MILESTONE
HELPING PATIENTS

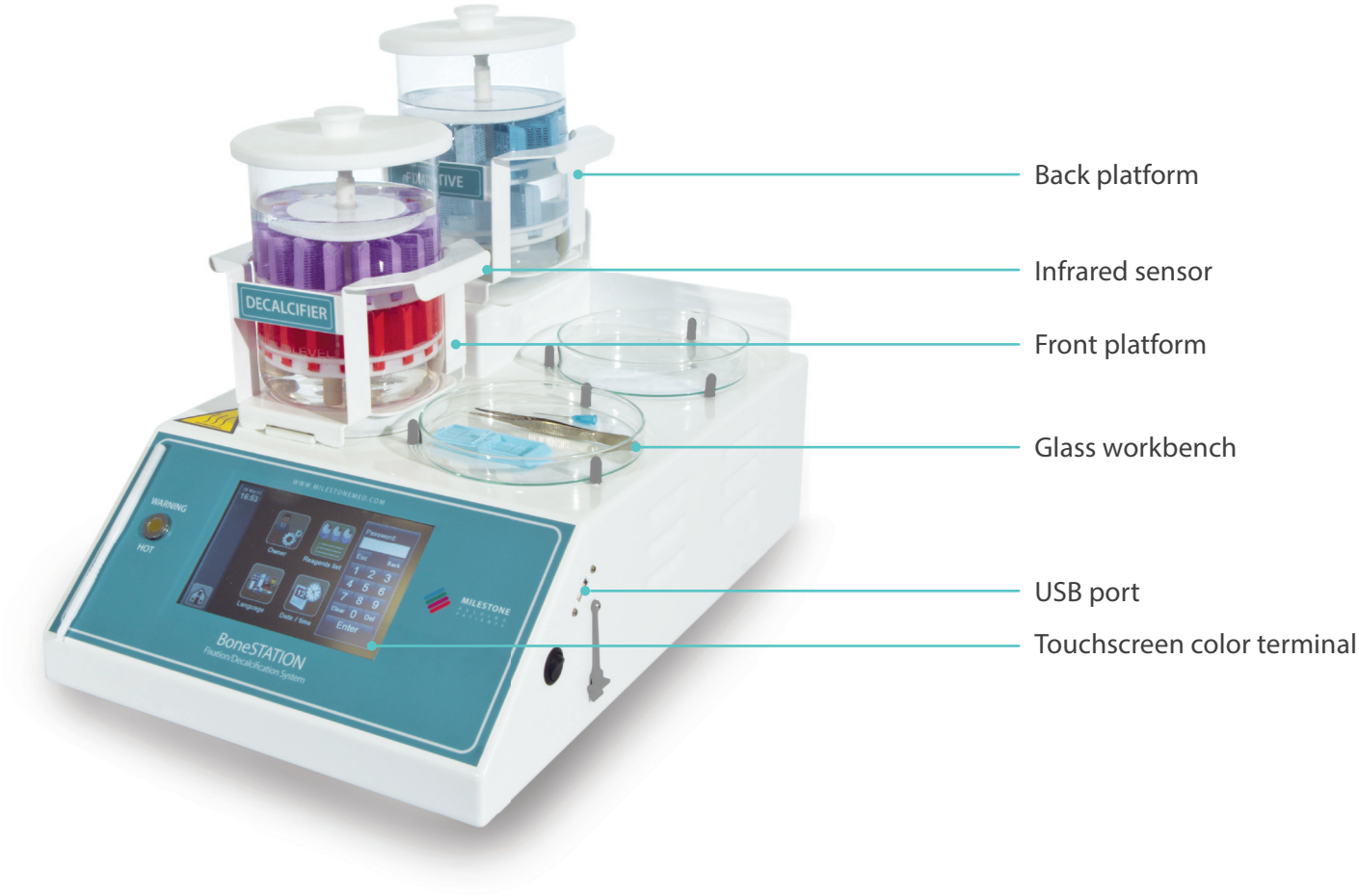
OPTIMIZE AND SPEED UP BONE MARROW DECALCIFICATION

BoneSTATION

Advanced System for Fixation and Decalcification of Bone Tissues

OPTIMIZE AND STANDARDIZE THE DECALCIFICATION PROTOCOLS

BoneSTATION is an innovative workstation for complete control of the all important pre-analytical step.
It provides accurate, reliable diagnostic results for morphology and molecular studies.



The BoneSTATION consists of two work platforms complete with glass modules for fixation/decalcification.

» The front platform features a heating plate with infrared sensor for automatic temperature control up to 50°C and magnetic stirring.
» The back platform has built-in magnetic stirring only.
» Two user-friendly glass containers, for easy handling of bone specimens, complete the unit.

