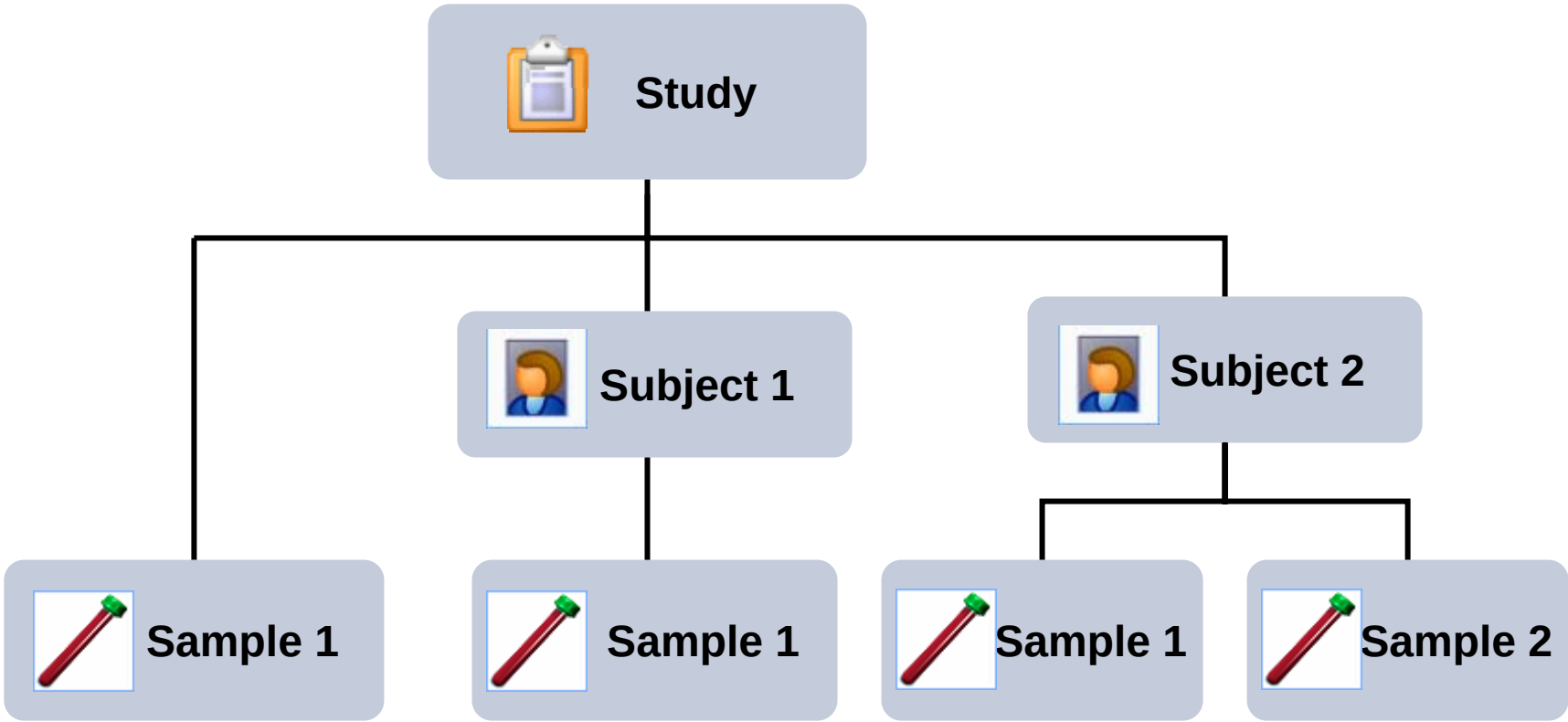
GenConnect: Inventory Tracking



Flexible design

GENVAULT

2

Spot GenPlate

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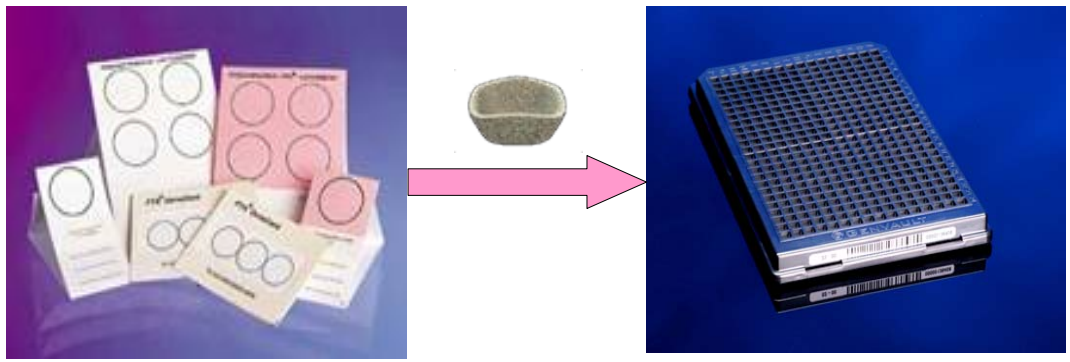
GenPlate: FTA goes Modern

Whatman FTA

- Isolate/preserve DNA for years (16 so far) at room temperature
- Conventional shipping methods, no biohazard

GenVault Innovation

- Pre-punching into plate
- GenCode sample tagging
- DNA recovery method



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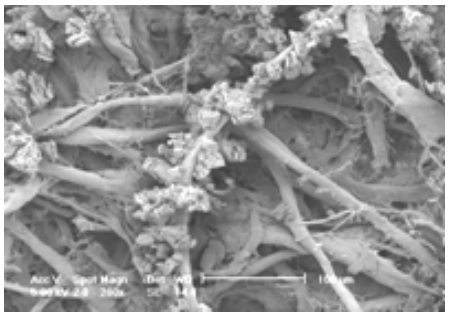
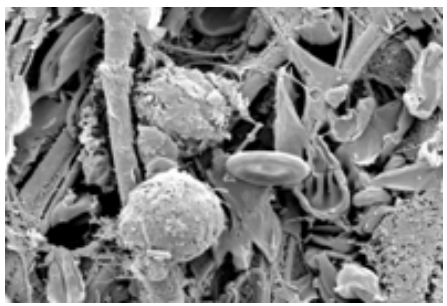
What is FTA?

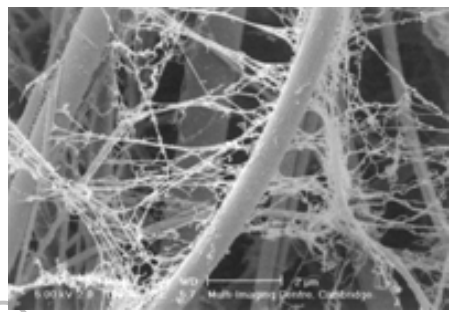
- Chemically-treated cellulose paper
- Guthrie card, S & S 903 ancestors



Before sample application

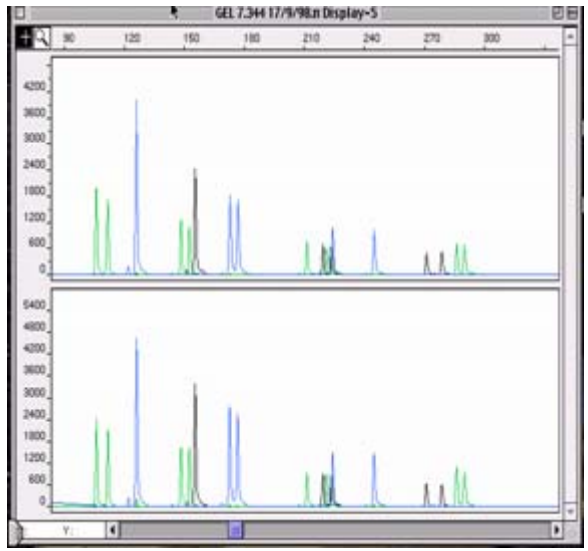


After blood application



After washing

- STR Analysis



Fresh blood

9 yrs at RT

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‘Container Identification’