The BoneSTATION can be used with any type of fixative/decalcifier, even with strong mineral acids (HCl - HNO_3), as all contact surfaces are either glass or PTFE polymer.

» The magnetic stirrer assures homogeneity of temperature throughout the solution.
» The PTFE cover condenses vapors, generating a reflux of the reagent for consistent and safe protocols at constant pH.
» A touchscreen terminal allows the user to optimize, standardize and fully document all the processes.

THIS IS HOW DECALCIFICATION SHOULD BE

All major parameters influencing the pre-analytical steps can be controlled, optimized and documented.

TEMPERATURE

Fixation and decalcification temperature can be set between 20-55°C for optimization of the process.

AGITATION (MAGNETIC STIRRING)

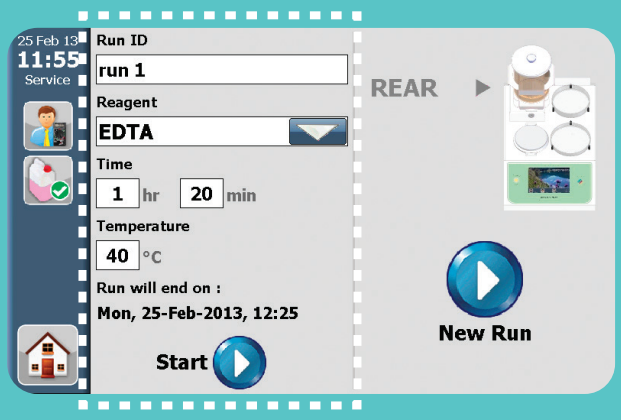
The calcium ions that have been removed can saturate the solution around the specimen. Continuous stirring assures a consistent flow of fresh decalcifier onto the bone surface, accelerating the decalcification process.

$$(\text{Bone})\ Ca^{++} \rightleftharpoons Ca^{++}(\text{Solution})$$

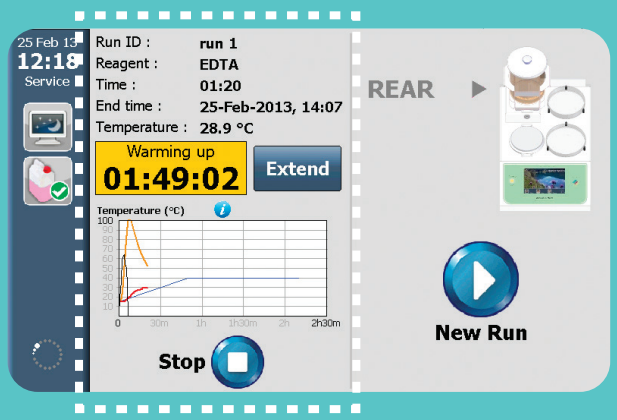
REAGENTS

All product surfaces involved in the process circuits are compatible with the following reagents:

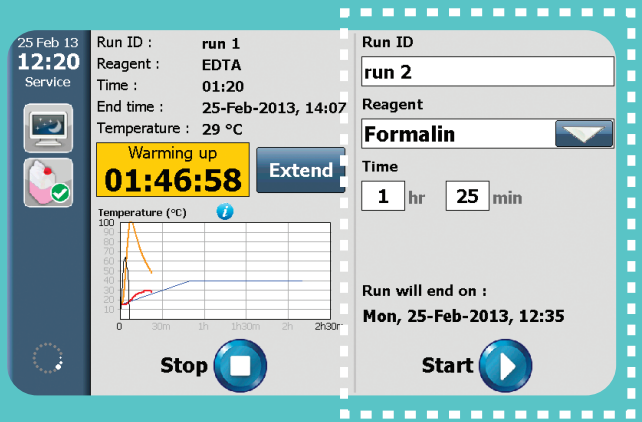
FIXATIVES	DECALCIFICATION SOLUTIONS	
• FineFIX • Formalin	• EDTA 20% at max 50°C • Formic acid 20% at max 50°C • Acetic acid 20% at max 50°C	• Hydrochloric acid 10% at max 37°C • Nitric acid 10% at max 37°C • Trichloroacetic acid 10% at max 37°C



1 - Setting up decalcification protocol



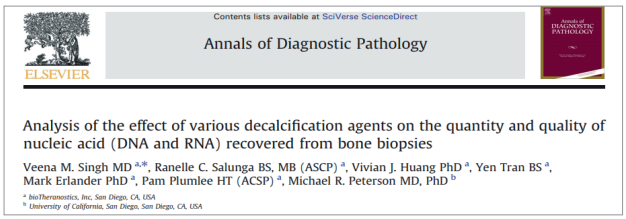
2 - Running a decalcification protocol with temperature curve