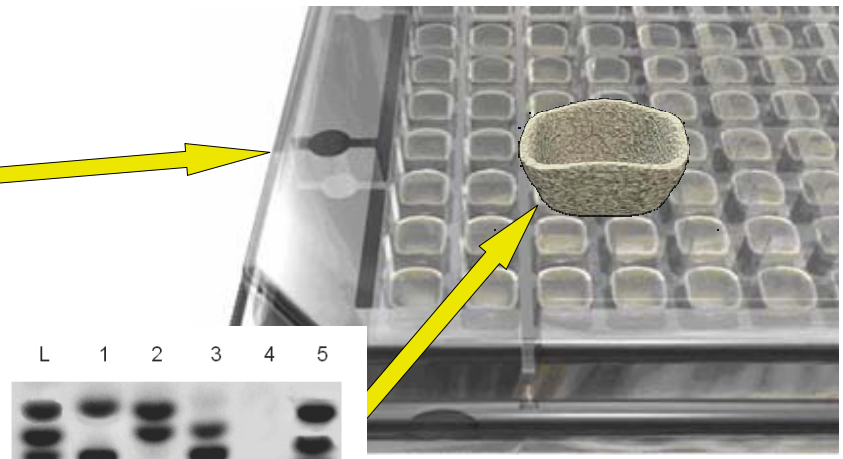
- Most often the container is labeled, not the actual contents.

- Once the sample is removed from the container, the chain of custody is broken.