3 - Setting up a fixation protocol

4 - Running of simultaneous fixation/decalcification protocols

DECALCIFICATION OF BONE MARROWS


Contents lists available at SciVerse ScienceDirect

Annals of Diagnostic Pathology

ELSEVIER

Analysis of the effect of various decalcification agents on the quantity and quality of nucleic acid (DNA and RNA) recovered from bone biopsies

Veena M. Singh MD [a,*], Ranelle C. Salunga BS, MB (ASCP) [a], Vivian J. Huang PhD [a], Yen Tran BS [a], Mark Erlander PhD [a], Pam Plumlee HT (ACSP) [a], Michael R. Peterson MD, PhD [b]

[a] bioTheranostics, Inc, San Diego, CA, USA
[b] University of California, San Diego, San Diego, CA, USA

Recent reports have systematically studied the effects of a spectrum of decalcifier agents on the quantities and quality of RNA and DNA recovered from bone biopsies. Reports concluded that there was a **significant decrease in both RNA and DNA yield and integrity with strong acids** (hydrochloric, nitric) versus 12,5-14% EDTA and formic acid. They also concluded that the preferred decalcifier agents to optimize quantity and quality nucleic acids recovery from bone biopsies specimens are those that contain either 14% EDTA or formic acid as sole agent or in combination.

FIXATIVES	DNA - YIELD (NG)	RNA - YIELD (NG)	DECAL TIME
14% EDTA	67.8	226.2	2 hours
Formic	41.5	175.0	2 hours
HNO_3	11.4	51.7	2 hours
HCL/EDTA	5.3	30.5	2 hours

"Analysis of the effect of various decalcification agents on the quantity and quality of nucleic acid (DNA and RNA) recovered from bone biopsies" - Veena M. Singh et al. (2013).

SPEED UP THE DECALCIFICATION PROCESS

For faster decalcification time, the process with EDTA is best carried out at a pH value of 7.2-7.4. Milestone has developed MoL-DECALCIFIER: an innovative, pure EDTA solution, based on a stoichiometric mixture of bibasic and tribasic EDTA to reach this pH value without the addition of an acid/base buffer. The combination of increased temperature, stirring and MoL-DECALCIFIER solution during the decalcificacion phase allows fixation, decalcification and processing of bone marrows within 48 hours.

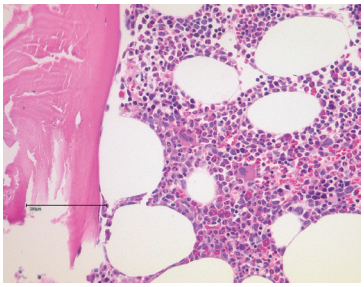
FIXATION	DECALCIFICATION	TEMPERATURE	TOTAL TIME
Formalin 10%	**MoL-DECALCIFIER**	°C	Fixation + Decalcification
4h	36h	27	40h
1h 30'	16h 30'	37	18h
1h	4h	50	5h

Formalin 10%	**Formic 10%**	°C	Fixation + Decalcification
4h	4h	27	8h
1h 30'	1h 30'	37	3h
1h	4h	50	2h

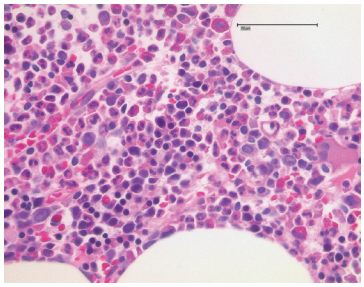
BoneSTATION typical protocols for bone marrows (Ø 1.8mm)

OPTIMIZED MOLECULAR RESULTS

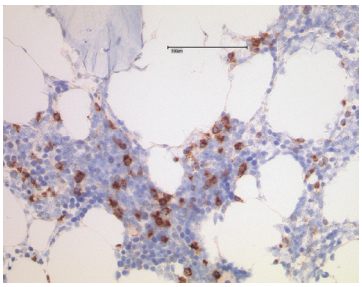
A presentation* during the "First Symposium on Pre-analytic of Pathological Specimens - Berlin March 2013" reported the first results on H&E, IHC, FISH and molecular using the Milestone decalcifying solution MoL-DECALCIFIER on bone marrow trephine biopsies.



H&E MoL-DECALCIFIER

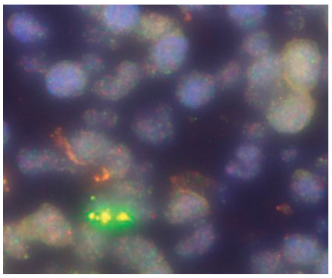


H&E MoL-DECALCIFIER

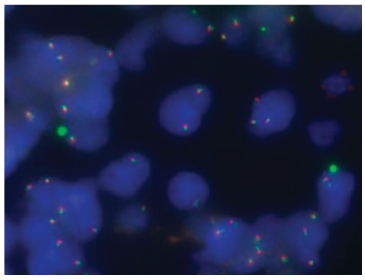


CD138 MoL-DECALCIFIER

FISH (BCL6 BREAK APART PROBE, ABBOTT)