GenVault

Dual Sample Identification

Barcode on each plate

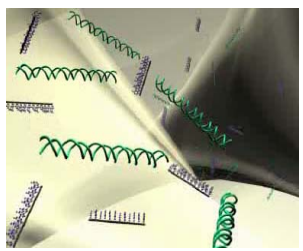


Code # 1

00101 10011 00110 11000 00111

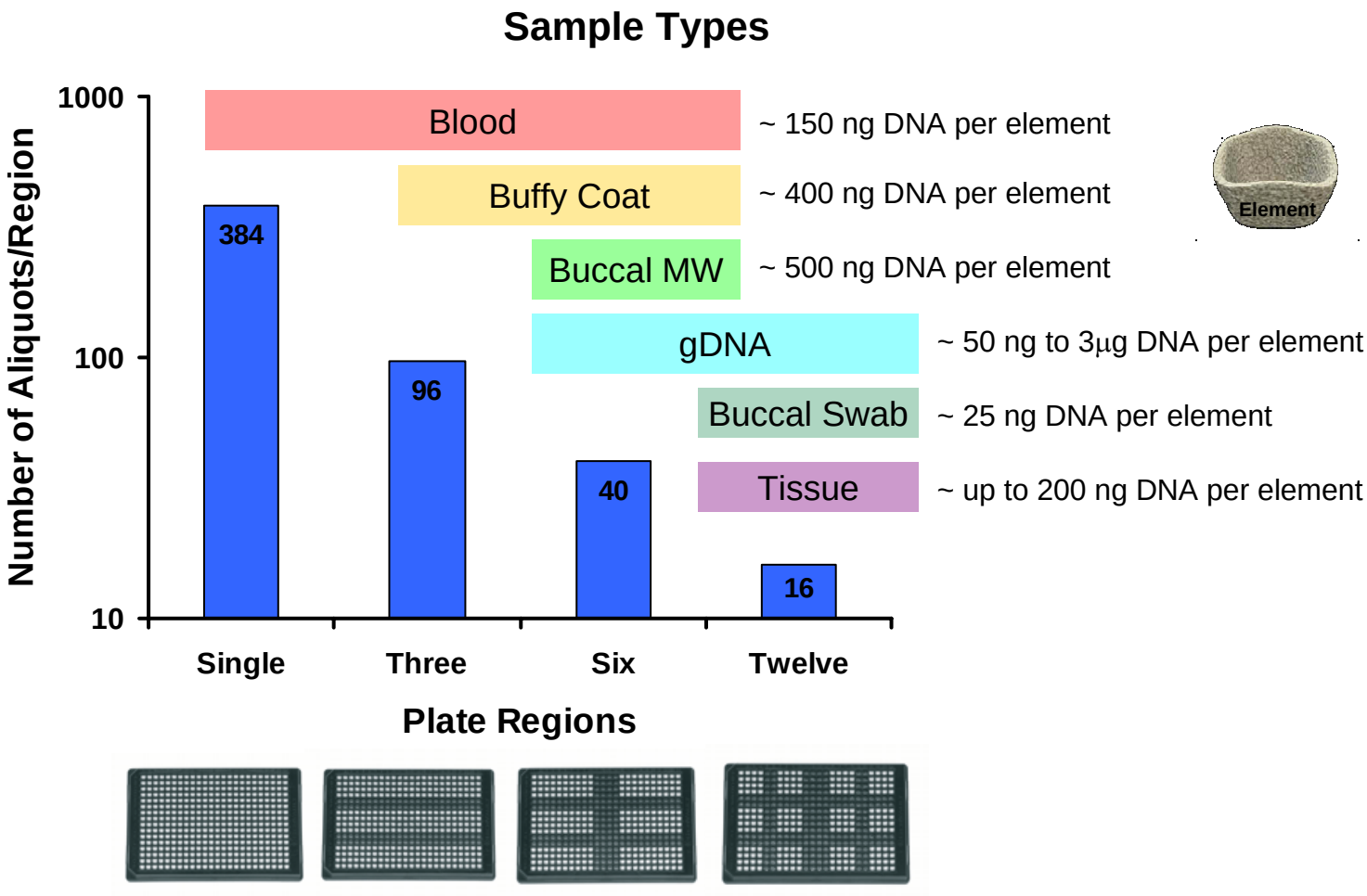
GenCode on each element

- Unbreakable ‘chain of custody’