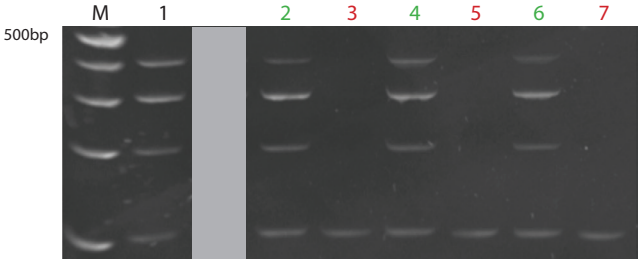
Conventional



MoL-DECALCIFIER

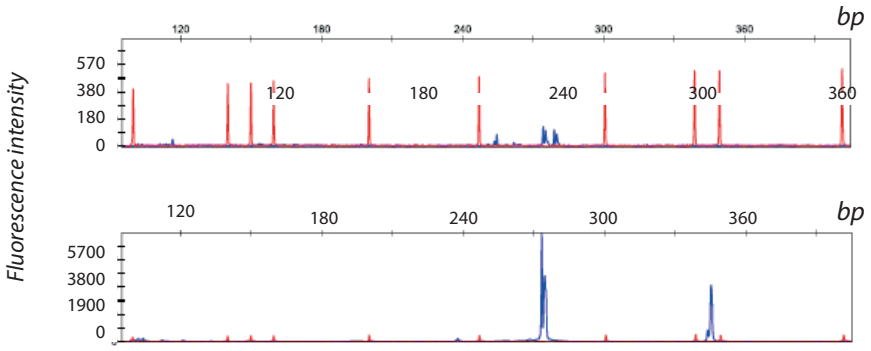
QUALITY CONTROL-PCR

Control multiplex-PCR: amplification of different-sized genomic segments (100, 200, 300, 400 bp) harboring single-copy genes (Biomed-2).



M: size standard.
1: Tonsil conventional
2, 4, 6: MoL-DECALCIEFIER
3, 5, 7: Conventional

IMMUNGLOBULIN HEAVY CHAIN GENE (IGH) REARRANGEMENT (FRAMEWORK 2)



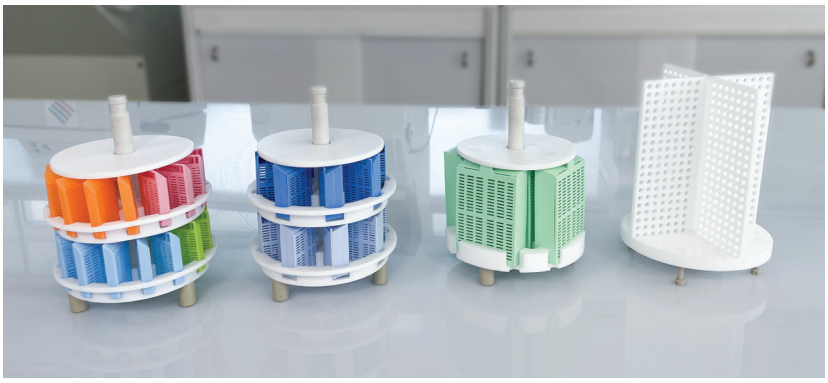
Conventional

Milestone MOL-DECALCIFIER

__Bone marrow work-up,__ Ioannis Anagnostopoulos Institute for Pathology Charité – Campus Mitte, Berlin Germany

DEDICATED CONFIGURATIONS TO FIT EVERY NEED

Four acid resistant rack configurations with built-in stirring bar are available to fulfill all specimen sizes:



» Rack for **30 standard** cassettes
» Rack for **16 mega** cassettes
» Rack for **6 supermega** cassettes
» Rack with **internal divider**

MILESTONE'S SOLUTIONS FOR DECALCIFICATION

DecalMATE

Automatic Fixation and Decalcification System for Bone Tissues

KOS

The Multifunctional Microwave Tissue Processor

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Milestone is a company headquartered in Northern Italy and was founded in 1988 as a corporation specializing in advanced microwave instrumentation for analytical and organic chemistry labs. As the technology leader in pre-analytical instrumentation, Milestone supports a worldwide installed base of over 25.000 systems. In 1994, Milestone established a separate Medical Division to expand our expertise in the crucial pre-analytical phase to the world of histopathology. We pioneered the first microwave rapid tissue processor for same day diagnosis and the first macro-digital system to enhance the grossing step. Today, our rapid tissue processors, macro-digital imaging systems, and pre-analytical instrumentation are used every day in the most renowned clinical and research laboratories around the world. But we never stop. We continue to lead the industry with constant innovation and improvement. Driven by the leading principle we live by, Helping patients.

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