- Co-migrates with sample DNA during downstream processing



GenVault

GenPlate and Sample Types



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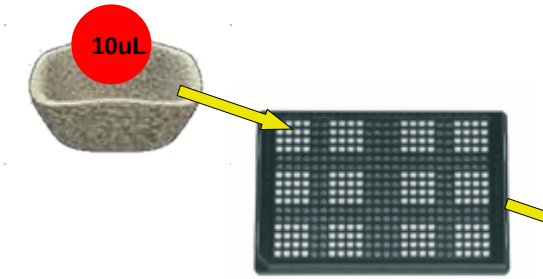
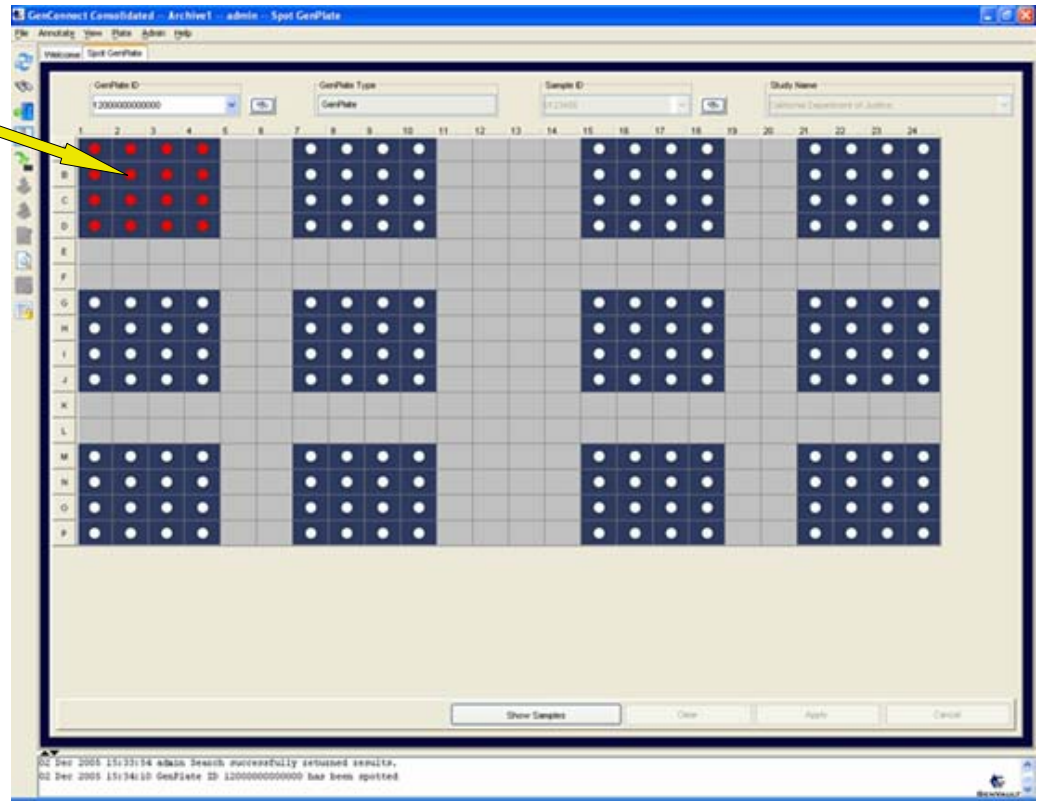
GenConnect: Spot GenPlate





- Sample tracking from point of collection
- Complete audit trail, records all transactions

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3

Archive Sample, Retrieve Sample

GenVault

GV Series – Desktop Archive

Capacity	100 GenPlates(100-1,200 samples)
Footprint	20”H x 20”W x 10”D
Viewing & access	One clear sealing cabinet door
Power requirements	Standard 120V
Portability	Desktop or Satellite
Humidity	Passive humidity control
Humidity Monitoring	Easy to read humidity monitor built into cabinet door

GENVAULT

GV Series – Personal Archive

Capacity	990 GenPlates(990-11,880 samples)
Footprint	81”H x 98”W x 30”D
Viewing and access	Three clear, locking cabinet doors
Power requirements	Standard 120V
Portability	Wheels allow for easy relocations
Software	Client/Server application compatible with Windows XP/2000
Computer	Dedicated server computer for database
Barcode scanner	Included, reads GenPlate barcodes
Air filtration	0.3 micron HEPA filter
Humidity Control	Optional attachment maintains optimal levels of humidity for GenPlate storage

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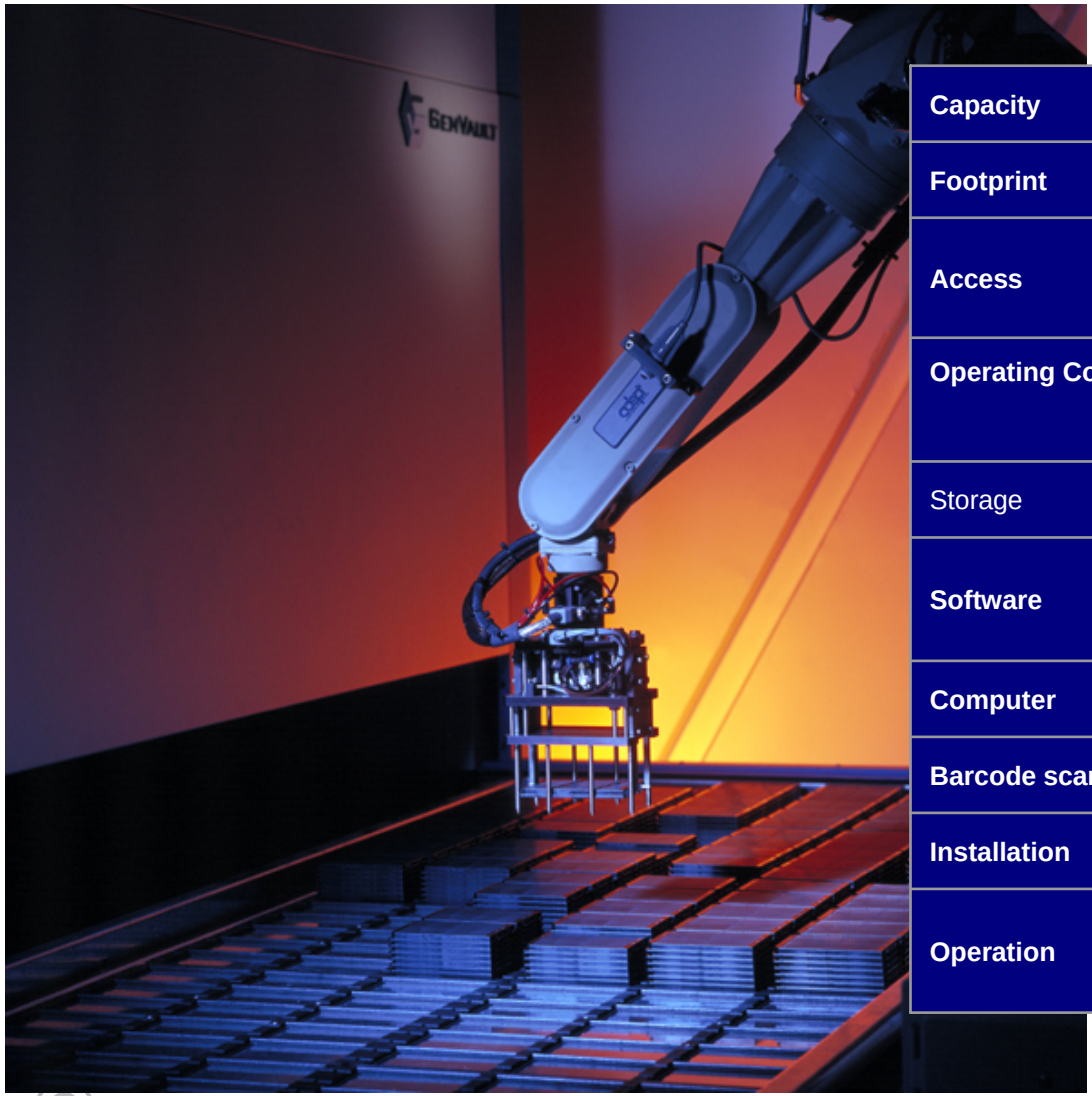
GV Series – Dynamic Archive



Capacity	Scalable (10,000 to millions of plates)
Footprint	Scalable (450sq vs. 20,000 sq.ft.)
Access	High throughput (300 plates/hour)
Operating Costs	Low operating costs (room temperature)
Storage	Handles multi-applications (DNA, proteins,…)
Software	Client/Server application compatible with Windows XP/2000
Computer	Dedicated server computer for database
Barcode scanner	Included, reads GenPlate barcodes
Installation	Installed in fireproof vault (class 125)
Operation	Industrial quality for 24/7 operation

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GV Series – Dynamic Archive

GV-100 – 400,000 plate capacity

Input and Output Stackers

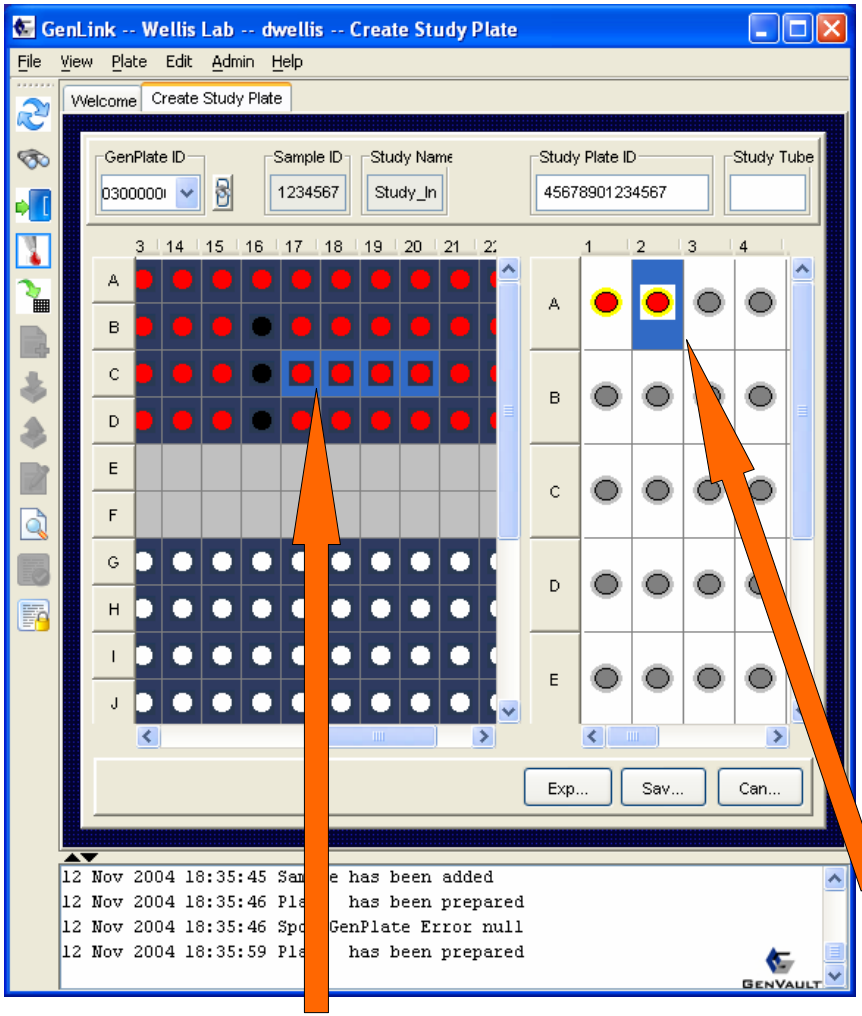
GenVault

4

Assemble Study Plate

GenVault

DNA Recovery (Study) Plate



- Create Study Plate
- Search samples based on annotations or barcode

Study Plate

Stored Samples

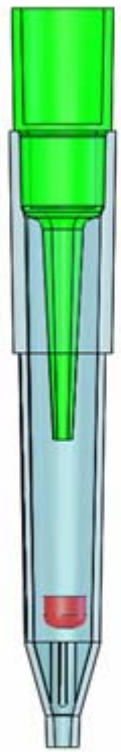
GENVAULT

Study Plate Assembly Station

- Automated plate identification via software
- Punch and compile a 96 well study plate under 60 minutes

GenVault

Element Recovery – Study Plate Assembly



Cap

Study Tube

Key Advantage:

- No chance for cross-contamination during recovery.

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5

Recover DNA

GenVault

DNA Recovery - GenSolve

SOAK ELEMENTS IN PROTEINASE K

DNA RECOVERY USING GENSOLVE REAGENTS

DNA PURIFICATION

SAMPLE READY FOR QUANTITATION AND DOWNSTREAM ANALYSIS

GENVAULT

GenVault Elution Stations

Automated Elution Station

Semi-automated

- Capacity
  1-96 samples
- Assay Time
  1.5 hours for 96 samples
- DNA Recovery Yield
  90-260ng/element

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Genvault vs. Whatman DNA Elution

- GenSolve elutes more DNA

Blood spots collected in the field from Tanzanian children. Collection & analysis University of Utah.

Whatman DNA Recovery

Sample	Concentration	Amount
A	0.08 ng/uL	2.75 ng
B	0.04 ng/uL	1.35 ng
C	0.11 ng/uL	3.75 ng
D	0.002 ng/uL	0.08 ng
E	0.01 ng/uL	0.37 ng

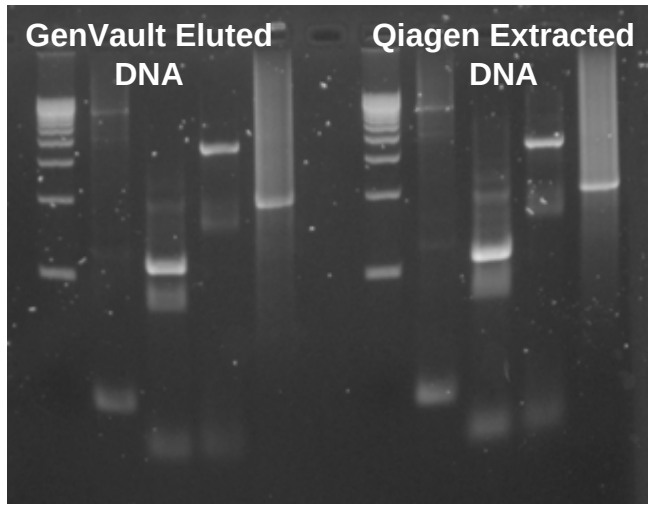
GenSolve DNA Recovery

Sample	Concentration	Amount
A	0.63 ng/uL	93.83 ng
B	0.38 ng/uL	56.53 ng
C	0.28 ng/uL	42.22 ng
D	0.21 ng/uL	30.96 ng
E	0.39 ng/uL	59.00 ng

GENVAULT

GenPlate DNA Quality

- Mostly double stranded DNA
  - Picogreen quantitation
- Large fragments (many Kb)
  - PCR up to 9.3Kb
  - PFGE shows >35Kb
- Compatible with downstream applications
  - WGA, Taqman
  - Genotyping
    - Illumina (Reproducibility >98%)
    - Affymetrix (10K SNP chip)



Lanes 1 and 7; 500bp ladder, Lanes 2-5 are amplicons from GenVault eluted DNA and lanes 8-11 are amplicons from Qiagen extracted DNA. Lanes 2 and 8; 110bp amplicon, Lanes 3 and 9; 558bp amplicon, Lanes 4 and 10; 1764bp amplicon and lanes 5 and 11; 1Kbp amplicon. Products were amplified using one universal PCR protocol. 5ng of dsDNA was added to each reaction. Gel is 1% agarose, run at 120V for 45 min and stained with EtBr.

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Affymetrix SNP Analysis

	GenSolve	QIAamp
Average Call Rate	97%	97%
% Concordant Calls Between Replicates	99.7%	100%
% Concordant Calls Between Samples	100%	

1. Blood sample applied to a GenPlate
   - DNA recovered from FTA elements using the GenSolve Recovery Kit
2. Same blood sample & extracted DNA using the QIAamp Mini Blood Kit.
3. All samples, in triplicate, submitted to the Expression Analysis* for SNP analysis using the Affymetrix 10K chip.

** Expression Analysis, Durham, NC*

GENVAULT

New: Application of purified genomic DNA

- When purified genomic DNA is applied to FTA, it is difficult to recover
- GenVault has developed a modification to the FTA paper that facilitates the recovery of >80% of the genomic DNA

MIX ELEMENTS IN RECOVERY SOLUTION A

REPEAT PREVIOUS STEP TWICE THEN CENTRIFUGE

COMBINE ALL SOLUTIONS & ADD RECOVERY SOLUTION B

ULTRAFILTRATION

GenVault

New: Protocol for Paraffin Tissue Samples

307M tissue samples are archived in the US, growing at an annual rate of 20M samples (RAND, 2004)

- Feasibility established at M.D. Anderson and VA Hospital
- Direct thermal extraction of DNA
- Direct transfer of fluidized DNA to GenPlate
- Room temperature storage
- Supports: PCR up to 500bp, WGA (GenomePlex), Single allele genotyping, Illumina genotyping

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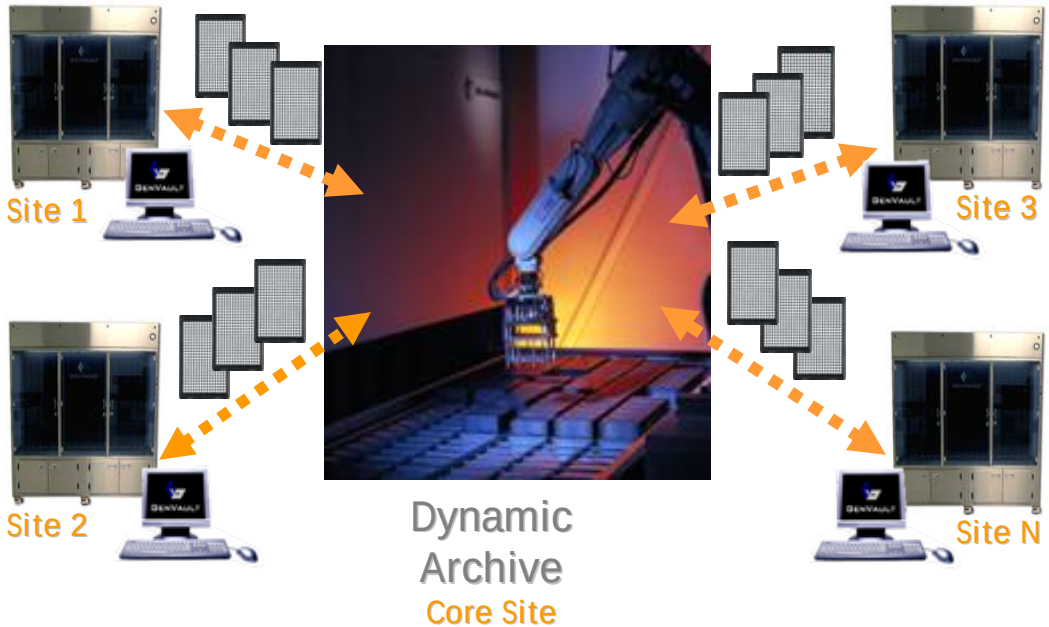
Benefits of GenVault Solution



Net-workable for linking sites and creating a ‘virtual archive’
GenCode- Lifetime sample tracking
Scalable design
Easy Access to High quality DNA ready for analysis
Biohazard free enables conventional shipping
Room temperature **enables** long term storage

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